

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belagavi)



**Autonomous programme
Bachelor of Engineering**



**DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING**

**SCHEME and SYLLABUS
(2024-25 Admitted Batch)**

Academic Year 2024-2028

VISION

To become a prominent department of Computer Science & Engineering producing competent professionals with research and innovation skills, inculcating moral values and societal concerns.

MISSION

1. Impart world class engineering education to produce technically competent engineers.
2. Provide facilities and expertise in advanced computer technology to promote research.
3. Enhance Industry readiness and entrepreneurial abilities through innovative skills
4. Nurture ethical values and social responsibilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO 1 : Graduates will be efficient software developers in diverse fields and will be successful professionals and/or pursue higher studies.
- PEO 2 : Graduates will be capable to adapt to new computing technology for professional excellence and Research and will be lifelong learners.
- PEO 3 : Graduates will work productively exhibiting ethical qualities for the betterment of society.
- PEO 4 : Graduates will possess leadership qualities, work harmoniously in a team with effective communication skills.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, natural science, computing engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
3. **Design/development of solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
4. **Conduct investigations of complex problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
5. **Engineering tool usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
6. **The engineer and the world:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
7. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
8. **Individual and collaborative team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary settings.
9. **Communication:** Communicate effectively and inclusively within the community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
10. **Project management and finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAM SPECIFIC OUTCOMES (PSOs)

Upon graduation, students with a degree B.E. in Computer Science & Engineering will be able to:

PSO – 1: To make the students industry ready by facilitating them with software tools in recent technologies

PSO – 2: To develop IT based solutions for problems in diverse domains

Malnad College of Engineering, Hassan

I year scheme and syllabus (2024-25)

I Semester: PHYSICS CYCLE STREAMS: E&CE, Civil, CS&E								
Sl.No	Course Code	CourseTitle	DEPT.	Teaching Hours/Week			Credits	Contact Hours
				L	T	P		
1	MAT4C11/ MAT4S11/ MAT4E11	Mathematics for CV/CS/ECStream-I	Mathematics	3	1	2	04	06
2	PHY4C12/ PHY4M12/ PHY4E12	Physics for CV/ME/EC stream	Physics	3	1	2	04	06
3	CIV413/ BEE413 / PPC413	Engg. Mechanics/Basic Electronics/ Principles of Programming using C	CV/EC/CS	3	0	0	03	03
4	ESC414x	Engineering Science Course-I	Respective Engg. department	3	0	0	03	03
5	ETC415x	Emerging Technology Course	Any department	3	0	0	03	03
6	ENG416	Communicative English	Humanities	1	0	0	01	1
7	KSK417/ KBK417	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	01	1
8	IDT418	Innovation and Design Thinking	Mechanical (Coordinating Dept)	0	0	2	01	2
TOTAL				16	04	06	20	

Malnad College of Engineering, Hassan

I year scheme and syllabus (2024-25)

I semester: CHEMISTRY CYCLE STREAMS: Electrical, Mechanical, IS&E, CSBS, AIML								
Sl.No	Course Code	Course Title	DEPT.	Teaching Hours/Week			Credits	Contact hours
				L	T	P		
1	MAT4S11	Mathematics for CSE Stream	Mathematics	3	1	2	04	06
2	CHE4S12	Chemistry for CSE Stream	Chemistry	3	1	2	04	06
3	CED413	Computer-Aided Engineering Drawing	ME	2	0	2	03	04
4	ESC414x	Engineering Science Course-I	Respective Engg. department	3	0	0	03	03
5	PLC415x	Programming Language Course	MECH	2	0	2	03	04
6	ENG416	Communicative English	Humanities	1	0	0	01	01
7	ICO417	Indian Constitution	Humanities	1	0	0	01	01
8	SFH418	Scientific Foundations of Health	Sports	0	0	2	01	02
TOTAL				16	2	08	20	

Malnad College of Engineering, Hassan

I year scheme and syllabus (2024-25)

(ESC-I) Engineering Science Courses-I	
Code	Course Title
ESC4141	Introduction to Civil Engineering
ESC4142	Introduction to Electrical Engineering
ESC4143	Introduction to Electronics Engineering
ESC4144	Introduction to Mechanical Engineering
ESC4145	Introduction to C Programming

(ETC-I) Emerging Technology Courses-I		
Code	Title	Offering Department
ETC415E	Renewable Energy Sources	Electronics and Electrical Engineering
ETC415F	Waste Management	Civil Engineering
ETC415H	Introduction to Internet of Things (IOT)	Electronics and Communication
ETC415I	Introduction to Cyber Security	Computer Science and Engineering
(PLC-I) Programming Language Courses-I		
PLC415B -Introduction to Python Programming		Mechanical Engineering

Malnad College of Engineering, Hassan
I year scheme and syllabus (2024-25)

II Semester: PHYSICS CYCLE STREAMS: Electrical, Computer Science, Mechanical								
Sl.No	Course Code	Course Title	DEPT.	Teaching Hours/Week			Credits	Contact hours
				L	T	P		
1	MAT4S21/ MAT4E21/ MAT4M21	Mathematics - II for ME/CS/EE Stream	Mathematics	3	1	2	04	06
2	PHY4S22/ PHY4E22/ PHY4M22	Physics for ME/CS/EE	Physics	3	1	2	04	06
3	PPC423/ EME423/ EEE423	Principles of Programming Using C Elements of Mechanical Engineering Elements of Electrical Engineering	CS/ME/EE	2 3 3	0 0 0	2 0 0	03	04
4	ESC424x	Engineering Science Course-II	Respective Engg. department	3	0	0	03	03
5	ETC425x	Emerging Technology Course	Any department	3	0	0	03	03
6	PWS426	Professional Writing Skills in English	Humanities	1	0	0	01	01
7	KSK427/ KBK427	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	01	01
8	IDT428	Innovation and Design Thinking	Physics (Coordinating Dept)	0	0	2	01	02
TOTAL				19	02	08	20	

Malnad College of Engineering, Hassan

I year scheme and syllabus (2024-25)

II Semester: CHEMISTRY CYCLE STREAMS: Electronics, Computer Science and Civil								
Sl.No	Course Code	Course Title	DEPT.	Teaching Hours/Week			Credits	Contact hours
				L	T	P		
1	MAT4C21/ MAT4S21/ MAT4E21	Mathematics for CV/CS/EC Stream-II	Mathematics	3	1	2	04	06
2	CHE4C22/ CHE4M22/ CHE4E22	Chemistry for CV/CS/EC Stream	Chemistry	3	1	2	04	06
3	CED423	Computer-Aided Engineering Drawing	MECH	2	0	2	03	03
4	ESC424x	Engineering Science Course-II	Respective Engg. department	3	0	0	03	03
5	PLC425x	Programming Language Course	MECH	2	0	2	03	04
6	PWS426	Professional Writing Skills in English	Humanities	1	0	0	01	01
7	ICO427	Indian Constitution	Humanities	1	0	0	01	01
8	SFH428	Scientific Foundations of Health	Sports	0	0	2	01	02
TOTAL				19	02	08	20	

1st Year HOD
Dr.Kalavathi G K

Malnad College of Engineering, Hassan
I year scheme and syllabus (2024-25)

(ESC-II) Engineering Science Courses-II	
Code	Course Title
ESC4241	Introduction to Civil Engineering
ESC4242	Introduction to Electrical Engineering
ESC4243	Introduction to Electronics Engineering
ESC4244	Introduction to Mechanical Engineering

(PLC-II) Programming Language Courses-II	
Code	Course Title
PLC425B	Introduction to Python Programming

(ETC-II) Emerging Technology Courses-II	
Code	Title
ETC425E	Renewable Energy Sources
ETC425F	Waste Management
ETC425I	Introduction to Cyber Security

Ist Year HOD
Dr.Kalavathi G

THIRD SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	BSC	24MA301	Mathematics for Computer Science	3	2	0			50	50	100	4
2.	PCC	24CS302	Digital Design and Computer Organization	42	0	28	50	120	50	50	100	4
3.	PCC	24CS303	Operating Systems	42	0	28	50	120	50	50	100	4
4.	PCC	24CS304	Data Structures and its Applications	42	0	0	48	90	50	50	100	3
5.	PCC	24CS305	Data Structures Laboratory	0	0	28	2	30	50	50	100	1
6.	(ESC/ETC/PLC)	24CS306X	Engineering Science Course (ESC/ETC/PLC)	28	0	28	34	90	50	50	100	3
7.	AEC	24CS307X	Ability Enhancement Course	0	0	28	2	30	50	50	100	1
8.	UHV	24SCR	Social Connect and Responsibility	0	0	28	2	30	50	50	100	1
9.	BSC	24BCM301	Bridge Course Mathematics -I (Mandate Non-Credit Course)	42	0	0	0	42	-	-	-	AUDIT
10.	MC	24NYP1	NSS, YOGA, PE	0	0	28	0	28	-	-	-	AUDIT
	Total											21

Engineering Science Course (ESC/ETC/PLC)		
ESC/ETC/PLC	24CS306A	OOP with Java
ESC/ETC/PLC	24CS306B	OOP with C++

Ability Enhancement Course		
AEC	24CS307A	R Programming
AEC	24CS307B	Data Analytics with Excel
AEC	24CS307C	Data Visualization with Python
AEC	24CS307D	Version Controller with GiT

FOURTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	PCC	24CS401	Design and Analysis of Algorithms	56	0	0	64	120	50	50	100	4
2.	IPCC	24CS402	Microcontroller and Embedded Systems	42	0	28	50	120	50	50	100	4
3.	IPCC	24CS403	Database Management Systems	42	0	28	50	120	50	50	100	4
4.	PCC	24CS404	Algorithms Laboratory	0	0	28	2	30	50	50	100	1
5.	PCC	24CS405	Unix and Shell Programming Laboratory	0	0	28	2	30	50	50	100	1
6.	ESC/ETC/PLC	24CS406X	Engineering Science Course (ESC/ETC/PLC)	42	0	0	48	90	50	50	100	3
7.	AEC	24CS407X	Ability Enhancement Course	0	0	28	2	30	50	50	100	1
8.	BSC	24CS408	Biology for Engineers	0	0	28	2	30	50	50	100	1
9.	UHV	24UHV	Universal Human Values	0	0	28	2	30	50	50	100	1
10.	MC	24NYP2	NSS, YOGA, PE	0	0	28	2	30	-	-	-	AUDIT
Total												20

Engineering Science Course (ESC/ETC/PLC)		
ESC/ETC/PLC	24CS406A	Optimization Techniques
ESC/ETC/PLC	24CS406B	Discrete Mathematical Structures
ESC/ETC/PLC	24CS406C	Graph Theory and Combinatorics

Ability Enhancement Course		
1	24CS407A	Computer Assembly and Networking
2	24CS407B	Introduction to Power Bi
3	24CS407C	Technical writing using Latex
4	24CS407D	UI/UX Laboratory

Scheme for III Year

FIFTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	PCC	24CS501	Finite Automata and Formal Languages	28	28	0	34	90	50	50	100	3
2.	PCC	24CS502	Software Engineering and Project Management	42	0	0	48	90	50	50	100	3
3.	IPCC	24CS503	Computer Networks	42	0	28	50	120	50	50	100	4
4.	IPCC	24CS504	Computer Graphics and Visualization	28	0	28	34	90	50	50	100	3
5.	PCCL	24CS505	Web Programming Laboratory	0	0	28	2	30	50	50	100	1
6.	PEC	24CS56X	Professional Elective Course - I	42	0	0	48	90	50	50	100	3
7.	PI	24CS507	Mini Project	0	0	28	2	30	50	50	100	1
8.	AEC	24RIP	Research Methodology and IPR	42	0	0	48	90	50	50	100	3
9.	HSMC	24EVS	Environmental Studies	0	0	28	2	30	50	50	100	1
10.	NCMC	24NYP3	NSS, YOGA, PE	0	0	0	28	-	50	50	100	AUDIT
Total												22

Sl. No.	Professional Elective Course - I	
	Course Code	Course Title
1.	24CS561	Digital Image Processing
2.	24CS562	Data Mining and Warehousing
3.	24CS563	Internet of Things
4.	24CS564	Advanced Java
5.	24CS565	Advanced Algorithms

SIXTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	IPCC	24CS601	Machine Learning	42	0	28	50	120	50	50	100	4
2.	HSMC	24CS602	Technology Management and Entrepreneurship	28	28	0	34	90	50	50	100	3
3.	PCC	24CS603	System Software and Compiler Design	28	28	0	34	90	50	50	100	3
4.	PCCL	24CS604	Full Stack Web Development Laboratory	0	0	56	4	60	50	50	100	2
5.	PI	24CS605	Main Project Phase - I	0	0	56	4	60	50	50	100	2
6.	PEC	24CS66X	Professional Elective Course - II	42	0	0	48	90	50	50	100	3
7.	OEC	24OEC6X	Open Elective – I	42	0	0	48	90	50	50	100	3
8.	AEC	24CS607X	Ability Enhancement Course	0	0	28	2	30	50	50	100	1
9.	NCMC	24NYP3	NSS, YOGA, PE	0	0	28	2	-	50	50	100	AUDIT
10.	HSMC	24ASK	Analytical skills	0	0	28	2	30	50	50	100	1
Total												22

Ability Enhancement Course		
1	24CS607A	Application Development Laboratory
2	24CS607B	Generative AI
3.	24CS607C	Automated Software Testing
4.	24CS607D	Devops

Sl. No.	Professional Elective Course - II	
	Course Code	Course Title
1.	24CS661	Introduction to Computer Vision
2.	24CS662	Artificial Intelligence
3.	24CS663	Wireless Networks
4.	24CS664	Social Network Analysis
5.	24CS665	Robotic Process Automation

Sl. No.	Open Electives	
	Course Code	Course Title
1.	24OEC61	Introduction to Cloud Computing
2.	24OEC62	Introduction to JAVA programming
3.	24OEC63	Web Technology

Scheme for IV Year

SEVENTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	PCC	24CS701	Cloud Computing	42	0	0	48	90	50	50	100	3
2.	PCC	24CS702	Network Security and Cyber Law	42	0	0	48	90	50	50	100	3
3.	PCC	24CS703	Data Science	42	0	0	48	90	50	50	100	3
4.	PEC	24CS74X	Professional Elective Course - III	42	0	0	48	90	50	50	100	3
5.	PEC	24CS75X	Professional Elective Course - IV	42	0	0	48	90	50	50	100	3
6.	SDC	24CS706	Main Project Phase - II	0	0	8	-	-	100	100	200	4
	Total											19

Sl. No.	Professional Elective Course - III		Professional Elective Course - IV		
	Course Code	Course Title	Sl. No.	Course Code	Course Title
1.	24CS741	Deep Learning	1.	24CS751	Pattern Recognition
2.	24CS742	Distributed Computing Systems	2.	24CS752	Big Data Analytics
3.	24CS743	Mobile Communications	3.	24CS753	Block Chain Technology
4.	24CS744	Software Testing	4.	24CS754	Green Computing
5.	24CS745	High Performance Computing	5.	24CS755	Natural Language Processing
6.	24CS746	Bio Inspired System	6.	24CS756	Cyber Security

EIGHT SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	PEC	24SW01	Professional Elective (Online Course)	42	0	0	48	90	50	50	100	3
2.	OEC	24SW02	Open Elective (Online course)	42	0	0	48	90	50	50	100	3
3.	PI	24INT	Internship (Research / Industry)(14-20 weeks)	0	0	0	-	360	100	100	200	10
	Total											16

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Hassan – 573202, Karnataka, India



BACHELOR OF ENGINEERING

DEPARTMENT OF MATHEMATICS

SYLLABUS

I & II Semester (2024 Admitted Batch)

Academic year 2024-25

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of evaluation (Theory courses)

Assessment	Marks
Three CIE's	30
Integrated LAB	20
SEE	50
Total	100

Scheme of evaluation (lab courses-IPCC)

Assessment	Marks
Manual solving	04
Record writing and observation	03
Executing the Programme with correct output	08
Final CIE	05
Total	20

Examination	Maximum marks	Minimum marks to qualify
CIE	50	20(12 +8)
SEE	50	20

Course Title	Mathematics for Computer Science Engineering stream -1		
Course Code	MAT4S11	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to:			
COs	Outcomes	POs	PSOs
CO1	Compute Taylor series, partial derivatives, pedal equation, curvature and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability, evolutes, errors and approximation.	PO1	-
CO2	Inspect for extreme values [the maximum output of a function (experimental data)] analyze the region of integration connected with multiple integrals so as to determine the area, volume. (remove add Probability)	PO1, PO2	-
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing in put or output of the given experimental data (interpolation/ extrapolation).	PO1	-
CO4	Model the real-life problems/engineering application problems and solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2,PO5	-
MODULE –1			
			10 Hrs.
Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability, Statement of Taylor's theorem, Taylor's series for a function of one variable - Illustrative examples. Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Pedal equations, Curvature and Radius of curvature in polar and pedal form. Applications : Extreme values of a single variable- cost and revenue. Self Study: Brief introduction to evolutes and involutes. Indeterminate forms - L'Hospital's rule problems. Extreme values of a single variable. Expansion of a function as a Maclaurin's series for function of one variable.			

MODULE –2	10 Hrs.
Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation and Illustrative examples. Evaluation of Jacobians, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor's series. Lagrange's method of undermined multifliers. Applications -To express the experimental data in terms of quadratic equation (function of one variable-curve fitting) and hence to find the maximum value of the experimental data.Application of total derivative- controlling sag in an uniformly loaded beam. Self Study: Extreme values of functions of two variables. Errors and approximations- Application in Computer Science Engineering. Expansion of a function as a Maclaurin's series for function of two variable.	
MODULE –3	10 Hrs.
Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Finite differences- Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae. Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule. Illustrative examples from engineering field. Applications- General applications connected with business cost and revenue. Errors in finite precision. Self Study: Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula to find the relation between the input and output of an experimental data using suitable interpolation formula. Application of arc length- to make sheets of corrugated iron roofing. Approximate solutions of ODE related to Computer Science Engineering.	
MODULE – 4	10 hrs.
Probability Theory: Counting principle - sum rule, product rule, permutation and combination, review of probability- applications of Baye's theorem. Mean, Standard deviation of the experimental data, discrete random variable, Binomial probability distribution, Computation of Mean and Standard Deviation of a Binomial distribution. Poisson probability distribution. Computation of Mean and Standard Deviation of a Poisson distribution Curve fitting: Linear equation $ax + by = c$, Quadratic equation $ax^2 + bx + c = y$ by least square method. Application - Experimental data for applications of probability in Computer science. Self Study: Continuous random variable. Computation of pdf, cdf, Mean and Standard Deviation.	

Tutorial component:

1. Examples on Taylor series for function of two variables(L3)
2. Examples on Extreme values- L3
3. Discussion on the use of extreme values in real life application problems such as predicting the share price in normal conditions. (L4)
4. Activity-Students are instructed to bring experimental data from various engineering department and are asked to fit the curve/equation. Also predicting the future data. - L3 & L4
5. Instructed to write a note on the use/applications of
 - i. Root finding
 - ii. Interpolation - L4
 - iii. Numerical integration
6. Examples on Interpolation and how to predict the data using Interpolation – L4
7. Examples on multiple integrals - L3 & L4
8. Applications to field and wave theory. - L3 & L4
9. Applications of probability in particular(Bayes theorem,Binomial & Poisson distributions).
10. Examples on Bayes theorem,Binomial and Poisson distribution. - L3 & L4
11. Examples on root finding- L3
12. Examples on Interpolation- L3
13. Example problems on application of numerical integration - L3
14. Example problems on application of numerical integration connected with L4.

Practical component:**List of Programmes:**

1. Computation of roots using - bisection method, Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newton's forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{\text{rd}}$ rule , Simpson's $3/8^{\text{th}}$ rule)
6. Finding angle between polar curves & computing the curvature of a given curve.
7. Finding partial derivatives, Jacobians.
8. Computing probability distribution(Binomial & Poisson).
9. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Course Title	Mathematics for Civil Engineering stream -1		
Course Code	MAT4C11	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to:			
COs	Outcomes	POs	PSOs
CO1	Compute Taylor series, partial derivatives, pedal equation, curvature, and solve simple problems connected with multiple integrals, evolutes, errors and approximation.	PO1	-
CO2	Inspect for extreme values [the maximum output of a function (experimental data-)], analyze the region of integration connected with multiple integrals so as to determine the area, volume.	PO1, PO2	-
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input or output of the given experimental data (interpolation/ extrapolation).	PO1	-
CO4	Model the real-life problems/engineering application problems and solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-
MODULE - 1			10 Hrs.
Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability, Statement of Taylor's theorem, Taylor's series for a function of one variable - Illustrative examples. Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Pedal equations. Curvature and Radius of curvature in polar and pedal form. Applications -Stiffness of a beam, strength of a beam. Self Study:Brief introduction to evolutes and involutes. Indeterminate forms - L'Hospital's rule, problems. Extreme values of a single variable. Expansion of a function as a Maclaurin's series for function of one variable.			

MODULE - 2	10 Hrs.
Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation and Illustrative examples. Evaluation of Jacobians, Statement of Taylor theorem, Taylor's series for a function of two variables and illustrative examples. Lagrange's method of undetermined multipliers. Applications - To express the experimental data in terms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting). Application of total derivative- controlling sag in a uniformly loaded beam. Self Study: Extreme values of functions of two variables. Errors and approximations- Application in Civil engineering. Expansion of a function as a Maclaurin's series for function of two variable.	
MODULE - 3	10 Hrs.
Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Finite differences: Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae. Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule, Illustrative examples from engineering field. Applications - Finding projectile height from its acceleration, initial velocity and initial position. Estimation of discharge in a stream – an application to hydrology, an application to surveying. Moment, mass and center of mass of a thin rod. Self Study: Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula to find the relation between the input and output of an experimental data using suitable interpolation formula. Application of arc length- to make sheets of corrugated iron roofing. Approximate solutions of ODE related to Civil Engineering.	
MODULE - 4	10 hrs.
Multiple Integrals: Introduction to coordinate systems. Double integrals in Cartesian & Polar form. Application to find area and volume. Evaluation of triple integrals in Cartesian co-ordinate system. Evaluation of triple integrals in cylindrical and Spherical co-ordinate system. Applications - To find mass and moment for the thin plate covering the region in the xy plane. Mass and moment for the object in space. Moment of inertia of a circle about its diametrical axis- an application to engineering Mechanics, computation of deflection of beams using double integral. Self-Study: Definitions and properties of Beta and gamma functions, Simple Problems.	

Tutorial component:

1. Examples on Taylor series for function of two variables(L3)
2. Examples on Extreme values- L3
3. Discussion on the use of extreme values in real life application problems such as predicting the share price in normal conditions. (L4)
4. Activity-Students are instructed to bring experimental data from various engineering department and are asked to fit the curve/equation. Also predicting the future data. - L3 & L4
5. Instructed to write a note on the use/applications of
 - i. Root finding
 - ii. Interpolation - L4
 - iii. Numerical integration
6. Examples on Interpolation and how to predict the data using Interpolation – L4
7. Examples on multiple integrals - L3 & L4
8. Applications to field and wave theory. - L3 & L4
9. Applications of probability in particular(Bayes theorem,Binomial & Poisson distributions).
10. Examples on Bayes theorem,Binomial and Poisson distribution. - L3 & L4
11. Examples on root finding- L3
12. Examples on Interpolation- L3
13. Example problems on application of numerical integration - L3
14. Example problems on application of numerical integration connected with L4.

Practical component:**List of Programmes:**

1. Computation of roots using - bisection method, Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newton's forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{\text{rd}}$ rule , Simpson's $3/8^{\text{th}}$ rule)
6. Finding angle between polar curves & computing the curvature of a given curve.
7. Finding partial derivatives, Jacobians.
8. Computing probability distribution(Binomial & Poisson).
9. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Course Title	Mathematics for Electrical and Electronics Engineering stream-1		
Course Code	MAT4E11	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to:			
COs	Outcomes	POs	PSOs
CO1	Compute Taylor series, partial derivatives, pedal equation, curvature, and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability, evolutes, errors and approximation.	PO1	-
CO2	Inspect for extreme values [the maximum output of a function (experimental data-)], analyze the region of integration connected with multiple integrals so as to determine the area, volume.	PO1, PO2	-
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input, or output of the given experimental data (interpolation/extrapolation).	PO1	-
CO4	Model the real-life problems/engineering application problems and solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2,PO5	-
MODULE - 1			10 Hrs.
Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability, Statement of Taylor's theorem, Taylor's series for a function of one variable - Illustrative examples.Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Pedal equations, Curvature and Radius of curvature in polar and pedal form. Applications -Extreme values of a single variable- to find the peak current in an circuit. Self Study:Brief introduction to evolutes and involutes. Indeterminate forms - L'Hospital's rule, problems. Extreme values of a single variable. Expansion of a function as a Maclaurin's series for function of one variable.			

MODULE - 2	10 Hrs.
Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation and Illustrative examples. Evaluation of Jacobians, Statement of Taylor theorem, Taylor's series for a function of two variables and illustrative examples. Lagrange's method of undetermined multipliers. Applications - To express the experimental data in terms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting). Application of total derivative- controlling sag in an uniformly loaded beam. Self Study: Extreme values of functions of two variables. Errors and approximations- Application in Electrical Engineering. Expansion of a function as a Maclaurin's series for function of two variable.	
MODULE - 3	10 Hrs.
Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Finite differences- Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae. Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule, Illustrative examples from engineering field. Applications- Application of root finding- ion concentration, Forcing electrons together, To estimate the total amount of pollutant produced due to production of electricity by burning oil. Self Study: Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula to find the relation between the input and output of an experimental data using suitable interpolation formula. Application of arc length- to make sheets of corrugated iron roofing. Approximate solutions of ODE related to Electrical Engineering.	
MODULE - 4	10 hrs.
Multiple Integrals: Introduction to coordinate systems. Double integrals in Cartesian & Polar form. Application to find area and volume. Evaluation of triple integrals in Cartesian co-ordinate system. Probability Theory: Brief introduction to probability, applications of Baye's theorem, discrete random variable, binomial probability distribution. Computation of Mean and Standard Deviation of a Binomial distribution. Application - Brief note on the applications connected with field and wave theory. Calculation optimal power in an electrical circuits. Self-Study: Definitions and properties of Beta and gamma functions, Simple Problems. Poisson probability distribution. Computation of Mean and Standard Deviation of a Poisson distribution.	

Tutorial component:

1. Examples on Taylor series for function of two variables(L3)
2. Examples on Extreme values- L3
3. Discussion on the use of extreme values in real life application problems such as predicting the share price in normal conditions. (L4)
4. Activity-Students are instructed to bring experimental data from various engineering department and are asked to fit the curve/equation. Also predicting the future data. - L3 & L4
5. Instructed to write a note on the use/applications of
 - i. Root finding
 - ii. Interpolation - L4
 - iii. Numerical integration
6. Examples on Interpolation and how to predict the data using Interpolation – L4
7. Examples on multiple integrals - L3 & L4
8. Applications to field and wave theory. - L3 & L4
9. Applications of probability in particular(Bayes theorem,Binomial & Poisson distributions).
10. Examples on Bayes theorem,Binomial and Poisson distribution. - L3 & L4
11. Examples on root finding- L3
12. Examples on Interpolation- L3
13. Example problems on application of numerical integration - L3
14. Example problems on application of numerical integration connected with L4.

Practical component:**List of Programmes:**

1. Computation of roots using - bisection method, Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newton's forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{\text{rd}}$ rule , Simpson's $3/8^{\text{th}}$ rule)
6. Finding angle between polar curves & computing the curvature of a given curve.
7. Finding partial derivatives, Jacobians.
8. Computing probability distribution(Binomial & Poisson).
9. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Course Title	Mathematics for Mechanical Engineering -1		
Course Code	MAT4M11	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in calculus and numerical methods so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to:			
COs	Outcomes	POs	PSOs
CO1	Compute Taylor series, partial derivatives, pedal equation, curvature, and solve simple problems connected with multiple integrals, evolutes, errors and approximation	PO1	-
CO2	Inspect for extreme values [the maximum output of a function (experimental data)], analyze the region of integration connected with multiple integrals so as to determine the area, volume.	PO1, PO2	-
CO3	Apply the numerical methods to compute: The area of a region, root (input) of an equation for the given output, missing input, or output of the given experimental data (interpolation/ extrapolation).	PO1	-
CO4	Model the real-life problems/engineering application problems and solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-
MODULE - 1			10 Hrs.
Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability, Statement of Taylor's theorem, Taylor's series for a function of one variable - Illustrative examples. Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves, Pedal equations, Curvature and Radius of curvature in polar and pedal form. Applications -Stiffness of a beam, strength of a beam. Self Study: Brief introduction to evolutes and involutes. Indeterminate forms - L'Hospital's rule, problems. Extreme values of a single variable. Expansion of a function as a Maclaurin's series for function of one variable.			

MODULE - 2	10 Hrs.
Partial differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation and Illustrative examples. Evaluation of Jacobians, Statement of Taylor theorem, Taylor's series for a function of two variables and illustrative examples, Lagrange's method of undetermined multipliers. Applications- Applications of Optimization (extreme values of a single variable) - metal fabrication. Application of total derivative- controlling sag in an uniformly loaded beam. Self Study: Extreme values of functions of two variables, Errors and approximations- Application in Mechanical Engineering. Expansion of a function as a Maclaurin's series for function of two variable.	
MODULE - 3	10 Hrs.
Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Finite differences- Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae. Numerical Integration: Evaluation of a line integral by Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Weddle's rule, Illustrative examples from engineering field. Applications - Amount of work required to put a satellite in an orbit. To estimate the length of the tank in a design of an aeroplane which has a constant cross sectional area in each wing. Self Study: Inverse Lagrange's interpolation formula, central difference formula- Bessel's formula to find the relation between the input and output of an experimental data using suitable interpolation formula. Application of arc length- to make sheets of corrugated iron roofing. Approximate solutions of ODE related to Mechanical Engineering.	
MODULE - 4	10 hrs.
Multiple Integrals: Introduction to coordinate systems. Double integrals in Cartesian & Polar form. Application to find area and volume. Evaluation of triple integrals in Cartesian co-ordinate system. Evaluation of triple integrals in cylindrical and Spherical co-ordinate system. Applications - to find mass and moment for the thin plate covering the region in the xy plane. Mass and moment for the object in space. Moment of inertia of a circle about its diametrical axis- an application to engineering Mechanics, computation of deflection of beams using double integral. Self-Study: Definitions and properties of Beta and gamma functions, Simple Problems.	

Tutorial component:

1. Examples on Taylor series for function of two variables(L3)
2. Examples on Extreme values- L3
3. Discussion on the use of extreme values in real life application problems such as predicting the share price in normal conditions. (L4)
4. Activity-Students are instructed to bring experimental data from various engineering department and are asked to fit the curve/equation. Also predicting the future data. - L3 & L4
5. Instructed to write a note on the use/applications of
 - i. Root finding
 - ii. Interpolation - L4
 - iii. Numerical integration
6. Examples on Interpolation and how to predict the data using Interpolation – L4
7. Examples on multiple integrals - L3 & L4
8. Applications to field and wave theory. - L3 & L4
9. Applications of probability in particular(Bayes theorem,Binomial & Poisson distributions).
10. Examples on Bayes theorem,Binomial and Poisson distribution. - L3 & L4
11. Examples on root finding- L3
12. Examples on Interpolation- L3
13. Example problems on application of numerical integration - L3
14. Example problems on application of numerical integration connected with L4.

Practical component:**List of Programmes:**

1. Computation of roots using - bisection method, Newton Raphson method.
2. To compute the extreme values of a function of two variables.
3. Interpolation by- Newton's forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{\text{rd}}$ rule , Simpson's $3/8^{\text{th}}$ rule)
6. Finding angle between polar curves & computing the curvature of a given curve.
7. Finding partial derivatives, Jacobians.
8. Computing probability distribution (Binomial & Poisson).
9. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Hassan – 573202, Karnataka, India



BACHELOR OF ENGINEERING

DEPARTMENT OF PHYSICS

**SYLLABI OF PHYSICS COURSES
FOR UG PROGRAMMES**

Academic year 2024-25

Vision

To build a foundation for excellence and encourage the development of the Institution as a premier Institution by imparting the quality education in the process of understanding fundamentals of physics based on which the present and future technology is established.

Mission

- To enlighten the students and realize their talents both in theory and experimental Physics, through dedication to teach, commitment towards students and innovative instructional methods.
- To organize and sustain efficient administration in the department to contribute to the development of the Institution.

Scheme of evaluation for theory (Integrated) courses

Assessment	Marks
Three CIE's	30
Lab CIE	20
SEE	50
Total	100

Examination		Maximum marks	Minimum marks to qualify
CIE	Theory	30	12
	Lab	20	08
SEE		50	20

Scheme of evaluation for open elective course

Assessment	Marks
Three CIE's	50
SEE	50
Total	100

Examination		Maximum marks	Minimum marks to qualify
CIE		50	20
SEE		50	20

Course Title	PHYSICS FOR CIVIL ENGINEERING		
Course Code	PHY4C12/22	(L-T-P)C	(3-1-2)4
SEE duration	3hour	Hours/Week	06 (4T+2L)
CIE (Theory) marks	30	CIE (Practicals) marks	20
SEE marks	50	Course Type	IPCC

Course Objective:

The objective of the course is to make students learn principle sand theories of physics in **civil and allied engineering** fields and to develop effective solutions for engineering problems.

Course Outcomes(COs): Upon completion of the course, students shall be able to

Sl. No.	Course outcomes	PO	PSO
1.	Discuss the concepts of vibrations, rigid body dynamics, crystallography, photonics and building acoustics.	1	-
2.	Interpret the dynamics of rigid bodies, applications of crystallography and photonics, and characteristics of building acoustics and ultrasonics.	1	-
3.	Solve problems on rigid body dynamics, crystallography, laser, and sound waves.	1	-
4.	Verify experimentally the laws and concepts of rigid body dynamics, crystallography, photonics, and resonance.	1, 10	-

Course Contents:

MODULE-1	10Hrs.
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Vibrations and Rigid Body Dynamics

Simple harmonic vibrations. Free vibrations. Damped vibrations-derivation of expressions for displacement of damped harmonic motion. Discussion of types of damped vibrations. Forced vibrations-derivation of expression for amplitude and phase-variation with frequency, Resonance. Condition for amplitude resonance. Applications of resonance.

Rigid body. Moment of inertia. Torsional pendulum-derivation of expression for time period of oscillation. Mention its uses. Bending of beams- derivation of expression for bending moment of a beam. Cantilever-derivation for depression of loaded end of a single cantilever.

Numerical problems on amplitude and phase of forced vibrations, time-period of oscillation, bending moment and Young's Modulus/depression of a cantilever.

MODULE-2	10Hrs.
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Crystallography

Space lattice, Bravais lattice-unit cell, primitive cell. Lattice parameters. 7 basic crystal systems. Directions and planes, Miller indices. Expression for interplanar spacing. Coordination number. Atomic packing factors (SC, FCC, BCC). Density of a unit cell. X-rays and their types. Bragg's law. Bragg's X-ray spectrometer for identification of crystal structure. Importance of X-ray diffraction in material characterisation. De Broglie's concept of matter waves. Exploitation of wave nature of electrons in SEM, list of other applications

Numerical problems on Miller indices, Interplanar space, Bragg's law.

MODULE-3	10 Hrs.
Photonics Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO₂ laser – construction and working, Qualitative discussion of measurement of pollutants (LIDAR), List of other applications: laser fencing, laser cutting, laser drilling, laser welding, laser-guided missiles, LASER Range Finder, Road Profiling, Bridge Deflection, Speed Checker. Optical fibres. Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Attenuation. List of applications of optical fibers. Merits and demerits of optical fibers. Numerical problems on Boltzmann factor, V-number, Numerical aperture, and attenuation.	
MODULE- 4	10 hrs.
Acoustics and ultrasonics Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (No derivation), Eyring's formula (No derivation). Comparison of Eyring's and Sabine's formula, measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Insulation, Ultrasonics. Non-destructive testing of materials using ultrasonics. Measurement of velocity of ultrasonic waves and elastic constants in solids and liquids. Numerical Problems on reverberation time, absorption power and absorption coefficient, Sabine's formula, Eyring's formula.	
List of experiments 1. Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique. 2. Determination of dielectric constant by charging and discharging of a capacitor. 3. Determination of wavelength of LASER by diffraction technique. 4. Verification of Stefan's law of radiation. 5. Determination of Planck's constant using Light Emitting Diodes. 6. Estimation of frequencies of vibrating string and AC using Sonometer. 7. Determination of resonance frequency and inductance using LCR circuits. 8. Determination of Young's modulus using single cantilever. 9. Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum. 10. Determination of numerical aperture and modes of transmission of optical fiber.	

Text Books:

1. Engineering physics: R K Gaur and S L Gupta, ISBN: 9788189928223, Dhanpat Rai Publishing Company (P) Ltd. Edition, 2011
2. Solid state physics: S O Pillai, ISBN-10: 9386070928, New Age International Pvt. Ltd, Eighth edition, 9 January 2018.

ReferenceBooks:

1. Fiber Optics: A K Ghatak and K Thyagarajan, ISBN-13: 978-0521577854, Cambridge University Press India Pvt. Limited, 1998.
2. Physics laboratory manual, Dept. of Physics, Malnad College of Engineering, Hassan.

Massive Open Online Courses (MOOC) :

1. https://onlinecourses.nptel.ac.in/noc23_ee84/preview
2. https://onlinecourses.nptel.ac.in/noc23_ar11/preview

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3											
CO4	3									1		

Plan for tutorial classes (PHY4C12/22)

Every fourth hour of physics in a week is scheduled for tutorial class in the timetable.

Week	Topic
1	Numerical problems on amplitude and phase of forced vibrations and summarization of the topics taught during preceding three classes.
2	Numerical problems on time-period of oscillation and summarization of the topics taught during preceding three classes.
3	Numerical problems on bending moment and Young's Modulus/depression of a cantilever and summarization of the topics taught during preceding three classes.
4	Summarization of the topics of MODULE 1.
5	Numerical problems on Miller indices and summarization of the topics taught during preceding three classes.
6	Numerical problems on Interplanar space and summarization of the topics taught during preceding three classes.
7	Numerical problems on Bragg's law and summarization of the topics taught during preceding three classes.
8	Summarization of the topics of MODULE 2.
9	Numerical problems on Boltzmann factor and summarization of the topics taught during preceding three classes.
10	Numerical problems on V-number, Numerical aperture and summarization of the topics taught during preceding three classes.
11	Numerical problems on attenuation and summarization of the topics taught during preceding three classes.

12	Summarization of the topics of MODULE 3.
13	Numerical problems on reverberation time and summarization of the topics taught during preceding three classes.
14	Numerical problems on absorption power and absorption coefficient and summarization of the topics taught during preceding three classes.
15	Numerical problems on Sabine's formula, Eyring's formula and summarization of the topics taught during preceding three classes.
16	Summarization of the topics of MODULE 4.

Course Title	PHYSICS FOR MECHANICAL ENGINEERING		
Course Code	PHY4M12/22	(L-T-P)C	(3-1-2)4
SEE duration	3hour	Hours/Week	06 (4T+2L)
CIE (Theory) marks	30	CIE (Practicals) marks	20
SEE marks	50	Type of Course	IPCC

Course Objective:

The objective of the course is to make students learn principle and theories of physics in **mechanical and allied engineering** fields and to develop effective solutions for engineering problems.

Course Outcomes(COs): Upon completion of the course, students shall be able to

Sl. No.	Course outcomes	PO	PSO
1.	Discuss the concepts of vibrations, rigid body dynamics, crystallography, photonics and thermoelectricity	1	-
2.	Interpret the dynamics of rigid bodies, applications of crystallography and photonics, and characteristics of thermoelectric materials.	1	-
3.	Solve problems on rigid body dynamics, crystallography, lasers and thermoelectric materials and devices.	1	-
4.	Verify experimentally the laws and concepts of rigid body dynamics, crystallography, photonics and resonance.	1,10	-

Course Contents

MODULE– 1	10Hrs
Vibrations and Rigid Body Dynamics Simple harmonic vibrations. Free vibrations. Damped vibrations-derivation of expressions for displacement of damped harmonic motion. Discussion of types of damped vibrations. Forced vibrations-derivation of expression for amplitude and phase-variation with frequency. Resonance. Condition for amplitude resonance. Applications of resonance. Rigid body. Moment of inertia. Torsional pendulum-derivation of expression for time of oscillation. Mention of uses. Bending of beams- derivation of expression for bending moment of a beam. Cantilever-derivation for depression of loaded end of a single cantilever. Numerical problems on Amplitude and phase of forced vibrations, time-period of oscillation, bending moment and Young's Modulus/depression of a cantilever.	

MODULE– 2	10Hrs
Crystallography Space lattice, Bravais lattice–unit cell, primitive cell. Lattice parameters. 7 basic crystal systems. Directions and planes, Miller indices. Expression for interplanar spacing. Coordination number. Atomic packing factors (SC, FCC, BCC). Density of a unit cell. X-rays and their types. Bragg’s law. Bragg’s X-ray spectrometer for identification of crystal structure. Importance of X-ray diffraction in material characterisation. De Broglie’s concept of matter waves. Illustration of wave nature of electrons in SEM, list of other applications. Numerical problems on Miller indices, Interplanar space, Bragg’s law.	
MODULE– 3	10 hrs
Photonics Interaction of radiation with matter. Expression for energy density in terms of Einstein’s coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO ₂ laser –construction and working, Measurement of pollutants (LIDAR), List of other applications: laser fencing, laser cutting, laser drilling, laser welding, laser-guided missiles, LASER Range Finder, Road Profiling, Bridge Deflection, Speed Checker. Optical fibres. Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Attenuation. List of applications of optical fibers. Merits and demerits of optical fibers. Numerical problems on Boltzmann factor, V-number, Numerical aperture, and attenuation	
MODULE– 4	10 hrs
Thermoelectric materials and devices Thermoelectric phenomena. Thermo emf and thermo current, Seebeck effect. Variation of thermo emf with temperature, Peltier effect, Seebeck, Peltier and Thomson coefficients (Mention Expression), laws of thermoelectricity. Experimental demonstration of Peltier effect. Explanation of thermo emf based on Peltier effect. Thermo-electric power. Construction and Working of Thermoelectric generators (General). Construction and working of Thermoelectric coolers (Refrigerators), Construction and working of Exhaust (Automobiles). Numerical Problems	
List of experiments 1. Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique. 2. Determination of dielectric constant by charging and discharging of a capacitor. 3. Determination of wavelength of LASER by diffraction technique.	

- Text Books:**
1. Engineering physics: R K Gaur and S L Gupta, ISBN: 9788189928223, Dhanpat Rai Publishing Company (P) Ltd. Edition, 2011
 2. Solid state physics: S O Pillai, ISBN-10: 9386070928, New Age International Pvt. Ltd, Eighth edition, 9 January 2018.
 3. Brijlal N Subramanyam : Heat and Thermodynamics ISBN: 81-219-2813-3 S. Chand and Co. Ltd. New Delhi, Edition, 2007.

1. Fiber Optics: A K Ghatak and K Thyagarajan, ISBN-13: 978-0521577854, Cambridge University Press India Pvt. Limited, 1998
2. E-resources; NPTEL courses on Engineering physics.
3. Singal, Agarwal and Prakash : Heat, Thermodynamics and Statistical Physics, ISBN-13: 9789350065235, Pragati Prakashan, India, 2017.
4. Physics laboratory manual, Dept. of Physics, Malnad College of Engineering, Hassan.

1. https://onlinecourses.nptel.ac.in/noc23_ee84/preview
2. https://onlinecourses.nptel.ac.in/noc23_cy37/preview

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Plan for tutorial classes (PHY4M12/22)

Every fourth hour of physics in a week is scheduled for tutorial class in the timetable.

Week	Topic
1	Numerical problems on amplitude and phase of forced vibrations and summarization of the topics taught during preceding three classes.
2	Numerical problems on time-period of oscillation and summarization of the topics taught during preceding three classes.
3	Numerical problems on bending moment and Young's Modulus/depression of a cantilever and summarization of the topics taught during preceding three classes.
4	Summarization of the topics of MODULE 1.
5	Numerical problems on Miller indices and summarization of the topics taught during preceding three classes.
6	Numerical problems on Interplanar space and summarization of the topics taught during preceding three classes.
7	Numerical problems on Bragg's law and summarization of the topics taught during preceding three classes.
8	Summarization of the topics of MODULE 2.
9	Numerical problems on Numerical problems on Boltzmann factor and summarization of the topics taught during preceding three classes.
10	Numerical problems on V-number, Numerical aperture and summarization of the topics taught during preceding three classes.
11	Numerical problems on attenuation and summarization of the topics taught during preceding three classes.
12	Summarization of the topics of MODULE 3.
13	Numerical problems on thermoelectric materials and summarization of the topics taught during preceding three classes.
14	Numerical problems on thermoelectric devices and summarization of the topics taught during preceding three classes.
15	Numerical problems on thermoelectric materials and summarization of the topics taught during preceding three classes.
16	Summarization of the topics of MODULE 4.

Course Title	PHYSICS FOR ELECTRONICS AND ELECTRICAL ENGINEERING STREAM		
Course Code	PHY4E12/22	(L-T-P)C	(3-1-2)4
SEE duration	3hour	Hours/Week	06 (4T+2L)
CIE (Theory) marks	30	CIE (Practicals) marks	20
SEE marks	50	Type of Course	IPCC
Course Objective: Objective of the course is to make students learn principles and theories of physics in electronics and electrical engineering fields and to develop effective solutions for engineering problems Course Outcomes(COs): Upon completion of the course, students shall be able to:			
#	Course outcomes	PO	PSO
1	Discuss the concepts of materials science, photonics and quantum mechanics	1	-
2	Interpret the laws of materials science, applications of photonics and quantum mechanics.	1	-
3	Solve problems on materials science, lasers, optical fibers and quantum mechanics.	1	-
4	Verify experimentally the laws and concepts of materials science, lasers, optical fibers and quantum mechanics.	1,10	-
Course Contents:			
MODULE– 1			10Hrs
Photonics Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO ₂ laser – construction and working, Measurement of pollutants (LIDAR), List of other applications: laser fencing, laser cutting, laser drilling, laser welding, laser-guided missiles, LASER Range Finder, Road Profiling, Bridge Deflection, Speed Checker. Optical fibres. Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Attenuation. List of applications of optical fibers. Merits and demerits of optical fibers. Numerical problems on Boltzmann factor, V-number, Numerical aperture, and attenuation.			
MODULE– 2			10Hrs
Electrical Properties of Solids Free electrons in metals. Classical free electron theory-assumptions. Drift velocity, Mean free path, Mean collision time, Relaxation time. Expression for electrical conductivity in metals. Failures of classical free electron theory. Quantum free electron theory–assumptions. Fermi energy. Fermi-Dirac distribution function (Fermi factor). Merits of quantum free electron theory. Dielectric materials. Polarization and its types. Frequency dependence of polarizability and			

permittivity. Expression for internal field. Claussius-Mossotti equation. Applications of dielectrics in capacitors, transformers, LEDs; OLED and QLED and microwave tunable devices. Numerical problems on electrical conductivity, Fermi energy, and Claussius-Mossotti equation.	
MODULE– 3	10 hrs
Semiconductors and Superconductors Effects of impurity and temperature on electrical resistivity of metals. Effects of impurity and temperature on their electrical resistivity semiconductors. Electrical conductivity of a semiconductor (derivation). Applications in development of electronic devices (mention diodes, transistors, LEDs, etc.,) Superconductors. Temperature dependence of electrical resistivity in superconductors. Meissner effect (qualitative). Critical magnetic field. Type I and Type II superconductors. BCS Theory. High temperature superconductors. Applications of superconductors; superconducting magnets, MRI, SQUID (to mention) and Maglev Vehicle (qualitative discussion). Numerical problems on electrical conductivity and critical magnetic field	
MODULE– 4	10 hrs
Quantum mechanics Origin of quantum mechanics - Black body radiation spectrum, Wien's law and Rayleigh Jeans law, assumptions of quantum theory of radiation, Planck's law. Evidence/explanation of dual nature of matter. Louis de Broglie hypothesis of matter waves. Relationship between group velocity, phase velocity, particle velocity and velocity of light. Characteristic properties of matter waves. Expression for de Broglie wavelength of electron, its application in SEM and TEM, and advent of nanotechnology (Qualitative). Schrodinger wave equation, wave function, Probability density & normalization of wave function (Max Born's interpretation). Eigen values and Eigen functions, Application of Schrodinger wave equation for trapped particle and free particle; computation of eigen values and eigen functions. Numerical problems on Louis de Broglie equations, group velocity, phase velocity and Eigenvalue equation.	
List of experiments 1. Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique. 2. Determination of dielectric constant by charging and discharging of a capacitor. 3. Determination of wavelength of LASER by diffraction technique. 4. Verification of Stefan's law of radiation. 5. Determination of Planck's constant using Light Emitting Diodes. 6. Estimation of frequencies of vibrating string and AC using Sonometer. 7. Determination of resonance frequency and inductance using LCR circuits.	

8. Determination of Young's modulus using single cantilever.
9. Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
10. Determination of numerical aperture and modes of transmission of optical fiber.

Text Books:

1. Engineering physics: R K Gaur and S L Gupta, ISBN: 9788189928223, Dhanpat Rai Publishing Company (P) Ltd. Edition, 2011
2. Solid state physics: S O Pillai, ISBN-10: 9386070928, New Age International Pvt. Ltd, Eighth edition, 9 January 2018.

Reference Books:

1. Modern Physics, Kenneth S. Krane, ISBN-13: 9781118061145, John Wiley & Sons, Inc., 3rd Edition, 2012.
2. B.B. Laud - Lasers and non-linear optics, New Age International, ISBN: 9788122430561, 3rdEdition, 2015.
3. Fiber Optics: A K Ghatak and K Thyagarajan, ISBN-13: 978-0521577854, Cambridge University Press India Pvt. Limited, 1998.
4. E-resources; NPTEL courses on Engineering physics.
5. Physics laboratory manual, Dept. of Physics, Malnad College of Engineering, Hassan.

Massive Open Online Courses (MOOC) :

1. https://onlinecourses.nptel.ac.in/noc23_ee84/preview
2. https://onlinecourses.nptel.ac.in/noc23_ph36/preview

Course Articulation Matrix:

[illegible]

Plan for tutorial classes (PHY4E12/22)

Every fourth hour of physics in a week is scheduled for tutorial class in the timetable.

Week	Topic
1	Numerical problems on Boltzmann factor and summarization of the topics taught during preceding three classes.
2	Numerical problems on V-number, Numerical aperture and summarization of the topics taught during preceding three classes.
3	Numerical problems on attenuation and summarization of the topics taught during preceding three classes.
4	Summarization of the topics of MODULE 1.
5	Numerical problems electrical conductivity and summarization of the topics taught during preceding three classes.
6	Numerical problems on Fermi energy and summarization of the topics taught during preceding three classes.
7	Numerical problems on Claussius-Mossotti equation and summarization of the topics taught during preceding three classes.
8	Summarization of the topics of MODULE 2.
5	Numerical problems on electrical conductivity and summarization of the topics taught during preceding three classes.
10	Numerical problems on critical magnetic field and summarization of the topics taught during preceding three classes.
11	Numerical problems on critical magnetic field and summarization of the topics taught during preceding three classes.
12	Summarization of the topics of MODULE 3.
13	Numerical problems on Louis de Broglie equations, and summarization of the topics taught during preceding three classes.
14	Numerical problems on group velocity, phase velocity and summarization of the topics taught during preceding three classes.
15	Numerical problems on Eigenvalue equation and summarization of the topics taught during preceding three classes.
16	Summarization of the topics of MODULE 4.

Course Title	PHYSICS FOR COMPUTER ENGINEERING STREAM		
Course Code	PHY4S12/22	(L-T-P)C	(3-1-2)4
SEE duration	3hour	Hours/Week	06 (4T+2L)
CIE (Theory) marks	30	CIE (Practicals) marks	20
SEE marks	50	Type of Course	IPCC

Course Objective:

Objective of the course is to make students learn principles and theories of physics in computer science and allied engineering fields and to develop effective solutions for engineering problems

Course Outcomes(COs): Upon completion of the course, students shall be able to:

#	Course outcomes	PO	PSO
1	Discuss the concepts of materials science, photonics and quantum mechanics in computation.	1	-
2	Interpret the laws of materials science, applications of photonics and quantum mechanics.	1	-
3	Solve problems on materials science, lasers, optical fibers and quantum mechanics.	1	-
4	Verify experimentally the laws and concepts of materials science, lasers, optical fibers and quantum mechanics.	1,1 0	-

Course Contents:

MODULE 1	10 hrs
Free Electron Theory and Superconductivity Free electron concept in metals. Classical free electron theory-assumptions. Drift velocity, mean free path, Mean collision time, Relaxation time. Mention of expression for electrical conductivity in metals. Failures of classical free electron theory. Quantum free electron theory-assumptions. Fermi-Dirac distribution function. Merits of quantum free electron theory. Effects of impurity and temperature on electrical resistivity of metals. Superconductors. Temperature dependence of electrical resistivity in superconductors. Meissner effect (qualitative). Critical magnetic field. Type I and Type II superconductors. BCS Theory. High temperature superconductors. Applications of superconductors; MRI and SQUID. Role of semiconducting and dielectric properties in computation; Elements of memory and processing of tasks in computation using transistors, resistors, capacitors. Numerical problems on electrical conductivity, Fermi energy, and critical magnetic field	
MODULE 2	10 hrs
Photonics Interaction of radiation with matter. Expression for energy density in terms of Einstein's coefficients. Requisites of a Laser system. Conditions for laser action. Types of laser sources (to list out Solid, Gas and Semiconductor lasers and to list the contrast between them). CO₂ laser – construction and working, Measurement of pollutants (LIDAR), List of other applications: laser fencing, laser cutting, laser drilling, laser welding, laser-guided missiles, LASER Range Finder,	

Road Profiling, Bridge Deflection, Speed Checker.

Optical fibres. Construction and principle. Ray propagation mechanism. Angle of acceptance and numerical aperture - their relationship with refractive indices of core and clad and condition for ray propagation. Modes of transmission: V-number and number of modes, Types of optical fibres, Attenuation. List of applications of optical fibers. Merits and demerits of optical fibers.

Numerical problems on Boltzmann factor, V-number, Numerical aperture, and attenuation.

MODULE 3

10 hrs

Quantum mechanics for computation

Origin of quantum mechanics - Black body radiation spectrum, Wien's law and Rayleigh Jeans law, assumptions of quantum theory of radiation, Planck's law. Evidence/explanation of dual nature of matter. Louis de Broglie hypothesis of matter waves. **Relationship between group velocity, phase velocity, particle velocity and velocity of light.** Characteristic properties of matter waves. Expression for de Broglie wavelength of electron, its application in SEM and TEM, and advent of nanotechnology (Qualitative). Schrodinger wave equation, wave function, Probability density & normalization of wave function (Max Born's interpretation). Eigen values and Eigen functions, **Application of Schrodinger wave equation for trapped particle and free particle; computation of eigen values and eigen functions.**

Numerical problems on Louis de Broglie equations, group velocity, phase velocity and Eigenvalue equation.

MODULE 4

10 hrs

Elements of Quantum Computing

Introduction to quantum computers, difference between classical and quantum computers, exponential growth of quantum computers for artificial intelligence and deep learning. Qubits and working principle of their different types; SQUID, Photonic, NMR, Ion trap. Dirac bracket notation, Bloch sphere, quantum logic gates; single qubit logic gates and multi qubit logic gates. Heisenberg's uncertainty principle, Quantum tunneling, Quantum entanglement, quantum superposition. Quantum Superposition and Quantum Entanglement; circuit building. Operation of logic gates on single and multi-Qubits. Game on quantum superposition and quantum entanglement

Numerical problems: Logic gates operation on Qubits

1. Measurement of electrical resistivity and energy gap of a semiconductor using four probe technique.
2. Determination of dielectric constant by charging and discharging of a capacitor.
3. Determination of wavelength of LASER by diffraction technique.
4. Verification of Stefan's law of radiation.
5. Determination of Planck's constant using Light Emitting Diodes.
6. Estimation of frequencies of vibrating string and AC using Sonometer.
7. Determination of resonance frequency and inductance using LCR circuits.
8. Determination of Young's modulus using single cantilever.
9. Determination of moment of inertia of rigid bodies and rigidity modulus of a string using torsion pendulum.
10. Determination of numerical aperture and modes of transmission of optical fiber.

1. **Engineering physics: R K Gaur and S L Gupta** ;ISBN: 9788189928223; *Dhanpat Rai Publishing Company (P) Ltd.* Edition: 2011
2. **Solid state physics: S O Pillai**; ISBN-10: 9386070928; New Age International Pvt. Ltd, Eighth edition: 9 January 2018.

- 1. Modern Physics: Kenneth S. Krane;***ISBN-13: 9781118061145* ; John Wiley & Sons, Inc., ; 3rd Edition, 2012.
- 2. Fiber Optics: A K Ghatak and K Thyagarajan;** *ISBN-13: 978-0521577854*; Cambridge University Press India Pvt. Limited, 1998.
- 3. Quantum computation and quantum information** - Michael A. Nielsen, Isaac L. Chuang - Cambridge University Press, 2004.\

1. https://onlinecourses.nptel.ac.in/noc23_ee84/preview
2. https://onlinecourses.nptel.ac.in/noc23_ph29/preview

[illegible]

Plan for tutorial classes (PHY4S12/22)

Every fourth hour of physics in a week is scheduled for tutorial class in the timetable.

Week	Topic
1	Numerical problems electrical conductivity and summarization of the topics taught during preceding three classes.
2	Numerical problems on Fermi energy and summarization of the topics taught during preceding three classes.
3	Numerical problems on Claussius-Mossotti equation and summarization of the topics taught during preceding three classes.
4	Summarization of the topics of MODULE 1.
5	Numerical problems on Boltzmann factor and summarization of the topics taught during preceding three classes.
6	Numerical problems on V-number, Numerical aperture and summarization of the topics taught during preceding three classes.
7	Numerical problems on attenuation and summarization of the topics taught during preceding three classes.
8	Summarization of the topics of MODULE 2.
5	Numerical problems on electrical conductivity and summarization of the topics taught during preceding three classes.
10	Numerical problems on critical magnetic field and summarization of the topics taught during preceding three classes.
11	Numerical problems on critical magnetic field and summarization of the topics taught during preceding three classes.
12	Summarization of the topics of MODULE 3.
13	Summarization of the topics taught during preceding three classes.
14	Summarization of the topics taught during preceding three classes.
15	Numerical problems Logic gates operation on Qubits and summarization of the topics taught during preceding three classes.
16	Summarization of the topics of MODULE 4.

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Hassan – 573202, Karnataka, India



BACHELOR OF ENGINEERING

DEPARTMENT OF CHEMISTRY

SYLLABUS

I AND II SEMESTERS

FIRST YEAR

Academic year 2024-25

VISION

To establish institutions of excellence and produce the best citizens who can contribute to global peace and prosperity.

MISSION

- To contribute to the qualified manpower of the nation.
- To provide excellent infrastructure and environment for quality education.
- To recruit and retain the finest faculty.
- To ensure enriching rewards to all stake holders.
- To fulfill social obligations in all possible ways.

Course Title	CHEMISTRY FOR CIVIL ENGINEERING STREAM		
Course Code	CHE4C12/22	(L-T-P)C	(3-1-2)4
SEE duration	3 hour	Hours / Week	06
CIE (Theory) marks	30	CIE(Practicals)/Activity marks	20
SEE marks	50	Total contact hours	60
Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.			
Course Outcomes: After the completion of the course, students shall be able to:-			
Sl. No.	Course outcomes		Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.		PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.		PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.		PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.		PO1, PO2& PO7

Course Contents:	
MODULE –1	10 Hrs.
Water and its Treatment Introduction, sources of water, impurities in water, standards of water for industrial supply. Hardness of water, types of hardness determination of total hardness by EDTA method. Boiler feed water and boiler problems , Boiler scales and sludge's- meaning, formation, disadvantages and prevention, priming and foaming. External treatment of boiler feed water - Hot Lime -Soda process and Ion exchange method. Internal treatment of water - phosphate conditioning & calgon treatment. Desalination - Meaning, purification of water by reverse osmosis. Potable water - Meaning, Standards of potable water, treatment of water for town supply. BOD and COD- definition, experimental determination of COD of the industrial waste water sample.	
MODULE –2	10 Hrs.
Chemical Energy Sources and Engineering Materials Fuels - Definition with examples. Characteristics of an ideal fuel. Calorific value- definition, types - Gross and Net calorific values, units in S.I system. Experimental determination of calorific value of a solid fuel using Bomb Calorimeter. Numerical problems on GCV and NCV. Chemical processing of Petroleum: Cracking - Definition. Types of cracking- thermal and catalytic cracking. Fluidized catalytic cracking. Reforming of petrol with reactions (Isomerization, cyclisation, aromatization and dehydrogenation). Octane number & Cetane number. Knocking in IC engine. Prevention of knocking - Anti knocking agents (TEL & MTBE). Green fuels: Power alcohol - introduction, advantages and disadvantages. Biodiesel - introduction, synthesis, advantages, and disadvantages. Cement : Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement.	
MODULE –3	10 Hrs.
Electrochemistry and Battery Technology Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst's equation. Concentration cell - Definition with example, derivation of EMF of concentration cells. Electrodes - Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas-electrode and ion selective electrode. Secondary reference electrodes – Calomel electrode-construction, working and applications.	

Ion selective electrode- construction and working of glass electrode. Determination of pH of a solution using glass electrode. Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells. Potentiometric estimation of FAS using $\text{K}_2\text{Cr}_2\text{O}_7$ solution.

Battery technology

Batteries- Definition, classification of batteries- primary & secondary batteries.

Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery.

Modern battery- construction, working and industrial applications of Li-ion batteries.

Fuel Cells- Introduction, definition, construction, working and industrial applications of $\text{H}_2\text{-O}_2$ fuel cell & Methanol- O_2 fuel cell.

MODULE – 4

10 hrs.

Macromolecules for Engineering Applications

Introduction, definition with examples. **Glass transition temperature (T_g)** - definition, factors affecting T_g and significances of T_g .

Plastics – Compounding of resins in to plastics.

Synthesis, properties and Industrial applications of PMMA and Polyurethane.

Polymer composites- introduction, **fibers-** meaning, synthesis, properties and industrial applications of Kevlar and Polyester.

Adhesives –Meaning, preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.

Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA).

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

List of experiments/Activities

A – Demonstration (any two) offline/virtual:

A1. Synthesis of polymer

A2. Synthesis of iron oxide nanoparticles

A3: Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A4. Determination of chloride content in the given water sample by Argentometric method

B – Exercise (compulsorily any 4 to be conducted):

- B1. Conductometric estimation of acid mixture
- B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$
- B3. Determination of p^{Ka} of vinegar using p^H sensor
- B4. Determination of rate of corrosion of mild steel by weight loss method
- B5. Estimation of total hardness of water by EDTA method

C – Structured Enquiry (compulsorily any 4 to be conducted):

- C1. Estimation of Copper present in electroplating effluent by optical sensor
- C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
- C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method
- C4. Estimation of Sodium present in soil/effluent sample using flame photometry
- C5. Determination of Chemical Oxygen Demand (COD) of industrial waste water sample

D – Open Ended Experiments (any two):

- D1: Evaluation of acid content in beverages by using p^H sensors and simulation
- D2. Estimation of copper in e-waste.
- D3. Volumetric estimation of gypsum in Portland cement
- D4. Searching suitable PDB file and target for molecular docking

TEXT BOOKS

- 1. Engineering Chemistry by M.M. Uppal, Khanna Publishers.
- 2. A text Book of Engineering Chemistry- by P C Jain and Monica Jain, Dhanapatrai Publications, New Delhi.(2015 edition)
- 3. A Text Book of Engineering Chemistry, R.V. Gadag and Nitthyananda Shetty, I.K. International Publishing house. 2nd Edition, 2016.
- 4. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, Bangalore.5th Edition,2014.

REFERENCE BOOKS

- 1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania, S.Nagin Chand &Co.,(2008 edition).
- 2. Industrial Chemistry by B.K.Sharma, GOEL Publishing House (2014 edition).
- 3. Industrial Electrochemistry, Second Edition by Derek Pletcher & Frank C. Walsh publisher: Chapman & Hall, USA (1993 edition)X
- 4. Corrosion Engineering, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
- 5. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan.
- 6. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
- 7. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H. Jeffery, 4th Ed.

MOOC COURSES

<https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-cy02/>

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3					
CO2	2	3					
CO3	3	2					
CO4	2	3					3

Tutorial class topics

1.	Revision of water and its treatment
2.	Question paper of CIE and SEE on water and its treatment will be discussed
3.	Test will be given on water and its treatment
4.	Numerical problems on GCV and NCV will be discussed
5.	Question papers of CIE and SEE on chemical energy sources and engineering materials will be discussed
6.	Test will be given on chemical energy sources and engineering materials
7.	Revision of electrochemistry and battery technology
8.	Question papers of CIE and SEE on electrochemistry and battery technology will be discussed
9.	Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells will be discussed
10.	Revision of macromolecules for engineering applications
11.	Question papers of CIE and SEE on macromolecules for engineering applications will be discussed
12.	Test will be given on macromolecules for engineering applications

Course Title		CHEMISTRY FOR COMPUTER SCIENCE AND ENGINEERING STREAM	
Course Code	CHE4S12/22	(L-T-P)C	(3-1-2)4
SEE duration	3 hour	Hours / Week	06
CIE (Theory) marks	30	CIE(Practicals)/Activity marks	20
SEE marks	50	Total contact hours	60
Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.			
Course Outcomes: After the completion of the course, students shall be able to:-			
Sl. No.	Course outcomes		Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.		PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.		PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.		PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.		PO1, PO2&PO7
Course Contents:			
MODULE –1			10 Hrs.
Macromolecules for Engineering Applications			
Introduction , definition with examples. Glass transition temperature (Tg) - definition, factors affecting Tg and significances of Tg.			
Plastics - Compounding of resins into plastics. Synthesis, properties and industrial applications of PMMA, Polyurethane & PTFE.			
Polymer composites - introduction. Fibers - meaning, synthesis, properties and industrial applications of Kevlar and Polyester.			
Adhesives –Meaning, preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.			
Elastomers - Definition, types-natural and synthetic rubber. Preparation of natural rubber from latex, deficiencies of natural rubber, vulcanization of natural rubber.			
Synthetic rubbers - Preparation, properties and industrial applications of SBR rubber, Thiokol, and Silicon rubber.			

MODULE –2	10 Hrs.
Electrochemistry and Sensors Electrochemistry Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst's equation. Concentration cell- Definition with example, derivation of E.M.F of concentration cells. Electrodes -Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas electrode and ion selective electrode. Secondary reference electrodes – Calomel electrode- construction, working and applications. Ion selective electrode- construction and working of the glass electrode. Determination of p^H of a solution using glass electrode. Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells. Potentiometric estimation of FAS using $K_2Cr_2O_7$ solution. Sensors: Introduction, working principle and applications of electrochemical sensors - Potentiometric sensors, Amperometric sensors, and Conductometric sensors. Optical sensors.	
MODULE –3	10 Hrs.
Energy, Storage and Conversion Batteries- Definition, difference between battery and cell. Classification of batteries- primary & secondary batteries. Battery characteristics. Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery. Modern batteries: Construction, working and industrial applications of Li-ion battery. Fuel Cells- Introduction, definition, construction, working and industrial applications of H_2-O_2 fuel cell & methanol-oxygen fuel cell. Differences between battery and fuel cell. Green fuels:Power alcohol- introduction, advantages and disadvantages. Biodiesel- Introduction, synthesis, advantages, and disadvantages. E-waste management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste.	
MODULE – 4	10 hrs.
Surface Finishing (PCB preparation) Introduction, technological importance of metal finishing. Factors affecting the nature of electro deposit - metal ion concentration, current density, complexing agents, organic additives, p^H , temperature & throwing power.	

Electroplating – Definition, electroplating process. Methods of cleaning the metal surfaces to be coated. Electroplating of Copper by cyanide bath method and electroplating of gold.

Electroless plating - Definition, distinction between electroplating and electroless plating, advantages of electroless plating. Electroless plating of Nickel and electroless plating of Copper in the manufacture of double-sided PCB.

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

List of experiments/Activities

A – Demonstration (any two) offline/virtual:

A1. Synthesis of polymer

A2. Synthesis of iron oxide nanoparticles

A3: Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A4. Determination of chloride content in the given water sample by Argentometric method.

B – Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$

B3. Determination of pKa of vinegar using p^H sensor

B4. Determination of rate of corrosion of mild steel by weight loss method

B5. Estimation of total hardness of water by EDTA method

C – Structured Enquiry (compulsorily any 4 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor

C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method

C4. Estimation of Sodium present in soil/effluent sample using flame photometry

C5. Determination of Chemical Oxygen Demand (COD) of industrial waste water sample

D – Open Ended Experiments (any two):

D1: Evaluation of acid content in beverages by using pH sensors and simulation

D2. Estimation of copper in e-waste.

D3. Volumetric estimation of gypsum in Portland cement

D4. Searching suitable PDB file and target for molecular docking

TEXT BOOKS

1. Engineering Chemistry by M.M. Uppal, Khanna Publishers.
2. A text Book of Engineering Chemistry- by P C Jain and Monica Jain, Dhanapatrai Publications, New Delhi.(2015 edition)
3. A Text Book of Engineering Chemistry, R.V. Gadag and Nitthyananda Shetty, I.K. International Publishing house. 2nd Edition, 2016.
4. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, Bangalore.5th Edition,2014.
5. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.

REFERENCE BOOKS

1. Industrial Chemistry by B.K.Sharma, GOEL Publishing House (2014 edition).
2. Industrial Electrochemistry, Second Edition by Derek Pletcher & Frank C. Walsh publisher: Chapman & Hall, USA (1993 edition)X
3. Corrosion Engineering, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
4. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan.
5. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
6. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H. Jeffery, 4th Ed.

MOOC COURSES

<https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-cy02/>

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3					
CO2	2	3					
CO3	3	2					
CO4	2	3					3

Tutorial class topics

1.	Revision of macromolecules for engineering applications
2.	Question papers of CIE and SEE on macromolecules for engineering applications will be discussed
3.	Test will be given on macromolecules for engineering applications
4.	Numerical problems on E, E^0 , E_{cell} , E^0_{cell} and concentration cells are discussed
5.	Question papers of CIE and SEE on electrochemistry and sensors will be discussed.
6.	Test will be given on electrochemistry and sensors
7.	Revision of energy, storage and conversion
8.	Question paper of CIE and SEE on energy, storage and conversion will be discussed
9.	Test will be given on energy, storage and conversion
10.	Revision of surface finishing
11.	Question papers of CIE and SEE on surface finishing are discussed
12.	Test will be given on surface finishing

Course Title		CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM	
Course Code	CHE4E12/22	(L-T-P)C	(3-1-2)4
SEE duration	3 hour	Hours / Week	06
CIE (Theory) marks	30	CIE(Practicals)/Activity marks	20
SEE marks	50	Total contact hours	60
Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.			
Course Outcomes:			
After the completion of the course, students shall be able to:-			
Sl. No.	Course outcomes		Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.		PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.		PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.		PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.		PO1, PO2&PO7
Course Contents:			
MODULE –1			10 Hrs.
Electrochemistry and Analytical Techniques			
Electrochemistry- Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst's equation.			
Concentration cell- Definition with example, derivation of emf of concentration cells.			
Electrodes - Types of electrodes-Metal-metal ion electrode, Metal-metal salt ion electrode, gas-electrode and ion selective electrode.			
Secondary reference electrode – Calomel electrode - construction, working and applications.			
Ion selective electrode- construction and working of the glass electrode. Determination of p^H of a solution using glass electrode. Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells.			
Analytical techniques: Introduction, principle and instrumentation: Colorimetric sensors – estimation of copper, Potentiometric sensors – estimation of iron and Conductometric sensors – estimation of weak acid.			

MODULE –2	10 Hrs.
Energy, Storage and Conversion Batteries- Definition, difference between battery and cell. Classification of batteries – primary & secondary batteries. Battery characteristics. Secondary batteries - construction, working and industrial applications of Lead- acid battery and Nickel-metal hydride battery. Modern batteries: Construction, working and industrial applications of Li-ion battery. Fuel Cells- Introduction, definition, construction, working and industrial applications of H ₂ -O ₂ fuel cell & methanol-oxygen fuel cell. Differences between battery and fuel cells. Green fuels:Power alcohol- Introduction, advantages and disadvantages. Biodiesel- Introduction, synthesis, advantages, and disadvantages. E-waste management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste.	
MODULE –3	10 Hrs.
Macromolecules for Engineering Applications Introduction, definition with examples. Glass transition temperature (T_g) - definition, factors affecting T _g and significances of T _g . Plastics – Compounding of resins into plastics. Synthesis, properties and industrial applications of PMMA, Polyurethane & PTFE. Polymer composites- introduction, Fibers- meaning, synthesis, properties and industrial applications of Kevlar and Polyester. Adhesives –Meaning, Preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins. Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA). Elastomers- Definition, types-natural and synthetic rubber. Preparation of natural rubber from latex, deficiencies of natural rubber, vulcanization of natural rubber. Synthetic rubbers- Preparation, properties and industrial applications of SBR rubber, Thiokol, and Silicon rubber.	
MODULE – 4	10 hrs.
Surface Finishing: Introduction, technological importance of metal finishing. Factors affecting the nature of electro deposit - metal ion concentration, current density, complexing agents, organic additives, p ^H , temperature & throwing power. Electroplating – Definition, electroplating process. Methods of cleaning the metal surfaces to be coated. Electroplating of Copper by cyanide bath method and electroplating of Gold.	

Electroless plating - Definition, distinction between electroplating and electroless plating. Advantages of electroless plating. Electroless plating of Nickel.

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration (water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

List of experiments/Activities

A – Demonstration (any two) offline/virtual:

A1. Synthesis of polymer

A2. Synthesis of iron oxide nanoparticles

A3: Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A4. Determination of chloride content in the given water sample by Argentometric method

B – Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$

B3. Determination of pKa of vinegar using pH sensor

B4. Determination of rate of corrosion of mild steel by weight loss method

B5. Estimation of total hardness of water by EDTA method

C – Structured Enquiry (compulsorily any 4 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor

C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method

C4. Estimation of Sodium present in soil/effluent sample using flame photometry

C5. Determination of Chemical Oxygen Demand (COD) of industrial waste water sample

D – Open Ended Experiments (any two):

D1: Evaluation of acid content in beverages by using p^H sensors and simulation

D2. Estimation of copper in e-waste.

D3. Volumetric estimation of gypsum in Portland cement

D4. Searching suitable PDB file and target for molecular docking

TEXT BOOKS

1. Engineering Chemistry by M.M. Uppal, Khanna Publishers.
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4. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, Bangalore.5th Edition,2014.

REFERENCE BOOKS

1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania, S.Nagin Chand &Co., (2008 edition).
2. Industrial Chemistry by B.K.Sharma, GOEL Publishing House (2014 edition).
3. Industrial Electrochemistry, Second Edition by Derek Pletcher & Frank C. Walsh publisher: Chapman & Hall, USA (1993 edition)X
4. Corrosion Engineering, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
5. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan.
6. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
7. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H. Jeffery, 4th Ed.

MOOC COURSES

<https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-cy02/>

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3					
CO2	2	3					
CO3	3	2					
CO4	2	3					3

Tutorial class topics

1.	Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells are discussed
2.	Question papers of CIE and SEE on electrochemistry and analytical techniques Will be discussed.
3.	Test will be given on electrochemistry and analytical techniques
4.	Revision of energy, storage and conversion
5.	Question paper of CIE and SEE on energy, storage and conversion will be discussed
6.	Test will be given on energy, storage and conversion
7.	Revision of macromolecules for engineering applications
8.	Question papers of CIE and SEE on macromolecules for engineering applications will be discussed
9.	Test will be given on macromolecules for engineering applications
10.	Revision of surface finishing
11.	Question papers of CIE and SEE on surface finishing are discussed
12.	Test will be given on surface finishing

Course Title	CHEMISTRY FOR MECHANICAL ENGINEERING STREAM		
Course Code	CHE4M12/22	(L-T-P)C	(3-1-2)4
SEE duration	3 hour	Hours / Week	06
CIE (Theory) marks	30	CIE(Practicals)/Activity marks	20
SEE marks	50	Total contact hours	60

Course Objective: The objective of this course is to build a strong foundation and basic skills in Engineering Chemistry for technological competence in industries.

Course Outcomes:

After the completion of the course, students shall be able to

Sl. No.	Course outcomes	Mapping to POs
1.	Describe the terms and chemical process involved in the scientific and engineering application.	PO1, PO2
2.	Illustrate the construction and working of the engineering process using basic concepts of chemistry.	PO1, PO2
3.	Outline the preparation, properties & applications associated with chemical substances in multidisciplinary fields.	PO1, PO2
4.	Apply the various principles and analytical techniques to solve the problems and quantitative analysis of materials in engineering applications.	PO1, PO2 PO7

Course Contents:

MODULE –1	10 Hrs.
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Chemical Energy Sources and Engineering materials

Fuels- Definition with examples. Characteristics of an ideal fuel. Calorific value- definition, types - Gross and Net calorific values, units in S.I system. Experimental determination of calorific value of a solid fuel using Bomb Calorimeter. Numerical problems on GCV and NCV.

Chemical processing of Petroleum: Cracking- Definition. Types of cracking- thermal and catalytic cracking. Fluidized catalytic cracking. Reforming of petrol with reactions (Isomerisation, cyclisation, aromatisation and dehydrogenation). Octane number & Cetane number. Knocking in IC engine. **Prevention of knocking** - anti knocking agents (TEL & MTBE).

Green fuels: Power alcohol- introduction, advantages and disadvantages. **Biodiesel-** introduction, synthesis, advantages and disadvantages.

Alloys: Introduction, classification, composition, properties and applications of Stainless Steel, Solders, Brass and Alnico.

MODULE –2	10 Hrs.
Water and its Treatment Introduction, sources of water, impurities in water, standards of water for industrial supply. Hardness of water, types of hardness determination of total hardness by EDTA method. Boiler feed water and boiler problems , Boiler scales and sludges- meaning, formation, disadvantages and prevention, priming and foaming. External treatment of boiler feed water - Hot Lime -Soda process and Ion exchange method. Internal treatment of water - phosphate conditioning & Calgon treatment. Desalination - Meaning, purification of water by reverse osmosis. Potable water - Meaning, Standards of potable water, treatment of water for town supply. BOD and COD- definition, experimental determination of COD of the industrial waste water sample.	
MODULE –3	10 Hrs.
Electrochemistry and Battery Technology Introduction, electrochemical cells – Definition, Types of electrochemical cells, Construction, working & representation of galvanic cell. Modern sign conventions, single electrode potential, standard electrode potential. E.M.F of a cell, standard E.M.F of a cell, derivation of Nernst equation. Concentration cell - Definition with example, derivation of emf of concentration cells. Electrodes - Types of electrodes-Metal-metal ion electrode, Metal- metal salt ion electrode, gas-electrode and ion selective electrode. Secondary reference electrodes – calomel electrode-construction, working and applications. Ion-selective electrode - construction and working of glass electrode. Determination of pH of a solution using glass electrode. Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells. Potentiometric estimation of FAS using $\text{K}_2\text{Cr}_2\text{O}_7$ solution. Battery technology: Batteries - Definition, Classification of batteries- primary & secondary batteries. Secondary batteries - construction, working and industrial applications of Lead-acid battery and Nickel -metal hydride battery. Modern battery - construction, working and industrial applications of Li-ion batteries. Fuel Cells - Introduction, definition, construction, working and industrial applications of $\text{H}_2\text{-O}_2$ fuel cell & Methanol- O_2 fuel cell.	
MODULE –4	10 Hrs
Macromolecules for Engineering applications : Introduction , definition with examples. Glass transition temperature (T_g) - definition, factors affecting T_g and significances of T_g . Plastics – Compounding of resins in to plastics.	

Synthesis, properties and Industrial applications of PMMA and Polyurethane.

Polymer composites- introduction, **fibers-** meaning, synthesis, properties and industrial applications of Kevlar and polyester.

Adhesives –Meaning, Preparation, properties and applications of Epoxy resins & Phenol-formaldehyde resins.

Bio-degradable polymers- Introduction, types of bio-degradable polymers, preparation, properties and applications of polylactic acid (PLA).

Corrosion chemistry

Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration(water line and pitting), factors affecting the nature of corrosion.

Corrosion control-galvanization, anodization and sacrificial anode method.

List of experiments/Activities

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A3: Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A4. Determination of chloride content in the given water sample by Argentometric method

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B3. Determination of pKa of vinegar using pH sensor

B4. Determination of rate of corrosion of mild steel by weight loss method

B5. Estimation of total hardness of water by EDTA method

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C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method

C4. Estimation of Sodium present in soil/effluent sample using flame photometry

C5. Determination of Chemical Oxygen Demand (COD) of industrial waste water sample

D – Open Ended Experiments (any two):

D1: Evaluation of acid content in beverages by using pH sensors and simulation

D2. Estimation of copper in e-waste.

D3.Volumetric estimation of gypsum in Portland cement

D4. Searching suitable PDB file and target for molecular docking

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5. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan.
6. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
7. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H. Jeffery, 4th Ed.

MOOC COURSES

<https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-cy02/>

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3					
CO2	2	3					
CO3	3	2					
CO4	2	3					3

Tutorial Class Topics

1.	Numerical problems on GCV and NCV will be discussed
2.	Question papers of CIE and SEE on chemical energy sources and engineering materials will be discussed
3.	Test will be given on chemical energy sources and engineering materials
4.	Revision of water and its treatment
5.	Question paper of CIE and SEE on water and its treatment will be discussed
6.	Test will be given on water and its treatment
7.	Revision of electrochemistry and battery technology
8.	Question papers of CIE and SEE on electrochemistry and battery technology will be discussed
9.	Numerical problems on E , E^0 , E_{cell} , E^0_{cell} and concentration cells will be discussed
10.	Revision of macromolecules for engineering applications
11.	Question papers of CIE and SEE on macromolecules for engineering applications will be discussed
12.	Test will be given on macromolecules for engineering applications

Scheme of Examination 2024-25

COURSE TYPE- INTIGRATED

Total marks	CIE Marks	SEE Marks
100	50	50

	Max Marks	Min. Passing Marks	<u>NOTE</u>
CIE:Theory	30	12	3 Tests
CIE:Practical	20	8	Experiments, records (15 Marks) & 1 Test (5 Marks)
CIE:Total	50	20	40% of 50 Marks(Minimum Eligible Marks for Writing SEE)
SEE (Only Theory)	100	35	Questions from practical component may be asked
SEE: Total	Reduced to 50Marks	18	35% of 50 Marks
Overall	100	40	CIE+SEE: (40%)

MALNAD COLLEGE OF ENGINEERING, HASSAN

An Autonomous Institution Affiliated to VTU, Belagavi



BACHELOR of ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS (2024 Admitted Batch)

I AND II SEMESTERS

(1st YEAR)

Academic Year 2024-25

Course Title		ELEMENTS OF MECHANICAL ENGINEERING	
Course Code	EME413	(L-T-P)C	(3-0-0)3
SEE duration	3 hour	Hours / Week	03
CIE (Theory) marks	30	CIE (Practicals)/Activity marks	20
SEE marks	50	Total contact hours	40
Course Objective: To introduce fresh entrants of mechanical engineering co.urse to the principles and fundamentals of Mechanical Engineering Course Outcomes (COs) {with mapping shown against the Program Outcomes (POs)}Upon completion of the course, students shall be able to:			
Sl. No.	Course outcomes		Mapping to POs
1.	Explain the purpose of mechanical engineering in industry and society, basics of steam, IC engines and electric vehicles		1, 2, 10
2.	Describe different power transmission systems, and concepts of engineering materials		1, 2, 10
3.	Describe traditional manufacturing techniques and illustrate manufacturing components using Lathe, CNC, additive manufacturing, and joining processes		1, 10
4.	Understand the basic principles of refrigeration and air-conditioning and mechatronics systems		1, 10
Course Contents:			
MODULE –1			10 Hrs.
Introduction to Mechanical Engineering (Overview) Role of Mechanical Engineers in Industries and Society - Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, Automation, Industry 4.0 and applications in Artificial Intelligence (AI) and Machine Learning (ML) Steam Formation and its properties: Steam formation, Types of steam, Steam properties and applications of steam, Simple numerical problems. IC Engines: Components and working principles, 4-stroke petrol and diesel engines, Applications of IC Engines, Performance of IC engines, Numerical problems on IP, BP, FP, Mechanical Efficiency.			
Activity: 1. Visit to any manufacturing/ aero/ auto industry or any power plant 2. Demonstration of working of IC engine 3. Various pollutants from the IC engine emission and effect on the environment.			

MODULE –2	10 Hrs.
Engineering Materials: Classification of Engineering Materials, Composite materials - classification, need, properties, advantages, limitations, and applications. Power Transmission: Gears-spurgears, bevelgears, helicalgears, worm gear sets, and rack and pinion, simple and compound gear trains, Belt drives (Flat and V-belt drive), Slip and creep in belt drives, V-belt drive, Velocity ratio, Simple numerical problems.	

Electric Vehicles: Working, Advantages and disadvantages, Components - Batteries, Chargers, Power devices, Drives and Transmission, Current status of EV vehicle technology in India.	
Activity: 1. Demonstration on tensile testing using UTM 2. Demonstration of power transmission devices 3. Comparison of electric and hybrid vehicles	
MODULE –3	10 Hrs.
Conventional Machining Processes: Introduction, Differences between conventional and non-conventional machining processes. Machine Tool Operations: Lathe: Principle of working of a center lathe, lathe operations - Turning, facing, thread cutting, taper turning by swiveling the compound rest. Drilling Machine: Working principle of simple drilling machine, drilling operations: drilling, boring, reaming, tapping. Milling machine: Working principle of simple milling machine, milling operations: up milling and down milling. (No sketches of machine tools, sketches to be used only for explaining operations) Joining Processes: Basic principle of welding, working principle of Electric Arc-welding and Gas welding and flames, Brazing, and soldering with applications.	
Activity: 1. Demonstration of lathe/ milling/ drilling operations 2. Demonstration of welding operation	
MODULE – 4	10 hrs.
Refrigeration and Air Conditioning: Principle of refrigeration, Refrigerants and their desirable properties, Working principle of VCR refrigeration system, Working principle of room/ window type air conditioner and Applications of air conditioners. Introduction to Advanced Manufacturing Systems: Introduction, Components of CNC, advantages and applications of CNC, Additive Manufacturing. Introduction to Mechatronics: Measurement system, Elements of measurement system, Open-loop and closed loop control systems, Advantages, disadvantages and applications of Mechatronics.	
Activity: 1. Demonstration of working of refrigerator 2. Visit to air conditioning unit 3. Demonstration of CNC operations and 3D printing	

TEXTBOOK:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

REFERENCES:

1. An Introduction to Mechanical Engineering, Jonathan Wickert, 2nd edition, Cengage Learning 2006, ISBN-10: 1-111-57682
2. Elements of Mechanical Engineering - K P Roy, S K H Choudhry, A K H Choudhry, Roy Media promoters and publishers, Mumbai, 7th edition, ISBN: 4567145216, 1234567145210.
3. Electric and Hybrid vehicles by A. K. Babu Khanna Publications
4. Introduction to Mechatronics, AppuuKuttan K K, Oxford University Press, 2007.

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	2	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	2	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	2	-	-	-	-

Scheme of Evaluation (Theory Courses)

	Portions for CIE	Mode of Evaluation	Weightage in Marks
CIE - 1	Syllabus to be decided by the course coordinators such that all the COs shall be covered.	Descriptive Test	10
CIE - 2		Descriptive Test	10
CIE - 3		Descriptive Test	10
Activity	Minimum of two activities to be conducted	Assignment / Case study/Practical/ Working model /Quiz	20
SEE			50
Total			100

Course Title	Computer Aided Engineering Drawing (CAED)		
Code	CED413/423	LTPC	2-0-2-3
SEE Duration	3 Hours	Hours/ Week	04
CIE (Theory Marks)	20	CIE (Practical/ Activity Marks)	30
SEE Marks	50	Total Hours	52

Course Objective: To introduce the students to “universal language of Engineers” for effective communication and perform drafting exercises of geometrical shapes, solids and machine elements in different systems of Projection using BIS/ISO standards and conventions with the aid of manual drafting and CAD package to effectively take-up the basic industrial/societal drawing needs.

Course Outcomes:

Upon completion of the course, students shall be able to;

COs	Statement	POs
1	visualize geometrical solids in 3D space through exercises in orthographic projections	1, 2, 5, 10
2	develop the lateral surfaces of geometrical solids	
3	interpret isometric views and draw orthographic views of machine components and perspective projections	
4	visualize engineering components	

Course contents:

MODULE 1

14 Hours

Principles of orthographic Projections: Different planes of projection and views taking point as an example with explanation about distance of a point from planes of projections. Concept of true length and true inclination of a line (emphasis on practical problems).

Orthographic Projection of Planes: Projection of Planes by change of position method only (no combination of planes).

MODULE 2

18 Hours

Orthographic Projection of Solids: Front, top and profile views of geometric solids resting with their base completely on HP (no other positions).

Development of lateral surfaces: Introduction to section planes and section of regular solids, Parallel and Radial line methods.

MODULE 3

12 Hours

Isometric Projections: Isometric projections of geometric solids and simple machine components. Conversion of Isometric views into Orthographic views: Simple machine components.

MODULE 4

08 Hours

Multidisciplinary Applications & Practice

Basic building drawing (Plan and Elevation), 2D Electrical wiring and lighting drawing, 2D Electronic PCB drawings.

Graphs & Charts: (Only for CIE)

Column chart, Pie chart, Line charts, Gantt charts, etc.using Microsoft Excel or any suitable software.

TEXT BOOK:

1. Engineering Drawing: N. D. Bhatt & M.Panchal. 37th Edition 1996, Charotar Publishing House. Gujarat.

REFERENCES:

1. Engineering Drawing & Design: Cencil Jensen, Jay D. Helsel, Dennis R. Short, Seventh Edition, Tata McGraw-Hill 2012.
2. Engineering Drawing: K. R. Gopal Krishna, 24th Edition 1999 Subhash Publications, Bangalore.
3. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
4. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newness, 1997.
5. Nainan P Kurian Design of foundation systems, Alpha Science International Ltd; 3rd edition, 2005.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	3	-	-	-	-	2	-	-
CO2	1	1	-	-	3	-	-	-	-	2	-	-
CO3	1	1	-	-	3	-	-	-	-	2	-	-
CO4	1	1	-	-	3	-	-	-	-	2	-	-

Scheme of Evaluation

	Portions for CIE	Mode of Evaluation	Weightage in Marks
CIE - 1	Syllabus to be decided by the course coordinators such that all the COs shall be covered.	Descriptive Test	10
CIE - 2		Descriptive Test	10
Activity	All 5 Modules	Assignment Submission	30
SEE			50
Total			100

Question Paper Pattern for Semester End Examination (SEE)

Q. No.	Module	Questions on	Sketching	CAD Printouts	Total
Part A (Answer Any Two)					
1	1	Projection of Planes	08	17	25
2	2	Projections of Solids (Polyhedra)	08	17	25
3	2	Projections of Solids (Solids of Revolution)	08	17	25
Part B (Answer Any Two)					
4	2	Development of lateral surfaces (Polyhedra)	08	17	25
5	3	Development of lateral surfaces (Solids of Revolution)	08	17	25
6	4	Isometric projections of geometric solids	08	17	25
Total Marks			32	68	100

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belgaum)



Bachelor of Engineering

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

I and II Semesters

(1st Year)

Academic Year 2024-25

VISION

The Department of Civil Engineering will be a centre of excellence in industry-oriented teaching, training, research, professional ethics, social responsibility, and continuing education for practicing engineers through sponsored research and consultancy services.

MISSION

- To improvise the curriculum to include contents pertaining to situational experience of variety of sites and develop a sense of social responsibility and to enhance research orientation of students through internship programs.
- To enhance sponsored research and consultancy works to achieve effective industry-institute-interaction and conduct Continuing Education Programme for practicing engineers.
- To inculcate professional ethics through quality and modern construction practices.
- To switch over to modern methods of material testing, Engineering analysis and design

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Program Educational Objectives:

PEO1: The graduate will be successful professionally and contribute to core civil engineering construction projects, infrastructure projects, alternative construction technology projects, green buildings towards environmental sustainability for academic domain as well as for research and pursue higher studies.

PEO2: The graduate will be professionally sound in broad area of knowledge of various dimensions of civil engineering and allied fields.

PEO3: The graduate will be a team leader/effective team member with ethical values, versatile, quick learner will adapt to given professional context with lifelong learning capability.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
1. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
2. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
3. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

(Source - Lead Society: American Society of Civil Engineers (ASCE) - Program Specific Criteria)

PSO 1: The Graduates will demonstrate the ability to design a civil engineering system, component or the process to meet desired project needs.

PSO 2: Graduates will be familiar with modern civil engineering professional software tools and demonstrate their ability in applying them for the solution of design situations.

Scheme of Evaluation (Theory Courses)

Assessment	Marks
CIE 1	10
CIE 2	10
CIE 3	10
Activities (Assignment/Mini Project) Minimum 2	20
SEE	50
Total	100

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	20 (12+8)
SEE	50	20

Course Title	ENGINEERING MECHANICS		
Course Code	CIV413	(L-T-P) C	(2-1-0) 3
SEE duration	3 Hours	Hours / Week	04
CIE (Theory) marks	30	Activity marks	20
SEE marks	50	Total Contact Hours	50

Course Objective:

- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the Centre of gravity and moment of inertia and their applications.

Course Outcomes (COs): Upon completion of the course, students shall be able to

Sl. No.	Course outcomes	Mapping to POs
1.	Compute the resultant of coplanar concurrent and non-concurrent force system	1,2
2.	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces	1,2
3.	Analyze the frictional resistance offered by different planes and locate the centroid.	1,2
4.	Compute the moment of inertia of sections and analyze the bodies in motion	1,2

Course Articulation Matrix

[illegible]

Course Contents:

MODULE –1	12Hrs.
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Resultant of coplanar force system:

Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

MODULE –2	12 Hrs.
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Equilibrium of coplanar force system:

Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.

MODULE –3	12 Hrs.
Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples. Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples.	
MODULE – 4	14 hrs.
Moment of inertia of plane areas: Introduction, moment of inertia of plane lamina, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built-up sections, Numerical examples. Kinematics and Kinetics Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion. Projectiles: Introduction, numerical examples on projectiles. D ‘Alembert’s principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.	
<u>Text Books:</u> 1. I B Prasad, “A Textbook of Applied Mechanics Dynamics and Statics”, Khanna Publishers. New Delhi. ISBN No. 978-81-7409-068-1, 19th Edition, Eleventh Reprint 2016. 2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications. 3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB 4. Engineering Mechanics Statics And Dynamics, S Rajasekaran Vikas Publishing House, 1 Nov 2009 - <u>Technology & Engineering</u>	
<u>Reference:</u> 1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill. 2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall. 3. Hibbler R.C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press. 4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press. 5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International 6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication. 7. Ramamrutham S: “Text book of Applied Mechanics”, Dhanpat Rai and Sons, New India. 1997.	

CIE Evaluation Scheme

Assessment		Weightage in Marks
CIE-I		10
CIE-II		10
CIE-III		10
Activity - I	1. Pragmatic application	10
Activity - II	1. Kinesthetics learning	10
Total		50

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	20 (12+8)
SEE	50	20

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous institution Affiliated to VTU, Belgaum)



Bachelor of Engineering

DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS

I & II Semester

(2024-25 Admitted Batch)

Academic Year 2024-25

Scheme & Syllabus for BE (E&C) I and II semesters

2024-25 Academic year

VISION OF THE DEPARTMENT

To produce industry ready, research oriented and socially responsible Electronics & Communication Engineers.

MISSION OF THE DEPARTMENT

- To create an ambience for learning.
- To conduct research, beneficial to the society.
- To promote industry-academic interaction at all-levels.
- To be continuously agile to the needs of the stake holders.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates will:

PEO1: Design and test Electronics & Communication systems and be successful professional in the field of ECE and allied areas.

PEO2: Be a good leader, team worker with strong communication skills.

PEO3: Possess capability to pursue higher education and be involved in research in the core and allied areas of E&C engineering and be a lifelong learner.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1:An ability to understand the basic concepts in Electronics and Communication Engineering and to apply them to various areas, like Signal and image processing, VLSI, Embedded systems, photonics, networks, MEMS, antennas etc., in the design and implementation of complex systems.

PSO2: Possess the skills to analyze and solve problems, using the latest software tools and hardware available in E & C Engineering along with analytical skills for real-time applications.

PROGRAM OUTCOMES

The program is targeted at developing the following competencies, skills and abilities amongst students of E & C Engineering:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis: Identify, formulate,** reviewer search literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of Evaluation (Theory Courses)

Assessment	Marks
THREE CIE's conducted for a total of 30 marks	30
Activities as decided by course faculty	20
SEE	50
Total	100

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	12+8=20 (CIE + Activity)
SEE	50	20

Course Title	BASIC ELECTRONICS		
Course Code	BEE413/423	(L-T-P)C	(3-0-0)3
SEE duration	3hours	Hours/Week	03
CIE(Theory)marks	30	Activity marks	20
SEE marks	50	Total contact hours	40

Sl. No.	Course outcomes	Mapping To POs	PSO's
1.	Develop the basic knowledge on construction, operation and characteristics of semiconductor devices.	1,2	1,2
2.	Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices.	1,2, 5, 9	1,2
3.	Develop competence knowledge to construct basic digital circuit by making use of basic gate and its function.	1, 2, 5, 9	1,2
4.	Analyze the basic concepts of communication System and various Modulation Techniques	1, 2, 5, 9	1,2

Course Objective:

The objective of the course is to equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.

Course Outcomes(COs): Upon completion of the course, students shall be able to

Course Contents:

MODULE –1	10 Hrs.
Semiconductor Diodes : Introduction, PN Junction diode, Characteristics, Diode Approximations, (Text1:2.1,2.2,2.3,2.4) Diode Applications: Introduction, Half Wave Rectification, Full Wave Center tapped and bridge Rectifier, Full wave Capacitor Filter Circuit, (Text1:3.1,3.2,3.4,3.5) Zener Diodes: Junction Breakdown, Characteristics, Zener Diode as Voltage Regulator (Numerical). (Text1:2.9, 3.7)	
MODULE–2	10 Hrs.
Bipolar Junction Transistors: Introduction, PNP and NPN Transistor, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, DC Loadline and Biaspoint: Self bias, fixed bias and voltage divider bias (Text1:4.2, 4.3, 4.5,4.6,4.7, 5.1, 5.2, 5.3, 5.4) Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs(Text1: 9.1,9.2,9.5)	
MODULE –3	10 Hrs.
Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting &Non-Inverting Amplifier.	

Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator, Summer and subtractor (Text 2: 1.1,1.2,1.3,1.5,2.2,2.3,2.4,2.6,6.5.1,6.5.2,6.5.3, 6.12, 6.13).	
MODULE– 4	10hrs.
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Basic Theorems and Properties of Boolean Algebra, Boolean Functions. Digital Logic Gates (Text3: 1.2,1.3,1.4,1.5,2.1,2.2,2.3,2.4, 2.5,2.6, 2.7) Combinational logic: Introduction, Design procedure, Adders-Half adder, Full adder (Text3:4.1,4.2,4.3) Communications: Introduction to Communication System, Modulation- AM and FM(Derivation and numerical)(Textbook5:1.1,1.2, 1.3, 3.1, 5.1)	

List of Activities

Activity Number	Activity Name	Description	Marks
1	Analog Circuit design and implementation using open Source Simulator	- Use Multisim Live Circuit Simulator (Online Simulation) - A group of 3 students should solve assigned experiment - Demonstration of the circuit with results	10*
2	Digital Circuit design and implementation using open-source Simulator	- Use Multisim Live Circuit Simulator (Online Simulation) - A group of 3 students should solve assigned experiment - Demonstration of the circuit with results	10*

Activity-1 Details:

Following are the experiments list of analog circuit design and implementation using open-source simulator.

- For a mobile charger design a zener voltage regulator that takes ripple DC voltage produced by bridge rectifier circuit and delivers a DC regulated supply of 5 V, 5 mA across load resistor.
- Construct an audio amplifier which takes 20 mV audio signal and delivers 2 V output signal to a loudspeaker inside a radio system.
- Construct a sinusoidal wave generator circuit using crystal oscillator to generate an audio signal frequency of 2kHz.
- Design an inverting amplifier to have a voltage gain of 50 and the output voltage amplitude is to be 2.5 V.
- A direct-coupled non inverting amplifier with a ± 25 mV input is to produce a ± 5 V output. Design the circuit with suitable resistance values.
- Design a bridge full wave rectifier circuit to produce 12 V unregulated DC voltage using a capacitor filter used in an electric vehicle charger circuit.
- The difference of two input signals is to be amplified by a factor of 20. Design the circuit with suitable resistance values.
- Design a three-input inverting summing amplifier circuit and show how it can be converted into an averaging circuit.

Activity-2 Details:

Following are the experiments list of circuit design and implementation using open source simulator.

1. Realization of Boolean expressions using basic gates.
2. Realization of half adder circuit.
3. Realization of full adder circuit.
4. Realization of 4-bit parallel adder.
5. Realization of SR and D flip flops.
6. Realization of JK and T flip flop.
7. Conversion of JK flip flop into D flip flop.
8. Realization of 4x 2 encoder and 2 x4 decoder.

Activity-3Details:

Assignment / Quiz

Suggested Learning Resources:

Books (Title of the Book / Name of the author/ Name of the publisher/Edition and Year)

1. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
2. Op-amp s and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4. Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013
5. Electronic Communication Systems, George Kennedy, 4th Edition, TMH

Web links and Video Lectures(e-Resources):

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

Course Articulation Matrix

Course Outcomes	Program Outcomes												Program Specific Outcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
Cos														
CO1	3	2											2	1
CO2	3	2			2				1				2	1
CO3	3	2			2				1				2	1
CO4	3	2			2				1				2	1

MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belgaum)



Bachelor of Engineering

**DEPARTMENT OF
ELECTRICAL & ELECTRONICS ENGINEERING**

SYLLABUS

I and II Semesters

(1st Year)

Academic Year 2024-25

VISION

To become a department of excellence in the domain of Electrical and Electronics Engineering producing competent engineers with research acumen having moral and social values.

MISSION

- Enhance industry and alumni interaction.
- Promote continuous quality up gradation of faculty and technical staff.
- Time to time modernization of departmental infrastructure to provide state of the art laboratories.
- Create research-oriented culture to invoke the desire and ability of lifelong learning among the students for pursuing successful career.
- Create and sustain environment of learning in which students acquire knowledge and learn to apply it professionally with due consideration of social and ethical values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the program will be able to

1. Design, analyse, operate and maintain equipment related to electrical and electronic industries with continuous integration with core and allied industries.
2. Use state of art laboratories and modern computer-based tools to pursue a diverse range of career as engineers and researchers.
3. Bring out innovations to provide best solutions to electrical engineering problems.
4. Fulfil the needs of society in solving technical problems using engineering principles, tools and practices, in an ethical and responsible manner.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Upon graduation, students with a degree B.E. in Electrical & Electronics Engineering will be able to:

1. Develop models, design, analyse and assess the performance of different types of electrical machines, control systems and generation, transmission, distribution, protection mechanisms in power systems.
2. Demonstrate knowledge and hands-on competence in the application of circuit analysis and design, associated software and applications, analog and digital electronics and microcontrollers to build, test, operate and maintain electrical and electronics systems.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Object management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Scheme of Evaluation (Theory Courses)

Assessment	Marks
CIE 1	10
CIE 2	10
CIE 3	10
Activities (Assignment/Mini Project) Minimum 2	20
SEE	50
Total	100

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	20 (12+8)
SEE	50	20

CIE Evaluation Scheme

Assessment		Weightage in Marks
CIE-I		10
CIE-II		10
CIE-III		10
Activity - I	1. Study of different types of wires, switches, sockets, lights and protective devices used for house wiring. 2. Selection of wires, switches, sockets, lights and protective devices with proper specification for given house plan	10
Activity - II	1. Calculation and analysis of energy consumption of individual residence and verification of electricity bill. 2. Working model of 1-way and 2-way control of a lamp.	10
Total		50

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	20 (12+8)
SEE	50	20

Course Title	Elements of Electrical Engineering		
Course Code	EEE413	L-T-P	(2-2-0) 3
Exam	3 Hrs.	Hours/Week	4
SEE	50Marks	Total Hours	40
Course Objective: The Students will acquire basic knowledge of electrical circuits, electromagnetism, protective devices and electric tariffs.			
Course Outcomes: At the end of course, students will be able to:			
#	Course outcomes	Mapping to PO's	Mapping to PSO's
1	Describe the basic laws used in the electromagnetism and DC circuits.	1,2	1
2	Apply the fundamentals of single phase and three phase AC circuits and perform related calculations.	1,2	1
3	Explain the concept of domestic wiring and Electrical safety measures.	1,2	1
4	Analyze the power rating of household appliances and electricity billing	1,2	1
MODULE-1			10 Hrs.
Electrical Energy: Significance of electrical energy, sources of energy, Conventional and renewable energy sources. Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical problems. DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits, Power and energy. Maxwells loop and node equations. Self-learning topics: Simple applications electromagnetic induction, self and mutual inductances.			
MODULE-2			10 Hrs.
Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R,L,C,R-L,R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numerical problems. Self-learning topics: Measurement of Voltage, current, power and power factor in single phase AC system			
MODULE-3			10 Hrs.
Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical. Self-learning topics: Measurement of Voltage, current, power and power factor in three phase AC systems			

COMMUNICATIVE ENGLISH

Course Title:		Communicative English		
Course Code:		ENG416	CIE Marks	50
			SEE marks	50
			Total Marks	100
Teaching Hours/Week (L:T:P: C)		1:0:0:1	Exam Hours	3 hours
Total Hours of Pedagogy		15 hours	Credits	01
CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.			
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.			
CO3	To impart basic English grammar and essentials of language skills as per present requirement.			
CO4	Understand and use all types of English vocabulary and language proficiency.			
CO5	Adopt the Techniques of Information Transfer through presentation.			
Course objectives: The course Communicative English (22ENG16) will enable the students, 1. To know about Fundamentals of Communicative English and Communication Skills in general. 2. To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills. 3. To impart basic English grammar and essentials of important language skills. 4. To enhance with English vocabulary and language proficiency for better communication skills. 5. To learn about Techniques of Information Transfer through presentation.				
Teaching-Learning Process : These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software’s to meet the present requirements of the Global employment market. (i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.				
Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.				

Module-1	(04 hours)
Introduction to Communicative English :Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.	
Module-2	(04 hours)
Introduction to Phonetics :Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.	
Module-3	(04hours)
Basic English Communicative Grammar and Vocabulary PART - I : Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.	
Module-4	(04 hours)
Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it. Communication Skills for Employment: Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.	
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Continuous Internal Evaluation(CIE): Two Unit Tests each of 30 Marks (duration 01 hour) • First test after the completion of 30-40 % of the syllabus • Second test after completion of 80-90% of the syllabus OneImprovementtestbeforetheclosingoftheacademictermmaybeconductedifnecessary.However besttwo tests out of three shall be taken into consideration Two assignments each of 20 Marks	

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour**. The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

- 1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd -2019.
- 2) **A Textbook of English Language Communication Skills**, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru -2022.

Reference Books:

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] -2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills–Lab Manual cum Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba**, Cambridge University Press –2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press –2016.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students instruct the students to prepare Flowcharts and Handouts
3. Organizing Group wise discussions Connecting to placement activities
4. Quizzes and Discussions, Seminars and assignments

INDIAN CONSTITUTION

Course Title:	Indian Constitution		
Course Code:	ICO417 / 427	CIE Marks	50
		SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	3 hours
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives:

The course **INDIAN CONSTITUTION (22ICO17 / 27)** will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Course outcome (Course Skill Set)

At the end of the course 22ICO17/27 the student will be able to:

CO1	Analyze the basic structure of Indian Constitution.
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3	Know about our Union Government, political structure & codes, procedures.
CO4	Understand our State Executive & Elections system of India.
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching – Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

- (i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.

- (ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills.

Module-1	(04 hours)
Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.	
Module-2	(04 hours)
Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.	
Module-3	(04 hours)
Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.	
Module-4	(04 hours)
Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism. State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.	
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Continuous Internal Evaluation(CIE): Two Unit Tests each of 30 Marks (duration 01 hour) • First test after the completion of 30-40 % of the syllabus. • Second test after completion of 80-90% of the syllabus. One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration. Two assignments each of 20 Marks The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time.	

Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour**. The student must secure a minimum of 35% of the maximum marks for SEE.

Suggested Learning Resources:

Textbook:

1. **“Constitution of India” (for Competitive Exams)** - Published by Naidhruva Edutech Learning Solutions, Bengaluru. –2022.
2. **“Introduction to the Constitution of India”,** (Students Edition.) by Durga Das Basu (**DD Basu**): Prentice –Hall, 2008.

Reference Books:

1. **“Constitution of India, Professional Ethics and Human Rights”** by Shubham Singles, Charles E.Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. **“The Constitution of India”** by Merunandan K B: published by Merugu Publication, SecondEdition, Bengaluru.
3. **“SamvidhanaOdu” - for Students & Youths by Justice HN NagamohanDhas, Sahayana, kerekon.**
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, **“Engineering Ethics”,** Prentice – Hall,2004.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students instruct the students to prepare Flowcharts and Handouts
3. Organizing Group wise discussions Connecting to placement activities
4. Quizzes and Discussions, Seminars and assignments.

Course Title	SAMSKRUTHIKA KANNADA		
Course Code	KSK417/427	(L-T-P)C	(1-0-0)1
CIE (Theory) marks	50	Class Hours/Week	01
SEE marks	50	Total class hours	30

Course Outcomes (COs):

At the end of course, student will be able to

#	Course outcomes	Mapping to PO's	Mapping to PSO's
CO1	Kannada bashe , Sahithya mathu kannadadha samskruthiya kurithu arivu mudiruthadhe.	P10	-
CO2	Kannada sahithyadha pradhana bhagavadha adhunika poorva mathu Adunika kavyagalannu sankethikavagi Kalithu hechina odhige mathu jnanakke spoorthi moodiruthadhe.	P10	-
CO3	Vidhyarthigalalli sahithya mathu samskruthiya bhagge arivu agu asakthiyannu hechaguthade.		
CO4	Thantrika vyaktigala parichaya agu avarugala sadhisidha vishayagalannu thilidhukondu nadina ennithara vyakthigala bhagge thilidhukollalu Kauthukathe hechaguthadhe.		
CO5	Samskruthika,janapadha agu oravasa kathanagala parichaya madikoduvudu.		

Course Contents:

Ghataka -1: Kannada Samkruthi mathu bhashe Kurithadha Lekhanagalu

1. Karnataka Samkruthi – Hampa Nagarajayya
2. Karnatakada yekikarana : Ondhu Apoorva Charithre – G.Venkatasubbayya
3. Adalitha Bhasheyaagi kannada – Dr. L.Thimmesha mathu, Prof.V.Keshavamurthy

Ghataka -2: Adhunika poorvadha kavya bhaga

- 4 .Vachanagalu : Basavanna , Akkamahadevi , Allamaprabhu , Aydhakki Maaraiyya , Jedaradasimaiyya , Aydhakki Lakkamma.
5. Kirthanegalu : Adharindenu pala edharindhenu pala? Purandharadhasaru Thalanisadhiru kandya thalu manave – Kanakadasaru
6. Thatvapadagalu : Saavira kodagala suttu – Shishunaala sharipha

Ghataka -3: Adhunika kavyabhaga

7. DVG ravara Mankuthimmana kaggadhindha aydhu bandha kelavu bhagagalu
8. Kurudu kachana : Da.Ra.Bhendre

9.Hosabalina geethe : Kuvempu

Ghataka -4: Thantrika Vyakthigala Parichaya

10. Dr.Sir.M.Visveshwari : Vyakthi mathu Aithihasika – A.N.Murthyrao

11. Karakushala kalegalu mathu parampareya vignana – Karigowda Bichanahalli

Ghataka -5: Samkruthika , janapadha kathe mathu pravasa kathegalu

12. Ugadi – Vasudhendra

13. Meghane yembha girijana parvatha – Hi.Chi.Bhoralingiyya

Course Title	BALAKE KANNADA (KANNADA FOR CONVERSATION)		
Course Code	KBK417/427	(L-T-P)C	(1-0-0)1
CIE (Theory) marks	100	Class Hours/Week	02
SEE marks	50	Total class hours	30

Course Learning Objectives:

At the end of course, student will be able to

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Non kannadiga students to undrestan, speak, read and write kannada language	P10	-
2	Communicate (converse) in Kannada language in their daily life with kannada speakers	P10	-

Course Contents:

Part-I: Lessons to teach and learn Kannada Language

Lesson-1: Vayaktika swamyasuuchaka/ sambandhitha saarwanaamagalulu mattu prashnarthaka padagalulu- personal pronouns, possessive forms, interrogative words

Lesson-2: Namapadagala sambandharthaka roopagalulu, sandehaspada prashnegalulu mattu sambhanda vachaka namapadagalulu – Possessive forms of nouns, dubitive question and relative nouns

Lesson-3: Guna parimaana mattu varnabanna visheshanagalulu sankhyavachakagalulu- Qualitative, Quantitative and Color Adjectives, Numerals

Lesson-4: Kaaraka roopagalulu mattu vibhakti prathyayagalulu- saphthami vibhakti prathyaya- (aa, adu, avu, alli) Predictive forms, locative case

Lesson-5: Chathurthi vibhakthi prathyayada balake mattu sankhyavachakagalulu- Dative cases and Numerals

Lesson-6: Sankhyaagunavaachakagalulu mattu bahuvachana naamaroopagalulu- Ordinal numerals and Plural markers

Lesson-7: Nyuuna / nishedhaarthaka kriyapadagalulu mattu Varna gunavachakagalulu- Defective / negative verbs and Color Adjectives

Lesson-8: Appane/oppige, nirdeshana, proothsaaha mattu otthaaya artharoopa padagalulu mattu vaakyagalulu- Permission, Commands, encouraging and Urging words (Imperative words and sentences)

Lesson-9 : Saamanya sambhaashanegalalli dvithiya vibhakthi prathyayagalulu mattu sambhavaniya prakaaragalulu- Accusative Cases and Potential Forms used in General Communication

Lesson-10 : “Iru mattu Iralla” sahayaka kriyaapadagalulu, sambhavyasuchaka mattu nishedhaarthaka kriyaa padagalulu – Helping Verbs “Iru and Iralla” , Corresponding future and Negation Verbs

Lesson-11:Hoolike (tharathama), sambhanda suchaka mattu vastu suchaka prathyayagalulu mattu nishedhaarthaka padagala balake- Comparative, Relationship, Identification and Negation Words

Lesson-12: Kaala mattu samayada haagu kriyapadagala vividha prakaragalulu- Different types of forms of Tense Sentences with Verb forms

Lesson-13: Dh, -Th, -Thu, -ithu, -aagi, -alla,-gh, -kh, -ide, kriyaa prathyayagalondige bhootha, bhavishyath mattu varthamana kaala vaakya rachane- Formation of Past, Future and Present Tense Sentences with Verb forms

Lesson-14: Karnataka raajya mattu raajyada bagge kurithaada ithare maahithigalu- Karnataka State and General information about the State

Lesson-15: Kannada bhaashe mattu saahithya- Kannada Language and Literature

Lesson-16: Bhaashe kaliyalu eenannu maadabeeku mattu maadabaaradu- Do's and Don'ts in Learning a Language

Lesson-17: Part-II

Kannada Language Script Part-1

Lesson-18 : Part-III

Kannada Vocabulary List: Sambhashaneyalli dinoopayoogi Kannada padagalu- Kannada words in Conversation.

University Guidelines for CIE Procedure:

- i) CIE Marks in Vyavaharika Kannada and Aadalita Kannada shall be the sum of marks prescribed for tests and assignments. Marks prescribed for tests shall be 75 and that for the assessments be 25.
- ii) The CIE marks awarded for the tests shall be based on three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 25 marks and the final CIE marks shall be the sum of the marks of all the three tests.
- iii) The remaining 25 marks shall be awarded based on the evaluation of assignments/unit tests/written quizzes that supports to communication skills as per Bloom's Revised Taxonomy and Course/programme outcomes.
- iv) Final marks awarded shall be the sum of (ii) and (iii) for a maximum of 100 marks.

The candidates shall write the test in Blue Books and also assignments/unit-tests/written quizzes in Blue Books/Notes which shall be preserved by the Principal/Head of the Department for at least six months after the announcement of University results and shall be made available for verification at the direction of the Registrar (Evaluation).

Course Title		INNOVATION & DESIGN THINKING	
Course Code	IDT418/428	(L-T-P) C	(1-0-0)1
SEE duration	2 hours	Hours / Week	01
CIE marks	50	Total Marks	100
SEE marks	50	Total contact hours	15
Course Objective: The objective of this course is to make students choose real life problems and generate innovative ideas to solve them through design thinking approach. Course Outcomes (COs) {with mapping shown against the Program Outcomes (POs)} Upon completion of the course, students shall be able to:			
Sl. No.	Course outcomes	Mapping to POs	
1.	explain the different stages in design thinking	1, 6, 7	
2.	generate solutions to real life problems by applying the design thinking approach	1, 2, 10, 12	
Course Contents:			
MODULE –1			5 Hrs.
Introduction: Innovation, Design, Early man as a designer, Design thinking levels: Component or product level, System or community level. Morphology of Design: Divergence or Explorative phase, Transformation or Creative phase, Convergence phase. Sustainable Development Goals.			
MODULE –2			5 Hrs.
Fundamentals of Design Thinking: Design Thinking Process: Different Phases. Empathize: Observation, Interview, Literature Survey. Define/Analyze:5 Why's technique, Conflict Analysis.			
MODULE –3			5 Hrs.
Ideate: Eskimo nine dot problem,Theory of Inventive Problem Solving (TRIZ method), Brain storming. Prototype: Methods of Prototyping. Testing: Self-reflection, Interviewing real customer.			
Activities: 1. Identifying real life problems through observation & interaction with real world 2. Literature Review 3. Brain Storming Session to generate ideas for the chosen problem 4. Skill building to prepare a prototype			
TEXTBOOK: 1. Dr. BalaRamadurai, " <i>Karmin Design Thinking</i> ", Mudranik Technology Private Ltd. ISBN978-93-5419-010-0. 2. V. Gupta and P. Murthy, An Introduction to engineering design method, Tata McGraw Hill, 2000. ISBN-0070964416.			

REFERENCES:

1. John.R.Karsnitz, Stephen O' Brienand JohnP. Hutchinson, *"Engineering Design"*, Cengage learning (International edition) Second Edition, 2013.
2. RogerMartin, *"The Design of Business: Why Design Thinking is the Next Competitive Advantage"*, Harvard Business Press ,2009.
3. HassoPlattner, Christoph Meine land LarryLeifer (eds), *"Design Thinking: Understand–Improve–Apply"*, Springer, 2011
4. IdrisMootee, *"Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School"*, John Wiley & Sons 2013.

Scheme of Evaluation (Laboratory Courses)

Level	Evaluation Type	Evaluation modules	Marks
1	Continuous internal Evaluation	Work diary	10
		Record	20
		Presentation based on chosen project	20
2	Semester End Examination	Design thinking project report	20
		Presentation based on chosen project	20
		Viva voce	10
Total			100

Note: The marks distribution to be made based on the rubrics.

Examination	Maximum marks	Minimum marks to qualify
CIE	50	20
SEE	50	20

SCIENTIFIC FOUNDATIONS OF HEALTH & PHYSICAL EDUCATION

Course Title:	SCIENTIFIC FOUNDATIONS OF HEALTH & PHYSICAL EDUCATION		
Course Code:	SFH418/428	CIE Marks	50
Course Type(Practical)	Practical	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:0:1:0	Exam Hours	02 hours Practical
Total Hours of Pedagogy/physical activity	30 hours	Credits	01

Course objectives:

To improve the student's physical and mental health

Course Outcome:

At the end of the course students will be able to

#	Course Outcomes	Mapping to PO's
1	Describe Health, wellness & its balance for positive mindset.	PO1
2	Adopt healthy lifestyles or good health and better future.	PO1
3	Demonstrate physical activity	PO1, PO9

Course Contents:

Module-1

(3hours of Pedagogy) :

Good Health & It's balance or positive mind set: Health-Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Method to improve good psychological health, Changing health habits for good health.

Module-2

(3hours of Pedagogy)

Building of healthy life styles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Physical Education Practical classes(24hours of Practical)		
Sl. No	Name of the Game	Name of the Skills
1.	Shuttle badminton	Service
		Smash
		Receive
		Drop Shot
		Foot work
2.	Basket ball	Dribbling
		Shooting
		Ten ley shoot
		Defensive slide
		Passing
3.	Foot Ball	Dribbling
		Chest drop
		Ball control
		Thigh drop
		Shooting
4.	Table tennis	Service
		Fore hand receive
		Back hand receive
		Smash
		Rally
5.	Volley ball	Attack
		Block
		Service
		Upper hand pass
		Under hand pass
6.	Ball badminton	Service
		Fore hand receive
		Back hand receive
		Spin Smash
		Striate Smash
7.	Throw ball	Spin Pass
		Jump Throw
		Service
		Receive
		Simple pass
8.	Kho- Kho	Giving Kho
		Single chain
		Pole dive
		Pole turning
		3 – 6 Up

9.	Kabaddi	Hand Touch
		Chain Hold
		Ankle Hold
		Thigh Hold
		Bonus
10.	Hand ball	Step with ball
		Shoot
		Pass
		Block
		Dribbling

Assessment Details (both CIE and SEE):

CIE Theory -20 Marks (Multiply Choice Questions - 20 marks)

CIE Practical -30 Marks (Physical activity, Performance and Attendance)

SEE Practical -50 Marks (Skill test-20 marks, Game performance-20 marks, and Event viva -10 marks)

Evaluation method	Assessment Tool	Maximum Marks	Minimum marks to be obtained
CIE	Multiple Choice Questions	20	8
	Performance and Attendance Criteria	30	12
SEE	Skill Examination	20	20
	Game Performance Examination	20	
	Viva -Voce	10	
Total Marks		100	40

ENGINEERING SCIENCE COURSES (ESC)

1. INTRODUCTION TO CIVIL ENGINEERING
2. INTRODUCTION TO ELECTRICAL ENGINEERING
3. INTRODUCTION TO ELECTRONICS ENGINEERING
4. INTRODUCTION TO MECHANICAL ENGINEERING
5. INTRODUCTION TO C PROGRAMMING

Course Title		INTRODUCTION TO CIVIL ENGINEERING												
Course Code	ESC4141/4241	(L-T-P) C		(3-0-0) 3										
SEE duration	3 Hours	Hours / Week		03										
CIE (Theory) marks	30	Activity marks		20										
SEE marks	50	Total Contact Hours		40										
Course Objective: • To make students learn the scope of various specializations of civil engineering. • To make students learn the concepts of sustainable infrastructure • To develop students’ ability to analyze the problems involving forces, moments with their applications. • To develop the student’s ability to find out the center of gravity and their applications. • To make the students learn about kinematics. • To make students learn the scope of Transportation Engineering in Civil Engineering														
Course Outcomes (COs): Upon completion of the course, students shall be able to														
Sl. No.	Course outcomes				Mapping to POs									
1.	Comprehend the Fundamentals of Civil Engineering and Building Science				1,2									
2.	Illustrate the Societal and Global Impact of Infrastructure				1,2									
3.	Apply the Principles of Force Systems				1,2									
4.	Determine Centroid and comprehend the basic concepts of Transportation Engineering				1,2									
Course Articulation Matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	2	3												
CO3	2	3												
CO4	2	3												
Course Contents:														
MODULE –1					10Hrs.									
Civil Engineering Disciplines and Building Science														
Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Environmental Engineering, Construction planning & Project management.														
Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals. Precast construction, Glass Fiber Reinforced Polymer.														
Structural elements of a building: foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.														

MODULE –2	10 Hrs.
Societal and Global Impact of Infrastructure Infrastructure: Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept. Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Land fill sites, urban flood control. Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.	
MODULE –3	10 Hrs.
Analysis of force systems: Concept of idealization, system of forces, principles of super position and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon’s theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems.	
MODULE – 4	10 hrs.
Centroid: Importance of centroid and center of gravity, methods of determining the centroid, locating the centroid of plane laminar from first principles, centroid of built-up sections. Numerical examples. Transportation Engineering: Importance of Transportation: Modes of transportation, Comparison with other modes, Different Road Patterns-Planning surveys. Importance-Controlling factors- Surface Characteristics-Cross Sectional elements, Camber, Sight distances, Horizontal and vertical alignment. Pavement Materials: Introduction, Soil, Road Aggregates and Bitumen.	
<u>Text Books:</u> 1. I B Prasad, “A Textbook of Applied Mechanics Dynamics and Statics”, Khanna Publishers. New Delhi. ISBN No. 978-81-7409-068-1, 19th Edition, Eleventh Reprint 2016. 2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications. 3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB	

Reference:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbeler R.C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Bhavikatti SS, Engineering Mechanics, 2019, New Age International.
6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

CIE Evaluation Scheme

Assessment		Weightage in Marks
CIE-I		10
CIE-II		10
CIE-III		10
Activity - I	Field Activity	10
Activity - II	Quiz	10
Total		50

Scheme of Evaluation (Theory Courses)

Assessment	Marks
CIE 1	10
CIE 2	10
CIE 3	10
Activities (Assignment/Mini Project) Minimum 2	20
SEE	50
Total	100

Examination	Maximum Marks	Minimum Marks to Qualify
CIE	50	20 (12+8)
SEE	50	20

Course Title		Introduction to Electrical Engineering	
Course Code	ESC4142/4242	(L-T-P)C	(3-0-0)3
Exam	3Hours	Hours/Week	03
SEE	50	Total Contact Hours	40
Course Objective: The student will acquire basic knowledge of electrical power systems, protective devices, electric circuits, measuring systems and machines.			
Course Outcomes(COs): Upon completion of the course, students shall be able to			
Sl.No.	Course outcomes		Mapping to POs
1.	Explain the basic concepts of electrical generation, transmission, distribution and basic electrical protection devices.		1, 2
2.	Describe the basic principle and construction of analog and digital measuring instruments.		1, 2
3.	Apply the basic concepts of electrical machines.		1, 2
4.	Analyze the fundamentals of single phase and three phase AC circuits and perform related calculations.		1, 2
MODULE –1			8 Hrs.
Electric Energy systems: Significance of electrical energy, sources of energy (Conventional/renewable), Single line/ block diagram representation of a typical power system. Brief introduction to the electrical generation, transmission and distribution subsystems indicating typical voltage levels. General concept of earthing, types of earthing, introduction to protective devices- Fuses, MCB, ELCB, MCCB, General types of wires and cables and selection, Electrical Tariff, Elementary calculation of energy consumption. SLC: General safety precautions in handling electrical appliances.			
MODULE –2			12 Hrs.
AC systems: Generation of single / three phase voltages, Instantaneous/average/rms values. Definition of impedance, admittance, real power, reactive power, apparent power and power factor. Analysis of series R-L,R-C,R-L-Ccircuits, phasordiagrams. Illustrative examples involving series and parallel circuits. Three phase systems: Star-Delta connection – calculation of voltage, current and power in a balanced three phase Star-Delta system. SLC: Measurement of Voltage, current, power and power factor in single phase and three phase AC system.			
MODULE –3			10 Hrs.
Electromechanical / Digital Instruments: Construction, working and principle of operation of Dynamometer type wattmeter. Digital meters, Merits and demerits of digital meters over analogmeters, digital multimeter and digital voltmeter. Electrical Machines: Specifications of machines, classification of machines, DCmachines-Constructional features, working principle of generator, EMF equation, Working principle of motor, Torque equation, Types of motors and their Voltage & Current relations, applications, Illustrative examples. SLC: Digital/smart energy meter, Brushless DC Motors and their application			

MODULE – 4	10hrs.
Transformers: Classification of transformers, applications of each type, construction of core and shell type transformers, principle of operation, EMF Equation, Transformation ratio, Power losses and efficiency, Illustrative examples on EMF equation and efficiency. Induction machines: Induction Motors-Concept of rotating magnetic field, classification (Squirrel cage and Slipring motors) Principle of operation and Constructional features, Slip and its significance, Single-phase induction motors, working principle, classification and applications. SLC: Applications of transformers and induction motors, types of electric motors used in Electric Vehicles.	
<u>Text Books:</u> 1. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice-Hall of India Pvt. Ltd., ISBN:81-203-2729-2, 2005.	
<u>Reference Books:</u> 1. D.C.Kulshreshtha, <i>Basic Electrical Engineering</i>, McGrawHill, 2nd edition, 2019 2. E. Hughes, <i>Electrical and Electronics Technology</i>, Pearson 2010 3. D.P.Kothari, I.J.Nagrath, <i>Basic Electrical Engineering</i>, McGrawHill Education, 4th Ed., 2019	

Course Articulation Matrix

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	2											3	
CO3	3	3											3	
CO4	3	2											2	

Course Title		INTRODUCTION TO ELECTRONICS ENGINEERING	
Course Code	ESC4143/4243	(L-T-P) C	(3-0-0)3
SEE duration	3 hours	Hours / Week	03
CIE (Theory) marks	30	Activity marks	20
SEE marks	50	Total contact hours	40
Course Objective: The objective of the course is to equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.			
Course Outcomes (COs): Upon completion of the course, students shall be able to			
Sl. No.	Course outcomes		Mapping to POs
1.	Develop the basic knowledge on construction, operation and characteristics of semiconductor devices.		1,2
2.	Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices.		1,2, 5, 9
3.	Develop competence knowledge to construct basic digital circuit by make use of logic gate and its function.		1, 5, 9
4.	Apply the knowledge of Embedded system and basic communication system.		1,2
Course Contents:			
MODULE –1			10 Hrs.
Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, voltage Multiplier.			
Amplifiers – CE amplifier input and output characteristics, multi-stage amplifier; BJT as a switch: Cut-off and saturation modes, BJT Biasing: Introduction, self bias and fixed bias. (Text 1)			
MODULE –2			10 Hrs.
Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op- amp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator. (Text 1)			
Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, RC Phase Shift Oscillator , Colpitt’s and Hartley oscillator, Crystal oscillator, Multivibrators, Single-stage astable multivibrator (using transistor only). (Only Concepts, working, and waveforms. No mathematical derivations).]			

MODULE –3		10 Hrs.
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7). Combinational logic: Introduction, Design procedure, Adders -Half adder, Full adder. (Text 2).		
MODULE – 4		10 hrs.
Embedded Systems–Definition, Embedded systems vs general computing systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller. (Text 4). Analog Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM. (Problems on AM only). Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK. (Only concepts, no mathematical derivations) (Text 3).		

List of Activities

Activity Number	Activity Name	Description	Marks
1	Analog Circuit design and implementation on using open Source Simulator	• Use Multisim Live Circuit Simulator (OnlineSimulation) • A group of 3 students should solve assigned experiment • Demonstration of the circuit with results	10
2	Digital Circuit design and implementation using open- source Simulator	• Use Multisim Live Circuit Simulator (OnlineSimulation) • A group of 3 students should solve assigned experiment • Demonstration of the circuit with results	10

Activity 1 Details:

Following are the experiments list of analog circuit design and implementation using open-source simulator.

1. For a mobile charger design a zener voltage regulator that takes ripple DC voltage produced by bridge rectifier circuit and delivers a DC regulated supply of 5 V, 5 mA across load resistor.
2. Construct an audio amplifier which takes 20 mV audio signal and delivers 2 V output signal to a loudspeaker inside a radio system.
3. Construct a sinusoidal wave generator circuit using crystal oscillator to generate an audio signal frequency of 2 kHz.
4. Design an inverting amplifier to have a voltage gain of 50 and the output voltage amplitude is to be 2.5 V.
5. A direct-coupled noninverting amplifier with a ± 25 mV input is to produce a ± 5 V output. Design the circuit with suitable resistance values.
6. Design a bridge full wave rectifier circuit to produce 12 V unregulated DC voltage using a capacitor filter used in an electric vehicle charger circuit.
7. The difference of two input signals is to be amplified by a factor of 20. Design the circuit with suitable resistance values.
8. Design a three-input inverting summing amplifier circuit and show how it can be converted into an averaging circuit.

Activity -2 Details:

Following are the experiments list of circuit design and implementation using open source simulator.

1. Realization of Boolean expressions using basic gates.
2. Realization of half adder circuit.
3. Realization of full adder circuit.
4. Realization of 4-bit parallel adder.
5. Realization of Integrator.
6. Realization of Differentiator.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DOI <https://doi.org/10.4324/9781315737980>. eBook ISBN 9781315737980.
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84.
3. D P Kothari, I J Nagrath, 'Basic Electronics', 2nd edition, McGraw Hill Education (India), Private Limited, 2018.
4. Shibu K V, "Introduction to Embedded systems", 4th print, McGraw Hill Education (India), Private Limited, 2011.

Course Articulation Matrix

Course Outcomes	Program Outcomes												Program Specific Outcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2											2	1
CO2	3	2			2				1				2	1
CO3	3				2				1				2	1
CO4	3	2											2	1

Course Title	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code	ESC4144/4244	(L-T-P)C	(3-0-0)3
SEE duration	3 hour	Hours / Week	03
CIE (Theory) marks	30	CIE (Practicals)/Activity marks	20
SEE marks	50	Total contact hours	39

Course Objective:

To introduce fresh entrants of engineering courses to the principles and fundamentals of Mechanical Engineering

Course Outcomes (COs) {with mapping shown against the Program

Outcomes (POs)} Upon completion of the course, students shall be able to:

Sl. No.	Course outcomes	Mapping to POs
1.	explain the concepts of mechanical engineering, energy sources, and engineering materials	1, 10
2.	explain the working principle of IC engines, electric and hybrid vehicles	1, 10
3.	describe non-traditional and modern manufacturing techniques and illustrate manufacturing components using CNC, additive manufacturing, and joining processes	1, 10
4.	understand the basic principles of automation, mechatronics and robotics	1, 10

Course Contents:

MODULE –1	10 Hrs.
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Introduction to Mechanical Engineering

Role of Mechanical Engineers in Industries and Society - Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, Automation, Industry 4.0 and applications in Artificial Intelligence (AI) and Machine Learning (ML).

Energy Sources: Introduction and applications of Energy sources like Fossil fuels, nuclear fuels, Hydel, Solar, wind, and biofuels.

Engineering Materials: Classification of Engineering Materials, Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer, composite materials.

Activity:

1. Visit to any manufacturing/ aero/ auto industry or any power plant
2. Demonstration on Tensile testing using UTM

MODULE –2		10 Hrs.
Introduction to IC Engines: Introduction, classification, Components and working principles, 4-stroke petrol and diesel engines, Applications of IC engines, Heat sinks in electronic devices.		
Electric and Hybrid Vehicles: Introduction, Working principle, Components of hybrid and electric vehicles, Advantages, and disadvantages of EVs and Hybrid vehicles.		
Activity: 1. Demonstration of working of IC engine 2. Various pollutants from the IC Engine Emission and Effect on the environment 3. Demonstration of power transmission devices		
MODULE -3		10 Hrs.
Non-conventional machining processes: Introduction, Difference between conventional and non-conventional machining processes. Working principle, advantages, disadvantages and applications of AJM, ECM, EDM and LBM.		
Joining Processes: Soldering and Brazing - principles and applications, Welding - Definition, applications, working principle of electric arc welding, gas welding and flames.		
Activity: Demonstration of welding, soldering and brazing		
MODULE – 4		10 hrs.
Introduction to Advanced Manufacturing Processes: Introduction, Components of CNC, advantages and applications of CNC, Additive Manufacturing.		
Introduction to Mechatronics and Robotics: Open loop and closed loop mechatronic systems, Programmable logic controllers, Sensors, Actuators, Nomenclature of an Industrial Robot: Polar Cylindrical, Cartesian coordinate and Spherical robot, Advantages, disadvantages, and applications. Automation, Types - Fixed, programmable, and flexible automation, merits and demerits of automation, Applications.		
Activity: 1. Demonstration of CNC operations and 3D Printing 2. Demonstration of pneumatic system and robot configuration in robotics lab.		

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	2	-	-	-	-

Scheme of Evaluation (Theory Courses)

	Portions for CIE	Mode of Evaluation	Weightage in Marks
CIE - 1	Syllabus to be decided by the course coordinators such that all the COs shall be covered.	Descriptive Test	10
CIE - 2		Descriptive Test	10
CIE - 3		Descriptive Test	10
Activity	Minimum of two activities to be conducted	Assignment / Case study/Practical/ Working model /Quiz	20
SEE			50
Total			100

Course Title	INTRODUCTION TO C PROGRAMMING		
Course Code	ESC4145/4245	L-T-P-C	(2-0-2)3
SEE Hours	03	Hours / Week	04
SEE	50 Marks	Total Hours	40
Course Objective : To provide fundamental programming concepts essential to develop program for a given problem.			
Course Outcomes (COs) : Upon Completion of the course, students shall be able to:			
COs	Statement	Mapping to POs	Mapping to PSOs
1.	Describe the concepts of C programming language	1	-
2.	Analyze the given program to determine the output and its correctness	1, 2	-
3.	Develop and document programs to find a solution for the given problem	3, 10	-
Course Contents:			
MODULE – 1			10 Hrs
Introduction: Importance of C, Basic structure of C program, executing a C program, Characters set, C tokens, Variables, Data types, Operators, Expressions, Evaluation of expressions, Operator precedence and associativity, Type conversion, Managing Input and Output Operations.			
MODULE – 2			10 Hrs
Decision making and Branching: Simple if, if..else, nested if and else if...ladder statements. Switch statement, The ?: operator. Decision making and Looping: Jumps in Loops, programming examples, Nested loops.			
MODULE – 3			10 Hrs
Arrays: One-dimensional Arrays, Two-dimensional Arrays, Character Arrays, Arithmetic operation on characters, String handling functions.			
MODULE – 4			10 Hrs
User-defined Functions: Elements of User defined function, Category of functions, Parameters passing in functions: call by value and call by reference. Structures: Defining a structure, Declaring a structure variable, Accessing structure members, Structure initialization, Operations on individual members, Arrays of structure Pointers: Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Initialization of pointer variables, Accessing a variable through its pointers.			

Text Book:	
1.	Balagurusamy E, Programming in ANSI C, 8 th Edition, Tata Mc Graw Hill, 2013.
Reference Books:	
1.	Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language”, 2nd Edition, PHI, 2012.
2.	Programming Techniques through C, M. G. Venkateshmurthy, Pearson Education, 2014

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	2	-	-	-	-

Laboratory Experiments											
1.	Quadratic equation is given by $ax^2+bx+c=0$, where a, b and c are the coefficients provided where $a \neq 0$. The formula to find roots of quadratic equation is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ Write a C program to find all the roots and test it for all three cases (based on discernment value)										
2.	A shop keeper requires performing simple calculations like addition, subtraction, Multiplication and modulo division for his daily business. Write a C program to design a simple calculator for shop keeper.										
3.	An electric power distribution company charges its domestic consumers as follows: <table border="0"> <tr> <td>Consumption Units</td><td>Rate of Charge</td></tr> <tr> <td>0-200</td><td>Rs. 0.50 per unit</td></tr> <tr> <td>201-400</td><td>Rs.100 plus Rs.0.65 per unit excess of 200</td></tr> <tr> <td>401-600</td><td>Rs.230 plus Rs.0.80 per unit excess of 400</td></tr> <tr> <td>601 and above</td><td>Rs.390 plus Rs.1.00 per unit excess of 600</td></tr> </table> Write a C program to read the customer number, power consumed and display the amount to be paid by the customer.	Consumption Units	Rate of Charge	0-200	Rs. 0.50 per unit	201-400	Rs.100 plus Rs.0.65 per unit excess of 200	401-600	Rs.230 plus Rs.0.80 per unit excess of 400	601 and above	Rs.390 plus Rs.1.00 per unit excess of 600
Consumption Units	Rate of Charge										
0-200	Rs. 0.50 per unit										
201-400	Rs.100 plus Rs.0.65 per unit excess of 200										
401-600	Rs.230 plus Rs.0.80 per unit excess of 400										
601 and above	Rs.390 plus Rs.1.00 per unit excess of 600										
4.	Sine series is given by $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$ upto n terms, where x is an angle in radian. Write a C program to find sine value for a given angle. Also verify calculated sine value using built in function.										
5.	A person wants to register his newly purchased car. He is passionate to have a Palindrome number for car registration. Write a C program to check whether the number allotted is palindrome or not.										
6.	Given a list of n student's weight, write a C program to find a student with given Weight. If found, display the position of the student in the list else display suitable message.										
7.	Given two matrices, write a C program to check whether the matrices are multipliable, if so find the product matrix, otherwise display suitable message.										
8.	Given a matrix, write a C program to find its transpose. Also find sum of upper triangle elements and sum of lower triangle elements of the transposed matrix.										
9.	Write a C program to read a string, find number of vowels and consonants in it.										
10.	Develop a function to find the factorial of a given number. Using the above function write a C program to find nCr and nPr where $nCr = \frac{n!}{r!(n-r)!}$ and $nPr = \frac{n!}{(n-r)!}$										
11.	Develop a C function to swap two numbers using pointers. Write a C program using the above function to swap two numbers.										
12.	Define a structure data type called student containing members: Name, USN, Marks of CIE1, CIE2, CIE3, activity1 and activity2. Write a C program that would assign values to individual members and display them along with the total internal marks of all students where total internal marks is sum of best of two CIE marks, activity1 and activity2.										

EMERGING TECHNOLOGY COURSES (ETC)

1. RENEWABLE ENERGY SOURCES
2. INTRODUCTION TO ELECTRIC VEHICLE TECHNOLOGY
3. WASTE MANAGEMENT
4. INTRODUCTION TO INTERNET OF THINGS (IOT)
5. INTRODUCTION TO CYBER SECURITY

Course Title	Renewable Energy Sources		
Course Code	ETC415E/425E	(L-T-P)C	(3-0-0)3
Exam	3Hours	Hours/Week	03
SEE	50	Total Contact Hours	40

Course Objective: The student will acquire basic knowledge of renewable energy systems.

Course Outcomes(COs): Upon completion of the course, students shall be able to

Sl.No.	Course outcomes	Mapping to POs
1.	Explain basic concept of renewable energy sources	1
2.	Describe the operation of solar thermal systems	1,6,7
3.	Explain the concept of wind energy systems	1,6,7
4.	Explain hydrogen energy, biomass, tidal and ocean energy systems	1,6,7

Course articulation matrix

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											3	
CO2	3	2											3	
CO3	3	3											3	
CO4	3	2											2	

Course Contents:

MODULE –1	10 Hrs.
Energy sources: Introduction to energy systems, introduction to renewable energy sources, Definition of renewable and non-renewable energy system with examples, Classification of renewable energy sources, worldwide renewable energy availability, Renewable energy in India Energy from sun: Solar energy geometry -latitude and longitude, Declination angle, day length and hour angle. Measurement of solar radiation- solar constant, Types of solar radiation, measurements and working principle of pyrheliometer.	
MODULE –2	10 Hrs.
Solar thermal energy systems and applications: Introduction to solar thermal energy storage and collection devices systems. Concentrating and non-concentrating type solar collectors, comparison between concentration and non-concentrating type solar collectors. Non-concentrating solar collectors: working principle of Flat-plate collectors. Concentrating Collectors: Types of concentrating collectors and descriptions. Applications: solar water heater and solar air heater Solar Photovoltaic: Solar cells- Types of solar cell, materials used for solar cell, Working principle of solar cell, I-V & P-V characteristics of solar cell. Series and parallel connection of solar cells. Panels, Modules. applications of solar cell systems, block diagram of solar PV system.	

MODULE –3	10 Hrs.
Hydrogen energy: Introduction to hydrogen energy, Properties of hydrogen with respect its utilization, Sources of hydrogen, production of hydrogen, Storage and transportation methods, Introduction to green hydrogen technology. Wind energy system: Availability of wind energy in India, motion of wind, wind seed characteristics. Basic components of a wind energy conversion system (WECS). Power in wind, Classification of WEC systems, Advantages, and disadvantages of WECS, Site Selection consideration.	
MODULE – 4	10hrs.
Biomass Energy: Introduction to biomass energy, types of biomasses and their applications, Energy content of biomass. Biomass as a source of energy-types of conversion process. Biogas-biogas production, Description biogas plant (batch type floating and fixed type). Ocean Energy: Tidal energy-Fundamental characteristics of Tidal power, classification of tidal power plants, advantages, and disadvantages of tidal power. Ocean thermal energy-fundamental characteristics of ocean thermal power, open cycle and closed cycle OTEC power plant. Advantages and limitations of OTEC. Introduction to sea wave energy.	
<u>Text Books:</u> 1. G.D.Rai, Non-conventional energy sources, Khana Publishers, 4th edition,2009, ISBN:8174090738, 9788174090737 2. S.P.Sukhatme, Solar Energy Principle of Thermal Collection and Storage, TataMcGraw Hill,1990,ISBN10: 0074624539	
<u>Reference Books:</u> 1. P.K.Nag,Solar power Engineering, TMH, 2003, ISBN: 0-07-043599-5. 2. Domkundwar, Power Plant Engineering, Dhanpath Rai & Sons, 3rd Edition, 2003, ISBN:6700000000330 3. B.H.Khan, Nonconventional energy resources by, TMH, 3rd edition, 2015, ISBN:13:978-0070142763	

MODULE-3	10Hrs
Sources: Batteries, Battery Parameters, Lead Acid Batteries, Nickel-Based Batteries, Sodium-Based Batteries, Lithium Batteries, Battery Charging, Battery Management System.	
MODULE-4	10Hrs
Electric Supply: Normal Existing Domestic and Industrial Electricity Supply, Infrastructure needed for charging Electric Vehicles, Electricity supply Rails, Battery swapping	
Fuel Cells: Operating principles of fuel cells, Fuel cell technologies, fuel supply, non-Hydrogen fuel cells	
ReferenceBooks: 1. JamesLarminie,JohnLowry, Electric Vehicle Technology Explained, John Wiley & Sons Ltd, 2nded.,2012. 2. JohnG.Hayes,G.AbasGoodarzi, Electric Powertrain: EnergySystems, Power Electronics and Drives for Hybrid, 3. Electric and Fuel Cell Vehicles, John Wiley & Sons Ltd,2018 4. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press Taylor & Francis Group,2004.	

Course Title	WASTE MANAGEMENT		
Course Code	ETC415F/425F	(L-T-P-S)	3-0-0-0
CIE marks	50	Hours/Week	03
SEE marks	50	Total contact hours	40
Total marks	100	SEE duration	3 hours

Course Objective:

To learn broader understandings on various aspects of solid waste management practice

Course Outcomes(COs): Upon completion of the course, students shall be able to

Sl.No.	Courseoutcomes	Mapping toPOs
1.	Comprehend the sources, classification, characteristics and system of collection of solid waste	PO1,PO2,PO7
2.	Learn different methods of transportation and treatment of solid waste	PO1,PO2,PO7
3.	Comprehend the various methods of air pollution control techniques and types of composting	PO1,PO6, PO7
4.	Learn different disposal methods of solid waste and hazardous waste	PO1,PO6,PO7

Course Articulation Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO2
CO1	3	2					1							
CO2	3	2					2							
CO3	2					1	3							
CO4	3					1	2							

Course Contents:

MODULE –1

10Hrs.

Introduction: Land Pollution-Definition, causes, health and environmental effects of waste. Scope and importance of solid waste management – Classification, source and characteristics. Estimation of energy content. Material flow and Functional elements of solid waste management.

Collection: segregation at source, Types of collection service. Systems of collection– hauled container and stationary container system. Estimation of solid waste quantities. Collection equipment– Garbage chutes. Bailing and compacting

MODULE –2	10Hrs.
Transportation and Processing Techniques: Transport methods, Transfer station and route optimization techniques. Mechanical volume reduction, Chemical volume reduction, Mechanical size reduction, Component separation, Drying and dewatering. Waste Disposal: key issues in waste disposal, disposal options and selection criteria. Incineration - Process, Design and Performance Considerations, 3T's of incineration process and problems associated within incineration operation	
MODULE –3	10Hrs.
Air Pollution Control Technologies: Gravitational settling chambers, Cyclone separator, Fabric filters, Electrostatic precipitators and Scrubbers Composting: Objectives, Aerobic and anaerobic composting-process and design consideration. Bangalore process of composting and Indore process of composting. Factors affecting composting. Vermi composting	
MODULE –4	10hrs.
Sanitary Land Filling: Different types Trench, area and Ramp Method. Advantages and disadvantages, land fill gas emission, leachate formation Hazardous waste: classification, exposure path ways and effects Biomedical waste: classification, potential implication and steps in biomedical waste management	
<u>TextBooks:</u> 1. Integrated Solid Waste Management: Tchobanoglous: Mc.GrawHill,1970, 1st Edition 2. SasiKumar. K, Sanoop GopiKrishna “Solid Waste Management” PHI Learning Pvt. Ltd, 2009	
<u>ReferenceBooks:</u> 1. Pavoni J.L “Hand book on Solid Waste Disposal” - 1973. Peavy and Tchobanoglous “Environmental Engineering” 1985	

Course Title	INTRODUCTION TO INTERNET OF THINGS
Course Code: ETC415H	LTPC: 3-0-0-3
Exam Hours : 3	Hours / Week : 3
SEE : 50 Marks	Lecture hours : 40 hours

Course Objective:

Understand about the fundamentals of networking, things in IOT and connecting things with the internet and IOT usage domains in everyday life.

Course Outcomes (COs){with mapping shown against the Program Outcomes (POs)} Upon completion of the course, students shall be able to:

COs	Statement	POs
1.	Describe the evolution of IOT, IOT networking components, and addressing strategies in IOT.	PO1
2.	Classify various sensing devices and actuator types.	PO1
3.	Explain the processing in IOT and associated IOT technology-cloud computing	PO1
4.	Illustrate architecture of IOT Applications	PO1,PO5

Course Contents:

Module-1	<u>Teaching Hours</u>
Basics of Networking: Introduction, Network Types, Layered network models Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4	10 Hours
Module-2	
IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensor examples, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Case study- Sensors and actuators in a smart phone Textbook 1: Chapter 5 – 5.1 to 5.9 Textbook-2 Chapter3- Tables 3.1 and 3.2	10 Hours

Module-3	
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. ASSOCIATED IOT TECHNOLOGIES Cloud Computing: Introduction, Virtualization, Cloud Models Textbook 1: Chapter 6 – 6.1 to 6.5 Chapter 10– 10.1 to 10.3	10 Hours
Module-4	
IOT CASE STUDIES Agricultural IoT – Introduction and Case Studies Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Textbook 1 Chapter 12- 12.1-12.2; Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1	10 Hours

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. Continuous Internal Evaluation (CIE):

Three Unit Tests each of 20 Marks then reduced to 10 Marks (duration 01 hour)

- First test after the completion of 30 % of the syllabus
- Second test after completion of 60% of the syllabus
- Third test after completion of 90% of the syllabus

ACTIVITIES

Activity Number	Activity Name	Description	Marks
1	Demonstrating the usage of general IoT sensors and actuators	• Demonstration using online simulation platform wokwi in group of 5-6 students. • Student can select any sensor or actuator for the simulation. For example sensors like DHT11, Ultrasonic sensor, IR sensor, Soil Moisture sensor, gas sensor, Current sensor, barometer etc and actuators like servo motor, LED, buzzer, DC motors etc. • Presentation with two pages report about the characteristics of sensors and actuators used.	15
2	Group Discussion	• Groups discussion about IoT case studies like Greenhouse automation, Vehicular IoT, IoT in smart cities, IoT in health and lifestyle etc.	05

Text Book:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry- IoT Fundamentals- Networking Technologies, Protocols and Use Cases for the Internet of Things, Cisco Press-2017

Reference:

1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

Course Title		INTRODUCTION TO CYBER SECURITY	
Course Code	ETC415I/425I	(L-T-P)C	(3-0-0)3
SEE duration	3 hour	Hours / Week	03
SEE marks	50	Total contact hours	40
Course Objective: Students will be able to gain knowledge on Cyber security and laws.			
Course Outcomes (COs): Upon completion of the course, students shall be able to			
Sl. No.	Course Outcomes	Mapping to POs	
1.	Comprehend knowledge on cybercrime terminologies	PO1	
2.	Explain Cyber offenses and Botnets	PO1, PO8	
3.	Gain insight on Modern Tools and Methods used on Cybercrime	PO1, PO5	
4.	Identify Phishing, Identity Theft and need of computer forensics	PO1, PO6	
Course Contents:			
MODULE –1			10 Hrs.
Introduction to Cybercrime:			
Cybercrime: Definition and Origins of the Word, Cybercrime, and Information Security, who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives			
Cyber Offenses:			
How Criminals Plan Them: Introduction, how criminals plan the attacks.			
MODULE –2			10 Hrs.
Social Engineering, Cyber Stalking, Cybercafé & cybercrimes.			
Botnets: The fuel for cybercrime, Attack Vector.			
Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers,			
MODULE –3			10 Hrs.
Phishing, Password Cracking, Key Loggers and Spyware, Virus, and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.			
Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing			

MODULE – 4	10 Hrs.
Types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.	
Text Books : 1. Nina Godbole and Sunit Belapure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)	
MOOCs 1. https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQG6Jm7LLSxvmNQjS_rt9swsu 2. https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_ 3. https://www.youtube.com/watch?v=6wi5DI6du4&list=PL_uaeekrhGzJIB8XQBxU3z__hDwT95xllk 4. https://www.youtube.com/watch?v=KqSqyKwVuA8	

Course Articulation Matrix:

COP O	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PS O1	PS O2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	2	-	-	-	2	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	3	-	-	-	-	-	-	-	-

PROGRAMMING LANGUAGE COURSES (PLC)

1. Introduction to Python Programming

MALNAD COLLEGE OF ENGINEERING, HASSAN
(An Autonomous Institution Affiliated to VTU, Belgaum)



Bachelor of Engineering

DEPARTMENT OF
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)

SYLLABUS

I&II Semester (2024 Admitted Batch)
(1st Year)

Academic Year 2024-25

Course Title	Introduction to Python Programming		
Course Code	PLC415B/425B	L-T-P-C	(2-0-2) 4
SEE duration	3 hours	Hours / Week	4
CIE(Theory)marks	30	CIE(Practicals)/Activity marks	20
SEE marks	50	Total contact hours	40
Course Objective: Student's will be able to write a python program to solve the given problem.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
SL. No.	Course Outcomes	Mapping to Pos	Mapping to PSOs
1.	Describe and apply python language construct for writing a program	1,3,5	-
2.	Analyze the codes snippet for its correctness	2,5	-
3.	Design a GUI/python program for the given problem	3,5	-
Course Contents:			
Module 1			10 Hours
Python Basics: The way of Programming. Variables, Expression and Entering Expressions into the Interactive Shell. The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, Flow control: Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow ControlStatements, Importing Modules, Ending a Program Early with sys.exit(). Loops for iteration. Manipulating Strings: Working with Strings, Useful String Methods.			
Module 2			10 Hours
Lists: The List DataType, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List. List-like Types: Strings and Tuples. Dictionaries: The Dictionary DataType, Pretty Printing. Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Argument sandprint(). Local and Global Scope, The global Statement. Exception Handling, A Short Program: Guess the Number.			
Module 3			10 Hours
Reading and Writing Files: Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module,Saving Variables with the print.format() Function. GUI Programming: Tkinter Introduction, Tkinter and Python programming, Widgets Label, Button, Entry, Scaling, Menu, Check Box, Radio button. Tkinter examples			

Module 4	10 Hours
Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying. Classes and functions: Time, Pure functions, Modifiers, Prototyping versus planning. Classes and methods: Object oriented features, Printing objects, Another example, A more complicated example, The init method. The str method. Operator overloading. Type-based dispatch, Polymorphism.	
Programming Exercises: 1. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages. 2. Develop a program to generate Fibonacci sequence of length(N). Read N from the console. 3. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R), 4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message. 5. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages. 6. Write a python program to Guess the number using randint() Functions (ask player to guess 6 times). 7. Write a magic 8-ball game program in python using list. 8. Write a program to search an element using linear search. 9. Write a program to search an element using binary search. 10. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not. 11. Write an Object-oriented Python program to create two Time objects: current Time, which contains the current time; and bread Time, which contains the amount of time it takes for a bread maker to make bread. Then we'll use add Time to figure out when the bread will be done. Write the print Time function to display the time when the bread will be done by the bread maker. 12. Define a function that takes two objects representing complex numbers and returns new complex number with an addition of two complex numbers. Define a suitable class 'Complex to represent the complex number. Develop a program to read N (N>2) complex numbers and to compute the addition of N complex numbers. 13. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details [Hint: Use list	

to store the marks in three subjects and total marks. Use init() method to initialize name, USN and the lists to store marks and total, Use the get Marks() method to read marks into the list, and display() method to display the scorecard details.]

14. Design GUI a python program to store the information about the student like first name, last name, department (text box), gender (radio button) with login and cancel button.

15. Design a simple GUI image viewer.

Text Books :

1. Al Sweigart, "Automate the Boring Stuff with Python", 1st Edition. No Starch Press, 2015.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015.
3. Wesley J Chun, "Core Python Application Programming", 3rd Edition, Pearson Publication, 2016.

Reference Books:

1. R. Nageswara Rao, "Core Python Programming", 3rd Edition, Dreamtech Press

Teaching-Learning Process

These are sample strategies, which teacher can use to accelerate the attainment of the various Course outcomes and make Teaching-Learning more effective

1. Chalk and talk, use modern tools and projector.
2. Demonstrate and visualize basic data types(list, tuple, and dictionary).
3. Use <https://pythontutor.com/visualize.html> mode edit in order to visualize the python code
4. Online Videos

Web links and Video Lectures(e-Resources):

- <https://www.learnbyexample.org/python/>
- <https://www.learnpython.org/>
- <https://pythontutor.com/visualize.html#mode=edit>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes for list, tuple, string dictionary slicing operations using below link:
<https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-python/raw/main/Python%203%20%20400%20exercises%20and%20solutions%20for%20beginners.pdf>

MOOCs:

1. https://onlinecourses.nptel.ac.in/noc21_cs32/

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3		2		3									
CO2		2			3									
CO3			2		3									

Scheme of Evaluation (Lab Integrated Courses)

Assessment	Marks
Three CIE's conducted for 20 marks each and reduced to 10 - Total of 30 Marks	30
Activities – 20 Marks 1. Continuous Evaluation in every lab session by the course coordinator -5 Marks 2. Record writing -5 Marks 3. Lab CIE – Conducted for 50 Marks and reduced to 10 Marks	20
SEE – Conducted for 100 Marks and reduced to 50 Marks.	50
Total	100

Examination	Maximum Marks	Minimum marks to qualify
CIE	50	(Theory 12 Marks, Activity 8 Marks) - 20
SEE	50	20

MATHEMATICS FOR SECOND SEMESTER B. E.

Course Title	Mathematics for Computer Science Engineering stream-2		
Course Code	MAT4S21	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)

Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to

COs	Outcomes	POs	PSOs
CO1	Apply suitable methods to solve the simple problems connected with ordinary differential equations/partial differential equations and vector calculus, number theory.	PO1	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	PO1, PO2	-
CO3	Examine and compute the vector calculus problems/applications connected with gradient, divergence and curl.	PO1, PO2	-
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-

MODULE - 1

10 Hrs.

Ordinary Differential Equations: First order first degree-Linear differential equations, Exact differential equation. Power series solutions --second order only.

Applicatons - Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, finding initial velocity of the space vehicle so that it has to

escape from earth. Modelling of infected diseases, carbon dating half-life period, mixing problem involving one tank, two tank. Application of first order differential equation- Autonomous equation and population dynamics- Logistic model- Natural growth of halibut population in certain areas of Pacific Ocean.

Self-Study- Bernoulli's differential equations, Reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$. Orthogonal trajectories in Cartesian form, illustrative examples, Applications to find the orthogonal trajectories -streamlines of flow in the channel, curves of constant temperature in a body, Equi-potential lines in an electric field between two concentric cylinders.

MODULE - 2

10 Hrs.

Ordinary Differential Equations: Higher order - Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non-homogeneous differential equations by inverse differential operator method for the following standard forms: exponential, polynomial, trigonometric and their product. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications - Oscillatory Electrical circuit: LC Circuit, LCR Circuit, LC Circuit with E.M.F, LCR Circuit with E.M.F, Electro-Mechanical Analogy.

Self-Study- Method of undetermined coefficients, LDE with variable coefficients (Cauchy's and Legendre's differential equations).

MODULE - 3

10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector method.

Partial Differential Equations: Brief introduction to classification of PDE, Solution of non-homogeneous PDE by direct integration. Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications - To find all possible solutions of one-dimensional heat equation and two-dimensional wave equation. Application connected with Computer Science Engineering.

Self-Study - Adam-Bashforth method, Solving PDE by variable separable method. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. To find all possible solutions of two-dimensional Laplace equation.	
MODULE - 4	10 hrs.
Vector Calculus: Velocity & acceleration of a vector point function, moment of a force, velocity of a rotating body, rotation of a rigid body, Physical & Geometrical Interpretation of dot product, Gradient, divergence & curl, irrotational vectors, illustrative examples from engineering field. Number theory -Properties of integers- division algorithm, GCD and LCM, Congruence relations, residue classes, congruence equations, applications of congruences on cryptography. Applications -Modelling projectile motion(vector approach), RSA Algorithm. Self-Study - Curvilinear coordinates: Scale factors, base vectors, and transformation between Cartesian and curvilinear systems, orthogonality- Problems.	
Tutorial component: 1. Need of studying the differential equations connected with L3. 2. Examples on first order first degree differential equations connected with L3. 3. Examples on first order first degree differential equations connected with L4. 4. Mathematical modeling using first order first degree differential equations. 5. Need of studying mathematical modeling –L4 6. Examples on linear differential equations with constant co-efficient (second order and first degree).L3 and L4 7. Mathematical modeling such as LCR circuit, transmission lines highway engineering, connected with LDE- L3 and L4 8. Need to study numerical solution of differential equations and examples L3 and L4 9. Report on role of partial differential equations in engineering-L3 10. Examples on numerical solution of simple partial differential equations-L3 11. Report on need of studying vector calculus-L4 12. Physical interpretation of the terms like gradient, divergence, curl, rotational and irrotational vectors - L3 and L4	

13. Examples on application on Vector Calculus connected with L3

14. Examples on application on Vector Calculus connected with L4

Practical component:

List of Programmes:

1. Solution of First order first degree-Linear differential equations
2. Solution of First order first degree-Exact differential equations
3. Solution of Linear differential equation with constant coefficients - Solutions of homogeneous equations.
4. Particular solution of non- homogenous differential equations for the following standard forms, exponential, polynomial, trigonometric and their product.
5. Solution of first order ordinary differential equation using Taylor series method
6. Solution of first order ordinary differential equation using Runge-kutta method.
7. Solution of first order ordinary differential equation using Milne's Predictor-Corrector method.
8. Finding gradient, divergence and curl.
9. Solution of 2nd order differential equations(by variation of parameter method).
10. Solution of partial differential equation (Laplace & Poisson equations).

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Text Books :

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd. 8th Edition (Wiley student edition) 2004.
3. Calculus by Thomas Finney, 9th edition, Pearson education, 2002.

Course Title	Mathematics for Civil Engineering-2		
Course Code	MAT4C21	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to			
COs	Outcomes	POs	PSOs
CO1	Apply suitable methods to solve the simple problems connected with ordinary differential equations/partial differential equations and vector calculus.	PO1	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	PO1, PO2	-
CO3	Examine and compute the vector calculus problems/applications connected with gradient, divergence and curl.	PO1, PO2	-
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-
MODULE - 1			10 Hrs.
Ordinary Differential Equations: First order first degree- Linear differential equations, Exact differential equations. Power series solutions -second order only. Applicatons - Mathematical modelling through differential equations of first order first degree and			

solution-modelling of population growth, finding initial velocity of the space vehicle so that it has to escape from earth. Modelling of infected diseases, carbon dating half-life period, mixing problem involving one tank, two tank. Application of first order differential equation- Autonomous equation and population dynamics - Logistic model - Natural growth of halibut population in certain areas of Pacific Ocean.

Self-Study - Bernoulli's differential equations, Reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$, Orthogonal trajectories in Cartesian form, illustrative examples. Applications to find the orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body. Equi-potential lines in an electric field between two concentric cylinders.

MODULE - 2

10 Hrs.

Ordinary Differential Equations: Higher order - Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non - homogenous differential equations by inverse differential operator method for the following standard forms, exponential, polynomial, trigonometric and their product. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications - Mechanical Vibrations-A Spring mass system $mu''(t) + ku'(t) + gu(t) = f(t)$ Undamped free vibrations, damped free vibrations, forced vibrations with damping, forced vibrations without damping.

Self-Study - Method of undetermined coefficients, LDE with variable coefficients (Cauchy's and Legendre's differential equations). Mechanical system and transmission lines.

MODULE - 3

10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods.

Partial Differential Equations: Brief introduction to classification of PDE, Solution of non-homogeneous PDE by direct integration. Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications - To find all possible solutions of one-dimensional heat equation and two-dimensional wave equation. Application connected with Civil Engineering. Self-Study - Adam-Bash forth method. Solving PDE by variable separable method. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. To find all possible solutions of two-dimensional Laplace equation.	
MODULE - 4	10 hrs.
Vector Calculus: Velocity & acceleration of a vector point function, moment of a force, velocity of a rotating body, rotation of a rigid body, Physical & Geometrical Interpretation of dot product, Gradient, divergence & curl, irrotational vectors, illustrative examples from engineering field. Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Applications -Modeling projectile motion(vector approach). Analysis of stream lines and electric potentials. Self-Study- Curvilinear coordinates: Scale factors, base vectors, and transformation between Cartesian and curvilinear systems, orthogonality- Problems.	
Tutorial component: 1. Need of studying the differential equations connected with L3. 2. Examples on first order first degree differential equations connected with L3. 3. Examples on first order first degree differential equations connected with L4. 4. Mathematical modeling using first order first degree differential equations. 5. Need of studying mathematical modeling –L4 6. Examples on linear differential equations with constant co-efficient (second order and first degree).L3 and L4 7. Mathematical modeling such as LCR circuit, transmission lines highway engineering, connected with LDE- L3 and L4 8. Need to study numerical solution of differential equations and examples L3 and L4 9. Report on role of partial differential equations in engineering-L3 10. Examples on numerical solution of simple partial differential equations-L3	

11. Report on need of studying vector calculus-L4
12. Physical interpretation of the terms like gradient, divergence, curl, rotational and irrotational vectors - L3 and L4
13. Examples on application on Vector Calculus connected with L3
14. Examples on application on Vector Calculus connected with L4

Practical component:

List of Programmes:

1. Solution of First order first degree-Linear differential equations
2. Solution of First order first degree-Exact differential equations
3. Solution of Linear differential equation with constant coefficients - Solutions of homogeneous equations.
4. Particular solution of non- homogenous differential equations for the following standard forms, exponential, polynomial, trigonometric and their product.
5. Solution of first order ordinary differential equation using Taylor series method
6. Solution of first order ordinary differential equation using Runge-kutta method.
7. Solution of first order ordinary differential equation using Milne's Predictor-Corrector method.
8. Finding gradient, divergence and curl.
9. Solution of 2nd order differential equations(by variation of parameter method).
10. Solution of partial differential equation (Laplace & Poisson equations).

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Text Books :

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd. 8th Edition (Wiley student edition) 2004.
3. Calculus by Thomas Finney, 9th edition, Pearson education, 2002.

Course Title	Mathematics for Electrical and Electronics Engineering stream-2		
Course Code	MAT4E21	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)

Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.

Course Outcomes (COs): At the end of course, student will be able to

COs	Outcomes	POs	PSOs
CO1	Apply suitable methods to solve the simple problems connected with ordinary differential equations/partial differential equations and vector calculus, graph theory.	PO1	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	PO1, PO2	-
CO3	Examine and compute the vector calculus problems/applications connected with gradient, divergence and curl.	PO1, PO2	-
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-

MODULE - 1	10 Hrs.
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Differential Equations (DE): first order first degree-Linear differential equations, Exact differential equations.

Power series solutions-second order only.

Applicatons : Mathematical modelling through differential equations of first order first degree and

solution-modelling of population growth, finding initial velocity of the space vehicle so that it has to escape from earth. Modelling of infected diseases, carbon dating half-life period, mixing problem involving one tank, two tank. Application of first order differential equation- Autonomous equation and population dynamics - Logistic model- Natural growth of halibut population in certain areas of Pacific Ocean.

Self-study - Reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$. Orthogonal trajectories in Cartesian form-illustrative examples. Applications to find the orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body. Equi-potential lines in an electric field between two concentric cylinders. Bernoulli's differential equations.

MODULE - 2

13 Hrs.

Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non- homogenous differential equations by inverse differential operator method for the following standard forms, exponential, polynomial, trigonometric and their product. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications of second order, first degree Differential equations - Oscillatory Electrical circuit, LC Circuit, LCR Circuit, LC Circuit with E.M.F, LCR Circuit with E.M.F, Electro-Mechanical Analogy. Applications of second order, first degree Differential equations - Transmission lines, Highway engineering.

Self-study-Method of undetermined coefficients, LDE with variable coefficients (Cauchy's and Legendre's differential equations).

MODULE - 3

10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods.

Partial Differential Equations. Brief introduction to classification of PDE, Solution of non-homogeneous PDE by direct integration, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: To find all possible solutions of one-dimensional heat equation and two-dimensional wave equation. Estimating the approximate solutions of ODE for electric circuits.

Self-Study - Adam-Bash forth method, Solving PDE by variable separable method. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. To find all possible solutions of two-dimensional Laplace equation. Application connected with Electrical Engineering.

MODULE - 4

10 hrs.

Vector Calculus: Velocity & acceleration of a vector point function, moment of a force, velocity of a rotating body, rotation of a rigid body, Physical & Geometrical Interpretation of dot product, Gradient, divergence & curl, irrotational vectors, illustrative examples from engineering field.

Graph theory: Introduction to graph theory, types of graphs, subgraphs, spanning subgraphs, shortest path algorithms (Prims and Kruskal).

Applications: Modelling projectile motion (vector approach), Analysis of streamlines and electric potentials.

Self - study: .**Curvilinear coordinates:** Scale factors, base vectors and transformation between Cartesian and curvilinear systems, orthogonality-Problems.

Tutorial component:

1. Need of studying the differential equations connected with L3.
2. Examples on first order first degree differential equations connected with L3.
3. Examples on first order first degree differential equations connected with L4.
4. Mathematical modeling using first order first degree differential equations.
5. Need of studying mathematical modeling –L4
6. Examples on linear differential equations with constant co-efficient (second order and first degree).L3 and L4
7. Mathematical modeling such as LCR circuit, transmission lines highway engineering, connected with LDE- L3 and L4
8. Need to study numerical solution of differential equations and examples L3 and L4
9. Report on role of partial differential equations in engineering-L3

10. Examples on numerical solution of simple partial differential equations-L3
11. Report on need of studying vector calculus-L4
12. Physical interpretation of the terms like gradient, divergence, curl, rotational and irrotational vectors - L3 and L4
13. Examples on application on Vector Calculus connected with L3
14. Examples on application on Vector Calculus connected with L4

Practical component:

List of Programmes:

1. Solution of First order first degree-Linear differential equations
2. Solution of First order first degree-Exact differential equations
3. Solution of Linear differential equation with constant coefficients - Solutions of homogeneous equations.
4. Particular solution of non- homogenous differential equations for the following standard forms, exponential, polynomial, trigonometric and their product.
5. Solution of first order ordinary differential equation using Taylor series method
6. Solution of first order ordinary differential equation using Runge-kutta method.
7. Solution of first order ordinary differential equation using Milne's Predictor-Corrector method.
8. Finding gradient, divergence and curl.
9. Solution of 2nd order differential equations(by variation of parameter method).
10. Solution of partial differential equation (Laplace & Poisson equations).

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Text Books :

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd. 8th Edition (Wiley student edition) 2004.
3. Calculus by Thomas Finney, 9th edition, Pearson education, 2002.

Course Title	Mathematics for Mechanical Engineering -2		
Course Code	MAT4M21	(L-T-P)	(3-1-2)4
Exam	3hours	Hours / Week	06
SEE	50 Marks	Total Hours	65(40L+13T+12P)
Course Objective: To train the students to acquire knowledge in differential equations and vector calculus, so as to solve basic engineering application problems.			
Course Outcomes (COs): At the end of course, student will be able to			
COs	Outcomes	POs	PSOs
CO1	Apply suitable methods to solve the simple problems connected with ordinary differential equations/partial differential equations and vector calculus.	PO1	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	PO1, PO2	-
CO3	Examine and compute the vector calculus problems/applications connected with gradient, divergence and curl.	PO1, PO2	-
CO4	Model the real-life problems/Engineering application problems and hence solve the same.	PO1, PO2	-
CO5	Write the program in python for the mathematical procedures connected with calculus, numerical methods, differential equations, vector calculus, execute the same and provides correct output.	PO1, PO2, PO5	-
MODULE - 1			10 Hrs.
Ordinary Differential Equations - first order first degree- Linear differential equations, Exact differential equations. Power series solutions- second order only. Applications: Mathematical modelling through differential equations of first order first degree and			

solution-modelling of population growth, finding initial velocity of the space vehicle so that it has to escape from earth. Modelling of infected diseases, carbon dating half-life period, mixing problem involving one tank, two tank. Application of first order differential equation- Autonomous equation and population dynamics- Logistic model- Natural growth of halibut population in certain areas of Pacific Ocean.

Self-study--Bernoulli's differential equations, Reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$, Orthogonal trajectories in Cartesian form-illustrative examples, Applications to find the orthogonal trajectories - streamlines of flow in the channel, curves of constant temperature in a body. Equi-potential lines in an electric field between two concentric cylinders.

MODULE - 2

10 Hrs.

Linear differential equation with constant coefficients - Solutions of homogeneous equations. Particular solution of non- homogenous differential equations by inverse differential operator method for the following standard forms, exponential, polynomial, trigonometric and their product. Method of variation of parameters to solve linear differential equation with constant coefficients.

Applications of second order, first degree Differential equations: - Mechanical Vibrations-A Spring mass system $mu''(t) + ku'(t) + gu(t) = f(t)$ Undamped free vibrations, damped free vibrations, forced vibrations with damping, forced vibrations without damping.

Self-study- method of undetermined coefficients, LDE with variable coefficients (Cauchy's and Legendre's differential equations. Mechanical system and transmission lines.

MODULE - 3

10 Hrs.

Numerical solution of first order, first degree ODE: Taylor's series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods.

Partial Differential Equations. Brief introduction to classification of PDE, Solution of non-homogeneous PDE by direct integration, Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formula.

Applications: To find all possible solutions of one-dimensional heat equation and two-dimensional

wave equation. Finding approximate solutions to solve mechanical engineering problems.

Self-Study- Adam-Bash forth method, Solving PDE by variable separable method. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. To find all possible solutions of two-dimensional Laplace equation. Application connected with Mechanical Engineering..

MODULE - 4

10 hrs.

Vector Calculus: Velocity & acceleration of a vector point function, moment of a force, velocity of a rotating body, rotation of a rigid body, Physical & Geometrical Interpretation of dot product, Gradient, divergence & curl, irrotational vectors, illustrative examples from engineering field.

Nonlinear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations.

Applications: Modelling projectile motion(vector approach), Formulation and solution of Cantilever beam. Analysis of stream lines and electric potentials.

Self-study: Curvilinear coordinates: Scale factors, base vectors, and transformation between Cartesian and curvilinear systems, orthogonality-Problems.

Tutorial component:

1. Need of studying the differential equations connected with L3.
2. Examples on first order first degree differential equations connected with L3.
3. Examples on first order first degree differential equations connected with L4.
4. Mathematical modeling using first order first degree differential equations.
5. Need of studying mathematical modeling –L4
6. Examples on linear differential equations with constant co-efficient (second order and first degree).L3 and L4
7. Mathematical modeling such as LCR circuit, transmission lines highway engineering, connected with LDE- L3 and L4
8. Need to study numerical solution of differential equations and examples L3 and L4
9. Report on role of partial differential equations in engineering-L3
10. Examples on numerical solution of simple partial differential equations-L3

11. Report on need of studying vector calculus-L4
12. Physical interpretation of the terms like gradient, divergence, curl, rotational and irrotational vectors - L3 and L4
13. Examples on application on Vector Calculus connected with L3
14. Examples on application on Vector Calculus connected with L4

Practical component:

List of Programmes:

1. Solution of First order first degree-Linear differential equations
2. Solution of First order first degree-Exact differential equations
3. Solution of Linear differential equation with constant coefficients - Solutions of homogeneous equations.
4. Particular solution of non- homogenous differential equations for the following standard forms, exponential, polynomial, trigonometric and their product.
5. Solution of first order ordinary differential equation using Taylor series method
6. Solution of first order ordinary differential equation using Runge-kutta method.
7. Solution of first order ordinary differential equation using Milne's Predictor-Corrector method.
8. Finding gradient, divergence and curl.
9. Solution of 2nd order differential equations (by variation of parameter method).
10. Solution of partial differential equation (Laplace & Poisson equations).

NOTE:

- 1.Proofs are not required for any theorems and properties.
- 2.There should not be any questions from self study part in semester End Examination.

Text Books :

1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd. 8th Edition (Wiley student edition) 2004.
3. Calculus by Thomas Finney, 9th edition, Pearson education, 2002.

Course Title	Mathematics-III for Computer Science Engineering		
Course Code	24MACS301	(L-T-P) C	(2-2-0) 3
Exam	3 hours	Hours/Week	03
SEE	50 marks	Total Hours	42L + 48ABL = 90
Course Objective: To introduce linear algebra and Probability theory which can be employed as tools in solving engineering application problems.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Demonstrate the matrix concepts and solution techniques to solve systems of linear equations and perform geometric transformations in engineering applications.	1	-
2.	Apply concepts of Eigen values, eigenvectors, and matrix factorization techniques to solve engineering problems and analyze models such as elastic deformation and population growth.	1,2	-
3.	Analyze and apply various probability distributions and statistical measures, including mean, variance, and cumulative distribution functions, to solve engineering and real-world problems.	1	-
4.	Employ the concepts of joint probability distributions, covariance, and Markov chains to model and analyze systems with multiple states and transitions in engineering applications.	1,2	-
5.	Model the real-life problems/engineering application problems and solve the same.	1,2	-
Course Contents:			
MODULE – 1			10 Hrs
Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non-homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given. Applications: Solution of system of equations to balance the chemical equations, Traffic flow problem. Self-Study-- Linearly dependent and independent vectors. To find the suitable combination of food stuff so as to get the desired nutrients as prescribed by a dietician.			
MODULE – 2			10 Hrs
Linear Algebra: Eigen values and Eigenvectors Illustrative examples, Applications-Stretching of an elastic membrane, To determine the growth of a population model. Rayleigh power method to find the highest Eigen value. Diagonalization and powers of 3X3 matrices when Eigen values are already given. Gram Schmidt process, QR-factorization, symmetric matrices and quadratic forms, Application: Role of Eigen values, eigenvectors in determining natural frequency- Spring Mass. Self-Study-- Stability analysis of differential equations which governs the dynamical systems using the concept of Eigen value, eigenvectors.			
MODULE – 3			10 Hrs
Random Variables: Random variables (discrete and continuous), Probability density function, Cumulative distribution function, Mean and Variance. Probability Distributions: Binomial and Poisson distributions, Exponential distribution and Normal distribution. Application: Current measurement problems, Digital transmission channel. Detection of signal. Self-Study: Uniform distribution.			
MODULE – 4			10 Hrs

Joint probability distribution: Joint distribution of Discrete random variables- Marginal probability distribution, Independent random variable , Expectation, Covariance, Correlation coefficient. Markov chains- Regular stochastic matrices, transition-probability matrix, Higher transition-probabilities, Stationary distribution of regular Markov chains and irreducible Markov chain. Application: Application of Markov chain to determine the voting tendencies, Estimating the population distribution of a city due to migration. Self-Study: Joint probability distribution-Continuous random variables					
Note – Theorems and properties without proof. Applicable to all the modules. Self-study is not included in SEE					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Higher Engineering Mathematics	Dr. B. S. Grewal	44	Khanna Publications	2016
2.	Linear algebra	David c lay	3	Pearson education	2002
Reference Books:					
1.	Advanced Engineering Mathematics	E. Kreyszig	10	Wiley	2015
2.	Advanced engineering mathematics	R K Jain and S R K Iyengar	2	Pearson education	2002
	Calculus	Thomas Finney	9	Pearson education	2002
EBOOKS/MOOC: 1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf					
Online Courses and Video Lectures: 1. https://www.coursera.org/learn/introduction-to-linear-algebra 2. https://www.coursera.org/learn/stanford-statistics 3. https://onlinecourses.nptel.ac.in/noc21_ma74 4. https://archive.nptel.ac.in/courses/111/106/111106135/					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning		3	14	42
2.	Integrated Lab Component		-	-	-
3.	Student Study Hours – Self Learning		1	14	14
4.	Activity Based Learning (ABL1 & ABL2)		-	-	27
5.	Evaluation of Learning Process		-	-	07
Total Learning Hours / Semester					90
Proposed Assessment Plan (for 50 marks of CIE):					
Tool	Remarks				Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks			10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks			10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks			10
Activity Details	Activity 1				10
	Activity 2				10
Total Marks					50
1.	Compare integer and floating-point operations				
Activity Based Learning (27 Hours)					

ABL 1 (14 Hours) : Activity 1 details													
1	Writing Assignment with Problems on concerned to real world applications.						Submission of the final assignment report and evaluation. (Questions of Blooms level L3 and Higher)					14	
ABL 2 (13Hours) : Activity 1 details													
1	Problem Solving Assignment						Understand the input data requirements					1	
							Formulate the methodology					4	
							Design the solution					4	
							Solving the problem and submission					4	
Total													27
Evaluation of Learning Process (6 Hours)													
Type of Evaluation													Hours
Test (1, 2 and 3)													3
Activity (1 and 2)													1
Semester End Exam													3
Total													7
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-

Course Title	DIGITAL DESIGN AND COMPUTER ORGANIZATION				
Course Code	24CS302	L-T-P-C	(3-0-2)4		
Exam Hrs.	3	Hours/Week	5		
CIE	50 Marks	SEE	50 Marks		
		Total Hours	42L+28P+ 50ABL =120		
Course Objective: Understand the organization of a computer system and design logic circuits for a given real life problem.					
Course Outcomes(COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Explain architecture and functioning of a digital computer components	1	-		
2.	Illustrate working of combinational and sequential logic circuits	1	-		
3.	Apply arithmetic operations and cache mapping methods for a given problem	2	2		
4.	Develop combinational and sequential logic circuit for a given problem.	3	2		
Course Contents:					
MODULE – 1			11 Hrs		
Digital Logic : The Basic Gates, The Universal Gates, Boolean Laws and Theorems, Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications - Overlapping, Eliminating Redundant Groups, Don't Care Condition Data-Processing Circuits: Multiplexers, Decoders.					
MODULE – 2			11 Hrs		
Flip-Flops: RS flip flop, Gated flip flop , Edge triggered flip-flop, D flip flop , Edge-triggered D flip flop , Edge-triggered flip flop , JK Master-slave flip flop . Various Representation of flip flops. Analysis of sequential Circuits, Conversion of flip flops, Registers: Types of Registers Counters: Counter Design as a Synthesis problem.					
MODULE – 3			10 Hrs		
Basic Structures of Computers: Functional units; Basic Operational Concepts: Bus Structures, Performance. Data Organization: Numbers, Arithmetic operations and characters, Memory Locations and Addresses: Byte addressability, Big-endian & Little-endian assignments, Word Alignment, Accessing Numbers, Characters & Character strings. Input/ Output Organization: Accessing I/O devices, Interrupts: Interrupt Hardware, Enabling & Disabling Interrupt, Handling Multiple devices, Controlling Device Requests, Direct Memory Access.					
MODULE – 4			10 Hrs		
The Memory System: Basic Concepts, Cache Memories: Mapping functions, Multiplication of Positive numbers: Booth Algorithm, Bit-pair Recoding of Multipliers; Integer division, IEEE Standard for Floating-point numbers, Arithmetic operations on Floating-point numbers, Implementing Floating-Point operations					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Digital Principles and Applications	Donald P Leach, Albert Paul Malvino & Goutam Saha	7th	Tata McGraw Hill	2011
2.	Computer Organization	Carl Hamacher, Z. Vranesic & S. Zaky	5 th	McGraw Hill	2012
Reference Books:					
1.	Computer Organization and Architecture	William Stallings	9th	Pearson India	2013
2.	Digital Logic and Computer Design	M Morris Mano	1 st	Pearson	2013

MOOC: http://www.nptelvideos.in/2012/11/computer-organization.html					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning		3	14	42
2.	Integrated Lab Component		2	14	28
3.	Self-Study Hours-Self Learning		1	14	14
4.	Evaluation of Learning Process		-	-	06
5.	Activity Based Learning		-	-	30
Total Learning Hours/Semester					120
Proposed Assessment Plan (for 50 marks of CIE):					
Tool	Remarks				Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks			10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks			10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks			10
Activity Details	Activity 1	Laboratory CIE			10
	Activity 2	Activity Based Learning			10
Total Marks					50
Integrated Laboratory Component (28 Hours)					
Perform the below experiments using Digital trainer kit.					
1.	Verification of truth tables of the following Logic gates Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR				
2.	Design a simple combinational circuit with four variables and obtain minimal expression and verify the truth table.				
3.	Design full adder circuit and verify its functional table.				
4.	In a battery powered computer, the diskette driver motor 1 should be ON iff There is a diskette in the drive The diskette drive door is closed Diskette drive motor 2 is not ON The battery low signal is not present and The computer has started a read operation or the computer has started a write operation Design a circuit to solve the above scenario using basic gates.				
5.	You will gain weight if you eat too much or you do not exercise enough, and your metabolism rate is too low. Design a system such that it alarms you when you gain weight using NAND gates.				
6.	The circuit breaker will trip iff The hair drier is turned ON The microwave oven is used All the lights in the room are ON or There is a short circuit in any appliance Solve the above issue using relevant MUX.				
7.	In an automated house, two lamps L1 and L2 are controlled by 3 switches: A, B,C. Any one of the lamps should be ON, following the below conditions				

	L1 is ON if switch A and B are open but not C L1 is ON if switch B and C are open but not A L2 is ON if only switch C is open L2 is ON if only switch B is open L2 is ON if switch A or C is open, but not B Design a circuit to make the lamp ON using decoder	
8.	Assume you are generating and transmitting binary data from one place to another. Check whether the sent data is transmitted properly.	
9.	Assume you need to send a secret message consisting of numbers from 1 to 9 and letters from A to F. Secret message is encoded using excess 3 code. Design a circuit using ADDER IC to send a secret message to your friend.	
10.	Consider a computer operator who needs to generate a sequence 1011 continuously which is transmitted across the network. Design a circuit to implement this job.	
11.	Consider a scenario where in you want to take print out of few selected random pages in sequence numbered from 0 to 15. Design a circuit to achieve this task using J-K Flip-flops.	
12.	Design and implement a 3-stage up/down counter that counts from a preset value using Decade presentable counter ICs. Display the result suitably.	
Self Study Component (14 Hours)		
1.	Number systems: Decimal, Binary and Hexadecimal.	
2.	Number systems: Conversions between Decimal, Binary and Hexadecimal numbers.	
3.	Integrated circuit manufacturing process	
4.	Digital logic - Generating Logic Levels, The Buffer, The Tri-State Buffer	
5.	Multiplexers in real life application	
6.	Registers in real life application	
7.	Function of internal hardware components of a computer system.	
8.	Sequence of steps during system boot-up	
9.	Progression of Computer Technology Over Generations	
10.	Multicore Architecture	
11.	Various levels of cache used in processors	
12.	Carry Look ahead adder	
13.	Hard Disk – how data is stored & retrieved	
14.	Compare integer and floating-point operations	
Activity Based Learning (30 Hours)		
DeldSim Simulator		Hours
1.	Learn DeldSim simulator	5
2.	Simulate the below : 1. Basic Logic Gates - Create and test a simple circuits using AND, OR, NOT 2. 4-bit Binary Adder - Use full adders to build a 4-bit binary addition circuit. 3. Binary to Gray Code Converter - Design a circuit that converts 4-bit binary input to Gray code. 4. 2-to-4 Line Decoder - Implement a decoder with enable input and verify outputs. 5. 4-bit Synchronous Counter - Create a counter using flip-flops and clock input. 6. Digital Clock (Basic) - Combine counters and display logic to make a simple digital clock display	20
3.	Documentation	05

Evaluation of Learning Process (6 Hours)													
Type of Evaluation												Hours	
Test (1, 2 and 3)												3	
Semester End Exam												3	
Total												6	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	-	-	-	-	2

Course Title		OPERATING SYSTEMS			
Course Code	24CS303	(L-T-P) C	(3-0-2) 4		
Exam	3	Hours/Week	05		
CIE	50 Marks	SEE	50 Marks		
Total Hours			42L + 28I+14SL+36ABL = 120		
Course Objective: Understand the role of Operating system in managing computer resources.					
Course Outcomes: Upon completion of the course, students shall be able to :					
COs	Statement		Mapping to PO's	Mapping to PSO's	
1	Explain fundamental concepts of operating system.		1	-	
2	Apply resource management strategies in operating system.		3,11	2	
3	Explore various process synchronization techniques.		2	-	
4	Apply suitable algorithms to handle deadlock.		3	2	
MODULE - 1				10 Hrs.	
Introduction to Operating Systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation;					
MODULE - 2				11 Hrs.	
Operating System structure; Virtual machines. Process Management: Process concept; Process scheduling; Operations on processes; Inter- process communication, Threads: Overview; Multithreading models; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling;					
MODULE - 3				11 Hrs.	
Process Synchronization: Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization. Deadlocks: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.					
MODULE - 4				10 Hrs	
Memory Management: Main Memory: Background; Swapping; Contiguous memory allocation; Paging; Segmentation. Virtual Memory Management: Background; Demand paging; Page replacement. Mass-Storage Structures: Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management					
Prescribed Text Books					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Operating System Principles	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	8th	Wiley-India	2012
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Operating systems - A concept based Approach	D.M. Dhamdhare	3 rd	Tata McGraw- Hill	2006
2.	Operating Systems	P.C.P. Bhatt	2 nd	PH	2006

3.	Operating systems	Harvey M Deital	3 rd	Pearson Education	1990
E Books and online course materials:					
Sl. No.	Course offered by		Year	URL	
1.	Introduction to Operating System	Coursera	2024	https://www.coursera.org/courses?query=operating%20system	
2.	Introduction to Operating System	NPTEL	2017	https://onlinecourses.nptel.ac.in/noc20_cs75/preview	
3.	Introduction to Operating System	Udacity	2022	https://www.udacity.com/course/introduction-to-operating-systems--ud923	
Teaching - Learning – Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning		3	14	42
2	Integrated Lab Component		2	14	28
3	Student Study Hours – Self Learning		1	14	14
3	Activity Based Learning (ABL1 & ABL2)		-	-	28
4	Evaluation of Learning Process		-	-	08
Total Learning Hours / Semester					120
Proposed Assessment Plan (for 50 marks of CIE):					
Tool		Remarks			Marks
CIE		Three CIEs conducted for 20 marks each and reduced to 10 marks			30
Activity Details		Details of activities to be conducted 1) Details of activity 1 2) Details of activity 2			20
Total					50
Activity Based Learning (27 Hours)					
ABL 1 (18 Hours) : Activity 1 details					18 Hours
ABL 1: Implementation of Operating System Concepts Using C Programming					
1. Write programs using the I/O system calls of UNIX/LINUX operating system.					
2. Write a C program simulate the following CPU scheduling algorithms:					
a) FCFS b) SJF c) Round Robin d) Priority					
3. Write a C program which demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.					
3. Write a C program to simulate producer-consumer problem using semaphores.					
4. Write a C program to simulate Bankers Algorithm for DeadLock Avoidance and Prevention.					
5. Write a C program to simulate the following contiguous memory allocation Techniques:					
a) Worst Fit b) Best Fit c) First Fit					
6. Write a C program to simulate page replacement algorithms:					
a) FIFO b) LRU					
7. Write a C program to simulate the following memory segment techniques					
a) Paging b) Segmentation					
8. Write a C program to simulate SCAN disk scheduling algorithm.					
Evaluation of ABL 1					
1. Verify if the program accurately implements the required algorithm or OS concept.					
2. Check for correct usage of relevant system calls or simulation techniques.					
3. Ensure the code is modular, readable, and well-commented.					
4. Confirm the output is clear and test cases cover various input scenarios.					

ABL 2: Simulation of Core Operating System Concepts using C – A Mini OS Development Project**Evaluation Criteria :**

1. Students will be evaluated based on accurate implementation and functionality of each core OS module including process scheduling, memory management, interprocess communication, and disk scheduling using C and UNIX/Linux system calls.
2. Final assessment will include integration of all individual simulations into a cohesive mini operating system framework with proper modular design, code documentation, and demonstration of each feature.

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	3	-	2
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-

Course Title	DATA STRUCTURES AND ITS APPLICATIONS				
Course Code	24CS304	L-T-P-C	(3-0-0)3		
Exam Hrs.	3	Hours / Week	3		
CIE	50 Marks	SEE	50 Marks		
Total Hours			42L+ 14SL+34ABL = 90		
Course Objective: To be able to use appropriate data structures for designing programs.					
Course Outcomes (COs) : Upon completion of the course, students shall be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Describe the operations of linear and non-linear data structures		1	-	
2.	Implement operations of linear and non-linear data structures		1	-	
3.	Apply suitable data structures to solve a problem		2,3	-	
4.	Develop a program using linear and non-linear data structures for a given scenario		2,3	2	
Course Contents:					
MODULE – 1				11 Hrs	
Introduction: Structures and pointers revisited. Introduction to data structures - Basic terminology, Classification, Operations. The Stack - Definition, Operations, Array Representation of stacks in C Applications of stack: Infix, postfix and prefix, Basic definitions and examples, evaluating a postfix expression, Program to evaluate a postfix expression, converting an expression from infix to postfix, Program in C to convert an expression from infix to postfix. Self-Study: Files and its operations					
MODULE – 2				11 Hrs	
Recursion - finding GCD, Fibonacci Series, Recursion Types, Tower of Hanoi, and Recursion versus iteration. Queues - Definition, Array representation of Queues, Operations on Queues, Types of Queues- Circular Queue and its implementation in C, Applications of Queues. Linked List: Introduction to linked list, linked list versus arrays, Singly linked list operations - Insert, Delete, Display, Search and Traverse. Self-Study: Priority Queues					
MODULE – 3				10 Hrs	
Other Lists structures: Circular Lists - C Implementation by adding and deleting nodes, Doubly Linked List - C implementation by adding and deleting nodes, Circular doubly linked list, Linked list Applications: Linked Implementation of stacks and Queues, Polynomial Representation. Self-Study: Implementation of Polynomial addition using linked lists					
MODULE – 4				10 Hrs	
Trees: Basic Terminology, Types, Representation using array and Linked List. Creating a binary tree from a general tree, Traversing a binary tree- In-order, Pre-order, Post order, Level order, Constructing a binary tree from traversal results. Efficient Binary Trees: Binary Search trees - definition, Operations- Create, Insert, delete, display, Finding height, Finding number of nodes. AVL trees - Definition, Rotations, Constructing an AVL tree. Self-Study: Threaded Binary trees					
Text Book:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Data Structures Using C	Reema Thereja	2 nd	Oxford Press	2017
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Data Structures Using C and C++	Yedidyah, Augenstein, Tannenbaum	2 nd	PearsonEducation	2003
2.	Data Structures A	Richard F. Gilberg and	1 st	Cengage Learning	2005

	Pseudocode Approach with C	Behrouz A. Forouzan											
3.	Classic Data Structures	Debasis Samanta	2nd	PHI	2009								
4.	Programming in ANSI C	Balagurusamy E	7th	Tata McGraw Hill	2017								
MOOC: http://nptel.ac.in/keyword_search_result.php?word=data+structures													
Self-Learning (14 Hours)													
1.	File operations : read, write, append, seek, etc												
2.	Programs on reading data from a file and writing onto a file												
3.	Sorting data in files												
4.	Counting number of lines, characters in a text file.												
5.	Reading numbers from a file and storing odd numbers and even numbers into separate files												
6.	Introduction to priority queue												
7.	Implementation of priority queue using arrays												
8.	Implementation of priority queue using linked lists												
9.	Applications of priority queue												
10.	Creating Polynomial using linked list												
11.	Addition of two polynomials using linked list												
12.	Subtraction of two polynomials using linked list												
13.	Concept of threaded binary trees												
14.	Traversal of a threaded binary trees												
Activity Based Learning:				Hours / Semester									
Applied Problem Solving : Students solve various problems on any online programming platform				28									
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks			Marks								
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks			10								
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks			10								
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks			10								
Activity Details		- Relevant online certification course - Programming test on Self Learning component			20								
Total					50								
Teaching - Learning – Evaluation Scheme													
Sl. No	Teaching - Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester								
1.	Class Room Teaching		3	14	42								
2.	Self-Learning		1	14	14								
3.	Activity Based Learning		-	-	28								
4.	Evaluation of Learning Process		-	-	6								
Total Learning Hours / Semester					90								
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	3	2	-	-	-	-	-	-	-	-	-	3

Course Title	DATA STRUCTURES LABORATORY		
Course Code	24CS305	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	SEE	50 Marks
		Total Hours	28L+2EV = 30
Course Objective: Design and implement various data structures.			
Course Outcomes (COs): Upon the completion of the course the students will be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Develop programs to demonstrate applications of data structures	3, 11	2
2.	Document the programs executed	9	-
Course Contents:			
Self-Guided Programs			
1.	Write a C program to find the maximum and minimum element in an array of n integers. Use only pointers for referencing the array.		
2.	Write a C program for Dynamic Memory allocation of 10 elements and find the largest element.		
3.	Write a C program to represent a complex number using structure variable. Write user defined functions that accept two complex numbers and finds their sum and difference.		
4.	Define a structure Author name with fields: First name, Middle name and Last name. Using the above structure, design another structure Book: ISBN, Author name, Book Title, Price, Publisher, and Edition. Write a function to search a book given the Author name. Using the above function write a C Program to store N books information and display the details of a book given the author name.		
Guided Programs			
1.	Files are placed one over another in my study room. The file which is at the top is the first one to be removed, i.e. the file which has been placed at the bottom most position remains in the pile of files for the longest period of time. Help me out to add a file and remove the bottom most file from the pile of files.		
2.	Consider an algebraic expression which needs to be evaluated by a computer system. Operating System (OS) consumes less time to evaluate if it is in postfix form of the expression. Thus, help your OS to evaluate by converting the expression into its postfix form.		
3.	Assume you have converted an algebraic expression into its postfix form to process the expression fast. This expression need to be evaluated for a given set of values.		
4.	Assume you come across a toll gate while you are on your way to home town. Illustrate the working of the toll gate using suitable data structure.		
5.	Suppose you want to search a text book in a huge library where books are arranged in alphabetical order. Optimize your search by using recursion. Implement Tower of Hanoi problem using recursion.		
6.	Consider a traffic signal controlled by a computer system. Traffic signal has three colors: Red, yellow and Green. All these glow in a circular fashion based on the traffic. Implement the above using suitable data structure.		
7.	Consider a treasure hunt task where a series of clues are given. Clue1 gives hint to clue2, clue2 Provides hint for clue3 and so on until you can get a hint to the final treasure. Develop an illustration to demonstrate the above scenario.		
8.	The parking lot has a fixed number of parking spaces. Cars can enter the parking lot and occupy an available space, and they can also exit the parking lot, freeing up the space for other cars. Designing a parking lot management system using a circular queue.		
9.	Consider a list of numbers. Find - Maximum number - Minimum number		

	iii. Sum of all the numbers												
10.	The phonebook will contain a list of contacts sorted in ascending order based on their names. Each contact will have a name and a phone number. Developing a phonebook management system using an ordered linked list.												
11.	Assume you have an iPod, where in you have stored plenty of songs so that you get engaged during a long journey. If you want to hear a particular song, you need to use forward button to reach that song and can also traverse back using backward button. Implement the following using relevant data structure.												
12.	Your text book contains chapters, sections, subsections, subdivisions, etc. Illustrate this scenario of text book using tree structure.												
Proposed Assessment Plan (for 50 marks of CIE):													
Tool				Remarks								Marks	
CIE				Laboratory CIE								30	
Record				Laboratory Record Submission								10	
Continuous Evaluation				Conduction of experiments								10	
Total												50	
Teaching - Learning – Evaluation Scheme													
Sl. No	Teaching - Learning Method					No. of Hours/ Week			No. of Weeks			Hours/ Semester	
1.	Class Room Teaching					2			14			28	
2.	Evaluation of Learning Process											2	
Total Learning Hours / Semester												30	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	3	-	-	-	-	-	-	-	3	-	3
CO2	-	-	-	-	-	-	-	-	3	-	-	-	-

Course Title		OBJECT ORIENTED PROGRAMMING WITH JAVA			
Course Code		24CS306A	L-T-P-C		(2-0-2)3
Exam Hrs.		3	Hours / Week		4
CIE		50 Marks	SEE		50 Marks
Total Hours					28L+28P+ 34ABL=90
Course Objective: Develop java application using object-oriented concepts.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Explain the fundamentals of Object-Oriented Programming.			1	-
2.	Develop java programs for a given problem using suitable Object-Oriented concepts			3,5	1,2
3.	Analyze the syntax and semantics of a given java code/snippet.			2	1
Course Contents:					
MODULE – 1					14 Hrs.
Object Oriented Concepts and Java: Concepts of Object-Oriented programming language: Object, Class, Message passing, inheritance, encapsulation, and polymorphism Difference between OOP and other conventional programming – advantages and disadvantages of OOP.					
Java Programming Fundamentals: Java and Java Applications, Java Development Kit (JDK), The Byte Code, The Java Buzzwords, A first Simple program, handling syntax errors, The Java Keywords, Identifiers in Java.					
Data Types and Operators: Java’s Primitive Types, A Closer Look at Variables, The Scope and Lifetime of Variables, Operators: Arithmetic, Bitwise, Relational, Boolean Logical, Assignment Operators, the ‘?’ Operator, Type conversion and Casting, Arrays, Strings.					
MODULE – 2					14 Hrs.
Program Control Statements: Input characters from the Keyboard, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nested switch statements, for Loop, Enhanced for Loop, While Loop, do-while Loop, Nested Loops, Use of break and continue.					
Introducing Classes, Objects and Methods: Class Fundamentals, Declaring Objects, Object Reference Variables, Methods, Constructors, the “This” keyword, Garbage collection, Overloading Methods and constructors, Argument Passing, Returning Objects, Access Control, Understanding Static, Nested and Inner Classes.					
MODULE – 3					14 Hrs.
Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and inheritance, Using super to C all Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Why overridden Methods, Using Abstract Classes, Using final, The object class.					
MODULE – 4					14 Hrs.
Interfaces: Interface Fundamentals, Creating an Interface, Implementing an Interface, Implementing Multiple Interfaces, Interfaces can be extended, Nested Interfaces. Packages: Package Fundamentals, Packages and Member Access, Importing Packages, Static import.					
Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and Catch, Multiple catch Clauses, throw, finally, Java’s Built-in Exceptions, Customized exceptions.					
Text Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Java Fundamentals: A comprehensive Introduction	Herbert Schildt, Dale Skrien.	1 st	Tata McGraw Hill	2013

	(Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9,10,12)				
2.	Java –The complete Reference (Chapter 19).	Herbert Schildt	8 th	Tata Mcgraw Hill Education	-

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Programming in JAVA2	Dr K Somasundaram	1 st	Jaico publications	-
2.	Java Programming	Hari Mohan Pandey	1 st	Pearson Education	2012
3.	Java How to Program	Deitel and Deitel	6 th	Pearson	-

MOOCs:

1. <http://nptel.ac.in/courses/106106147/>
2. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
3. https://www.youtube.com/watch?v=0KL_zftem4g
4. <https://www.coursera.org/specializations/object-oriented-programming>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	2	14	28
3	Activity Based Learning (ABL)	-	-	24
4	Evaluation of Learning Process	-	-	10
Total Learning Hours/Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks & reduced to 10 marks	10
	CIE2	Conducted for 20 marks & reduced to 10 marks	10
	CIE3	Conducted for 20 marks & reduced to 10 marks	10
Activity Details	Activity-1	Laboratory CIE-1, Record & Continuous evaluation	15
	Activity-2	ABL	5

Laboratory Component:

Sl No	Programs	Hours
1.	Write java programs a. To print Fibonacci series without using recursion and using recursion. b. To check prime numbers. c. To sort an array element using bubble sort algorithm.	4
2.	Create a class called account with the data members (accNum: integer, name: string, phoneNum:integer, balAmt:float) and following methods: a. getInput() to get input from the user. b. deposit() method which takes the amount to be deposited in to his/her account and do the calculation. c. withdraw() method which gets the amount to be withdrawn from hi/her account. d. Print the appropriate results.	4
3.	Define a stack class to implement the stack data structure. Include constructors to	4

	perform initialization, method push to push an element into the stack, method pop to remove an element from the stack and display method to display the elements of the stack.												
4.	Define a class Complex with data members as two complex numbers, constructors for initialization these numbers, members, methods to add and subtract two complex numbers.	4											
5.	Write a java program to work with strings: a. Program to check whether a string is a Palindrome b. Read a text and count all the occurrences of a particular word. c. Replace a substring in the given string, d. Rearrange the string and rewrite in alphabetical order. Compare two string ignoring case. Concatenate two strings.	4											
6.	Write a Java program to create a class called Shape with a method called getArea(). Create a subclass called Rectangle that overrides the getArea() method to calculate the area of a rectangle.	4											
7.	Write a Java program to create an abstract class BankAccount with abstract methods deposit () and withdraw (). Create subclasses: SavingsAccount and CurrentAccount that extend the BankAccount class and implement the respective methods to handle deposits and withdrawals for each account type.	2											
8.	Write a Java program that reads a list of integers from the user and throws an exception if any numbers are duplicates.	2											
Activity Based Learning (24 Hours)													
ABL		Hours											
1.	Develop a java application for the given real world problems using OOP concepts.	24											
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	3	3
CO3	-	3	-	-	-	-	-	-	-	-	-	3	-

Course Title	OBJECT ORIENTED PROGRAMMING WITH C++				
Course Code	24CS306B	L-T-P-C	(2-0-2)3		
Exam Hrs.	3	Hours / Week	4		
CIE	50 Marks	SEE	50 Marks		
Total Hours			28L+28P+ 34ABL=90		
Course Objective: To solve real world problems using object oriented concepts.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Explain the object-oriented programming concepts.	1	-		
2.	Develop reusable and extensible programs using Inheritance.	3	-		
3.	Implement the concept of Encapsulation, Polymorphism and exception handling.	3	-		
4.	Design the solution to a real world problem using Object – Oriented programming concepts.	3	2		
Course Contents:					
MODULE – 1			14 Hrs.		
Introduction to Object Oriented Programming: A Look at Procedure-Oriented Programming, Object-Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Object-Oriented Languages, and Applications of OOP. A Simple C++ Program, More C++ Statements, Structure of C++ Program, An Example with Class, Tokens, Keywords, Identifiers and constants, Reference Variables, Operators in C++, Scope resolution operator, Expressions and their types– Special assignment expressions.					
MODULE – 2			14 Hrs.		
Functions in C++: Function prototyping, Call by reference, Return by reference, Inline functions, Default arguments, Function overloading. Classes and Objects: Specifying a Class, Defining Member Functions, A C++ Program with Class, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friend Functions, Returning Objects, Constructors, Parameterized Constructors, Multiple Constructors in a class, Copy Constructor, Destructors.					
MODULE – 3			14 Hrs.		
Operator Overloading: Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators - Overloading Binary Operators using Friend function – Manipulation of strings using Operators – Rules for Overloading Operators. Inheritance: Derived class Constructors, destructors, Types of Inheritance, Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.					
MODULE – 4			14 Hrs.		
Templates: Class Templates – Class Templates with Multiple Parameters, Function templates, Function Templates with Multiple Parameters, Overloading of Template functions, Member Function Templates. Exception Handling: Introduction to Exception, Benefits of Exception handling, Try and catch block Throw statement, Pre-defined exceptions in C++.					
Text Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Programming with C++	E. Balaguru samy	8 th	Tata McGraw Hill Education Pvt.Ltd	2020
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Programming with ANSI C++”,	Bhushan Trivedi	2 nd	Oxford Press	2012

MOOCs:													
1. https://www.mooc-list.com/course/introduction-c-coursera													
2. https://onlinecourses.nptel.ac.in/noc21_cs02/preview													
3. https://www.mooc-list.com/course/c-lab-content-coursera													
4. https://www.mooc-list.com/course/c-class-development-coursera													
Web links and Video Lectures (e-Resources):													
1. Basics of C++ - https://www.youtube.com/watch?v=BCIS40yzssA													
2. Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw													
Tutorial Link:													
1. https://www.w3schools.com/cpp/cpp_intro.asp													
2. https://www.edx.org/course/introduction-to-c-3													
Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1	Class Room Teaching & Learning						2		14		28		
2	Integrated Lab Component						2		14		28		
3	Activity Based Learning (ABL)						-		-		24		
4	Evaluation of Learning Process						-		-		10		
Total Learning Hours/Semester											90		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE	CIE1	Conducted for 20 marks & reduced to 10 marks										10	
	CIE2	Conducted for 20 marks & reduced to 10 marks										10	
	CIE3	Conducted for 20 marks & reduced to 10 marks										10	
Activity Details	Activity-1	Laboratory CIE-1, Record & Continuous evaluation										15	
	Activity-2	ABL										5	
Laboratory Component: Develop C++ program to demonstrate													
Sl No	Programs											Hours	
1.	The use of scope resolution operator.											2	
2.	Call by reference.											2	
3.	Inline functions.											2	
4.	Default arguments.											2	
5.	Function overloading.											2	
6.	Constructors and Destructors.											2	
7.	Operator Overloading.											2	
8.	Friend function.											2	
9.	Single Inheritance.											2	
10.	Multiple Inheritance.											2	
11.	Hierarchical Inheritance.											2	
12.	Class Templates.											3	
13.	Function templates.											3	
Activity Based Learning (26 Hours)													
1.	Develop a C++ application for the given real world problems using OOP concepts.											24	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	3

Course Title	R PROGRAMMING		
Course Code	24CS307A	L-T-P-C	(0-0-2) 1
Exam Hrs.	3	Hours / Week	02
CIE	50 Marks	SEE	50
Total Hours			28P + 2EV = 30
Course Objective: To learn and Practice Programming techniques using R Programming.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Prepare the dataset in suitable format with required preprocessing.	1	-
2.	Apply suitable R programming language constructs to write a program.	2, 3, 5	-
3.	Use visualization packages and file handlers for data analysis.	1, 2	-
Course Contents:			
Practice Programs: (Self-Learning)			
1. Installation of R Studio 2. Write an R Program to take input from the user (name and age) and display the values. Also print the version of R installation. 3. Write an R Program to get the details of the objects in memory. 4. Write an R Program to create a sequence of numbers from 20 to 50 and find the mean and product of numbers from 20 to 60 and sum of numbers from 51 to 91. 5. Write an R Program to multiply two vectors of integer's type and length 3.			
Guided Laboratory Experiments			
1. Demonstrate the steps for installation of R and R Studio. Perform the following: a) Assign different type of values to variables and display the type of variable. Assign different types such as Double, Integer, Logical, Complex and Character and understand the difference between each data type. a. Demonstrate Arithmetic and Logical Operations with simple examples. b. Demonstrate generation of sequences and creation of vectors. c. Demonstrate Creation of Matrices d. Demonstrate the Creation of Matrices from Vectors using Binding Function. e. Demonstrate element extraction from vectors, matrices and arrays 2. Assess the Financial Statement of an Organization being supplied with 2 vectors of data: Monthly Revenue and Monthly Expenses for the Financial Year. You can create your own sample data vector for this experiment) Calculate the following financial metrics: a. Profit for each month. b. Profit after tax for each month (Tax Rate is 30%). c. Profit margin for each month equals to profit after tax divided by revenue. d. Good Months – where the profit after tax was greater than the mean for the year. e. Bad Months – where the profit after tax was less than the mean for the year. f. The best month – where the profit after tax was max for the year. g. The worst month – where the profit after tax was min for the year. Note: a. All Results need to be presented as vectors b. Results for Dollar values need to be calculated with \$0.01 precision, but need to be presented in Units of \$1000 (i.e 1k) with no decimal points c. Results for the profit margin ratio need to be presented in units of % with no decimal point. d. It is okay for tax to be negative for any given month (deferred tax asset) e. Generate CSV file for the data.			

3. Develop a program to create two 3 X 3 matrices A and B and perform the following operations
a) Transpose of the matrix b) addition c) subtraction d) multiplication
4. Develop a program to find the factorial of given number using recursive function calls.
5. Develop an R Program using functions to find all the prime numbers up to a specified number by the method of Sieve of Eratosthenes.
6. The built-in data set mammals contain data on body weight versus brain weight. Develop R commands to:
a) Find the Pearson and Spearman correlation coefficients. Are they similar?
b) Plot the data using the plot command.
c) Plot the logarithm (log) of each variable and see if that makes a difference.
7. Develop R program to create a Data Frame with following details and do the following operations.

Item code	Item category	Item price
1001	Electronics	700
1002	Desktop Supplies	300
1003	Office Supplies	350
1004	USB	400
1005	CD Drive	800

- a) Subset the Data frame and display the details of only those items whose price is greater than or equal to 350.
- b) Subset the Data frame and display only the items where the category is either “Office Supplies” or “Desktop Supplies”
- c) Create another Data Frame called “item-details” with three different fields item_Code, ItemQtyonHand and ItemReorderLvl and merge the two frames
8. Let us use the built-in dataset air quality which has Daily air quality measurements in New York, May to September 1973. Develop R program to generate histogram by using appropriate arguments for the following statements.
a) Assigning names, using the air quality data set.
b) Change colors of the Histogram
c) Remove Axis and Add labels to Histogram
d) Change Axis limits of a Histogram
e) Add Density curve to the histogram
9. Design a data frame in R for storing about 20 employee details. Create a CSV file named “input.csv” that defines all the required information about the employee such as id, name, salary, start_date, dept. Import into R and do the following analysis.
a) Find the total number rows & columns
b) Find the maximum salary
c) Retrieve the details of the employee with maximum salary
d) Retrieve all the employees working in the IT Department.
e) Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file “output.csv”
10. Using the built in dataset mtcars which is a popular dataset consisting of the design and fuel consumption patterns of 32 different automobiles. The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models). Format A data frame with 32 observations on 11 variables : [1] mpg Miles/(US) gallon, [2] cyl Number of cylinders [3] disp Displacement (cu.in.), [4] hp Gross horsepower [5] drat Rear axle ratio,[6] wt Weight (lb/1000) [7] qsec 1/4 mile time, [8] vs V/S, [9] am Transmission (0 = automatic, 1 = manual), [10] gear Number of forward gears, [11] carb Number of carburetors
Develop R program, to solve the following:
a) What is the total number of observations and variables in the dataset?
b) Find the car with the largest hp and the least hp using suitable functions

c) Plot histogram / density for each variable and determine whether continuous variables are normally distributed or not. If not, what is their skewness?													
d) What is the average difference of gross horse power (hp) between automobiles with 3 and 4 number of cylinders (cyl)? Also determine the difference in their standard deviations.													
e) Which pair of variables has the highest Pearson correlation?													
Text Book :													
Sl.No	Book Title					Authors		Edition	Publisher			Year	
1.	Learning R: A Step by Step Function Guide to Data Analysis					Cotton, R.		1 st	O'Reilly Media Inc			2013	
Reference Books:													
Sl.No	Book Title					Authors		Edition	Publisher			Year	
1.	Introduction to Scientific Programming and Simulation Using					Jones, O., Maillardet. R. and Robinson, A		1st	The R Series.			2014	
2.	The Book of R: A First Course in Programming and Statistics					Davies, T.M		1 st	No Starch Press			2016	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	3	-	3	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-
Teaching - Learning – Evaluation Scheme:													
Sl No.	Teaching and Learning Method							No. of Hours/Week		No. of Weeks		Hours/ Semester	
1	Class Room Teaching & Learning							-		-		-	
2	Lab Component							2		14		28	
3	Student Study Hours – Self Learning							-		-		-	
4	Activity Based Learning (ABL1)							-		-		-	
5	Evaluation of Learning Process							-		-		2	
Total Learning Hours/Semester												30	
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE		CIE conducted for 30 marks										30	
Lab Report		Lab Report Submission										10	
Activity Details		Project based group activity										10	
Activity Details													
1.		Identifying areas in which students want to carry out the project											
2.		Meeting and Discussion (Online or offline) with the faculty and fixing the Problem Statement											
3.		Designing and implementing the project											
4.		Presentation and submitting the final report											

Course Title		DATA ANALYTICS WITH EXCEL																																						
Course Code	24CS307B	L-T-P-C	(0-0-2)1																																					
Exam Hrs.	3	Hours / Week	2																																					
CIE	50 Marks	SEE	50 Marks																																					
		Total Hours	28L+2EV = 30																																					
Course Objective: To perform Data analytics using Excel.																																								
Course Outcomes (COs): Upon completion of the course, students shall be able to:																																								
#	Course Outcomes	Mapping to POs	Mapping to PSOs																																					
1.	Apply the mathematical calculations in Excel	1, 2	2																																					
2.	Apply sorting, filtering and condition formats for the given problem	2, 3, 5	1																																					
3.	Visualize results of excel charts for the given problem.	1,5,11	1,2																																					
Course Contents:																																								
Guided Laboratory Experiments																																								
1.	In a company, 30 employee details (name, Date of Joining, Qualification, and Salary) are stored in Microsoft Access Database and text file. Using Excel tool import the data from different sources for analysis and perform the following: a. Show average salary. b. Show salary between 30000/- and 50000/- c. Sort the employee list on the date of joining.																																							
2.	Suppose a class of size 40 having SGPA of 8 semesters between 5 to 10. Calculate the CGPA of each student in below Grade form: <table><tr><td>O</td><td>S</td><td>A</td><td>B</td><td>C</td></tr><tr><td>10>=9</td><td>8 - 8.9</td><td>7 – 7.9</td><td>6 – 6.9</td><td>5 – 5.9</td></tr></table>				O	S	A	B	C	10>=9	8 - 8.9	7 – 7.9	6 – 6.9	5 – 5.9																										
O	S	A	B	C																																				
10>=9	8 - 8.9	7 – 7.9	6 – 6.9	5 – 5.9																																				
3.	Create 40 students name in the form of First name, Middle name and Last name. Concatenate all the names and store in one column and also find the length of each name.																																							
4.	Suppose your customer survey results from the east and west regions, month wise are <table><tr><th>Month</th><th>East</th><th>West</th><th>Low (<50%)</th><th>Medium (50%-80%)</th><th>High (>80%)</th></tr><tr><td>Apr-15</td><td>86.4%</td><td>63.0%</td><td>50%</td><td>30%</td><td>20%</td></tr><tr><td>May-15</td><td>45.8%</td><td>58.9%</td><td>50%</td><td>30%</td><td>20%</td></tr><tr><td>Jun-15</td><td>44.1%</td><td>81.6%</td><td>50%</td><td>30%</td><td>20%</td></tr><tr><td>Jul-15</td><td>77.6%</td><td>86.1%</td><td>50%</td><td>30%</td><td>20%</td></tr><tr><td>Aug-15</td><td>80.7%</td><td>95.0%</td><td>50%</td><td>30%</td><td>20%</td></tr></table> For the above data, display customer satisfaction survey using Band Chart				Month	East	West	Low (<50%)	Medium (50%-80%)	High (>80%)	Apr-15	86.4%	63.0%	50%	30%	20%	May-15	45.8%	58.9%	50%	30%	20%	Jun-15	44.1%	81.6%	50%	30%	20%	Jul-15	77.6%	86.1%	50%	30%	20%	Aug-15	80.7%	95.0%	50%	30%	20%
Month	East	West	Low (<50%)	Medium (50%-80%)	High (>80%)																																			
Apr-15	86.4%	63.0%	50%	30%	20%																																			
May-15	45.8%	58.9%	50%	30%	20%																																			
Jun-15	44.1%	81.6%	50%	30%	20%																																			
Jul-15	77.6%	86.1%	50%	30%	20%																																			
Aug-15	80.7%	95.0%	50%	30%	20%																																			
5.	A Person takes a loan of Rs. 5,00,000/- for a tenure of 30 years, find the monthly payments (EMI) for the varied interest rates (Assume interest rate start with 12% and incremented by 2% in each month). Calculate the amount of interest and Principal that is paid in the second year. (use what if Analysis tool)																																							
6.	Suppose there is a bookstore that has 100 books in storage. The original price of the book is 250 and certain number of books was sold at that price. Later, the bookstore announced a 10% discount on that book and cleared off the stock. You might want to know how many books are sold at the original price to obtain total revenue of 24,500.																																							
7.	Suppose you want to have a report displaying the following – (Explore Data using Pivot Table) a. Data for five disciplines - Archery, Diving, Fencing, Figure Skating and Speed Skating. b. Regions that scored more than 80 medals in these 5 disciplines. c. The count of medals in each of the five disciplines in each of these regions. d. Total count of medals for the five disciplines in each of these regions.																																							

8.	Consider the data of 30 employees are stored in two different tables. First table consists of name, employee ID and Second table consists of employee ID, salary. Find the employee salary using lookup table from second table to first.
9.	In Olympic, 20 countries participated and won various medals by male and female in equal proportions. Display the medal count for each country with the charts (Pie, Column, Bar, Line, Scatter, and Bubble).
10.	Consider the sequence of data from 1 to 100, where Male are 48% and Female are 52% in the data. For the given data create Male vs Female Info-graphic Chart, Male vs Female Ratio Chart and Waffle chart.

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Laboratory CIE	30
Record	Laboratory Record Submission	10
Continuous Evaluation	Conduction of experiments	10
Total		50

Teaching - Learning – Evaluation Scheme

Sl. No	Teaching - Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching	2	14	28
2.	Evaluation of Learning Process	-	-	2
Total Learning Hours / Semester				30

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2
CO2		3	3		3	-	-	-	-	-	-	2	-
CO3	3	-	-	-	3	-	-	-	-	-	2	2	2

Course Title		DATA VISUALIZATION WITH PYTHON		
Course Code	24CS307C	L-T-P-C	(0-0-2) 1	
Exam Hrs.	3	Hours / Week	02	
CIE	50 Marks	SEE	50	
Total Hours			28P + 2EV = 30	
Course Objective: To explore principles and techniques of data visualization using Python.				
Course Outcomes (COs): Upon completion of the course, students shall be able to:				
#	Course Outcomes	Mapping to POs	Mapping to PSOs	
1.	Demonstrate the use of IDLE or PyCharm IDE to create Python Applications	1, 5	-	
2.	Apply various visualization techniques using suitable python libraries.	2, 5, 9	2	
3.	Implement, document and present the data visualization projects for the chosen problems.	2, 5, 9, 11	2	
Course Contents:				
Practice Programs: (Self-Learning)				
1 Installation of Pycharm 2 Importing numpy, CSV, matplotlib libraries.				
Guided Laboratory Experiments				
1. Write a Python program to read data from a CSV file and create a line plot to visualize the trend over time. Customize the plot with appropriate labels, title, and color. 2. Load a dataset containing information about students' scores in different subjects. Create a scatter plot to visualize the relationship between two variables (e.g., math score vs. science score). Use Seaborn to enhance the plot with appropriate styling and add labels. 3. Given a dataset with multiple variables, create a figure with two subplots: one displaying a line plot and the other showing a bar chart. Customize the subplots with appropriate titles, legends, and colors. 4. Load a dataset containing information about employees' salaries across different departments. Create a box plot and a violin plot to visualize the distribution of salaries by department. Customize the plots and add appropriate labels and titles. 5. Load a dataset containing stock prices over time. Create a line plot to visualize the stock prices and add appropriate labels and titles. Format the x-axis tick labels to display the dates properly. 6. Load a dataset containing temperature readings over time. Create an interactive line plot using Plotly, which displays the temperature when hovering over the data points. Add appropriate labels and customize the plot's appearance. 7. Load a dataset with information about population density by country. Create a choropleth map using GeoPandas to visualize the population density. Customize the map's appearance and add a color legend. 8. Design and implement an interactive dashboard using Dash to display various visualizations. Include at least two interactive controls (e.g., dropdowns, sliders) to update the visualizations dynamically.				
Sample Activity Problem:				
• Select a dataset related to a specific topic of interest (e.g., climate change, COVID-19). Design a series of visualizations that tell a compelling data story, highlighting key insights and trends. Present the visualizations with appropriate annotations and captions. • Choose a dataset related to a real-world problem (e.g., retail sales, customer behavior). Explore the dataset, identify interesting patterns, and design a set of visualizations to present the findings effectively. Present the visualizations along with a brief explanation of the insights gained.				
Text Book :				
Sl.No	Book Title	Authors	Edition	Publisher
				Year

1.	Python Data Visualization Using Plotly Framework					Stephen G Schmitt		1 st				2024	
MOOC: https://www.coursera.org/learn/python-for-data-visualization https://www.edx.org/learn/data-visualization/ibm-visualizing-data-with-python													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	2	-	-	-	-	-	-	-	-
CO2	-	2	-	-	3	-	-	-	3	-	-	-	3
CO3	-	3	-	-	3	-	-	-	3	-	3	-	3
Teaching - Learning – Evaluation Scheme:													
Sl No.	Teaching and Learning Method							No. of Hours/Week		No. of Weeks		Hours/ Semester	
1	Class Room Teaching & Learning							-		-		-	
2	Lab Component							2		14		28	
3	Student Study Hours – Self Learning							-		-		-	
4	Activity Based Learning (ABL1)							-		-		-	
5	Evaluation of Learning Process							-		-		2	
Total Learning Hours/Semester												30	
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE		CIE conducted for 30 marks										30	
Lab Report		Lab Report Submission										10	
Activity Details		Project based group activity										10	
Activity Based Learning (14 Hours)													
ABL1: Implementing Real Time Project using Python													
1.	Identifying areas in which students want to carry out the project												
2.	Meeting and Discussion (Online or offline) with the faculty and fixing the Problem Statement												
3.	Designing and implementing the project												
4.	Presentation and submitting the final report												

Course Title		VERSION CONTROLLER WITH GiT			
Course Code	24CS307D	L-T-P-C		(0-0-2) 1	
Exam Hrs.	3	Hours / Week		02	
CIE	50 Marks	SEE		50	
Total Hours				28P + 2EV = 30	
Course Objective: To use GitLab/Git and utilize it for software development.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Construct the repository using various Git commands.		3, 5	1, 2	
2.	Demonstrate and document the work carried out		5, 9, 11	1, 2	
Course Contents:					
Practice Programs: (Self-Learning)					
• Installation of Desktop Git repository					
Guided Laboratory Experiments					
1. Initializing a Repository: Initialize a new Git repository for a simple project. Add a few files to the repository and commit them.					
2. Committing Changes: Make changes to the files in the repository and commit them. Practice creating meaningful commit messages					
3. Creating and Switching Branches: Create a new branch in the repository, make changes in the branch, and switch between branches.					
4. Merging Branches: Create a branch, make changes in both the main branch and the new branch, and merge the changes back into the main branch.					
5. Resolving Merge Conflicts: Create a merge conflict by making conflicting changes in two different branches. Practice resolving the conflict using Git's conflict resolution tools.					
6. Working with Remote Repositories: Clone a remote repository to your local machine. Make changes locally and push the changes back to the remote repository.					
7. Collaborating with Others: Practice collaborating with others using Git. Clone a shared repository, make changes, push the changes, and pull changes made by others.					
8. Reverting and Rolling Back Commits: Experiment with reverting commits and rolling back changes to a previous state in the repository using Git commands.					
9. Tagging Releases: Tag a specific commit in the repository as a release version. Practice creating annotated tags and lightweight tags.					
10. Ignoring Files: Create a .gitignore file to exclude certain files or directories from being tracked by Git.					
11. Viewing Repository History: Use Git commands to view the commit history, explore differences between commits, and track changes made over time.					
12. Branch Management: Practice creating, deleting, and renaming branches in the repository using Git commands.					
Text Book :					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Version Control with Git	Prem Kumar Ponuthorai, Jon Loeliger	3 rd	O'Reilly Media Inc	2022
eBook: https://www.oreilly.com/library/view/version-control-with/9781492091189/					
MOOC:					
1. https://www.coursera.org/learn/version-control-with-git					
2. https://www.classcentral.com/course/microsoft-learn-introduction-to-version-control-with-git-2391					

Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	-	3	3
CO2	-	-	-	-	3	-	-	-	2	-	3	3	3
Teaching - Learning – Evaluation Scheme:													
Sl No.	Teaching and Learning Method						No. of Hours/Week		No. of Weeks		Hours/ Semester		
1	Class Room Teaching & Learning						-		-		-		
2	Lab Component						2		14		28		
3	Student Study Hours – Self Learning						-		-		-		
4	Activity Based Learning (ABL1)						-		-		-		
5	Evaluation of Learning Process						-		-		2		
Total Learning Hours/Semester											30		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE		CIE conducted for 30 marks										30	
Lab Report		Lab Report Submission										10	
Activity Details		Project based group activity										10	
Activity Based Learning (14 Hours)													
1.	Identifying areas in which students want to carry out the project												
2.	Meeting and Discussion (Online or offline) with the faculty and fixing the Problem Statement												
3.	Designing and implementing the project												
4.	Presentation and submitting the final report												

Course Title	SOCIAL CONNECT & RESPONSIBILITY		
Course Code	24SCR	L-T-P	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2
CIE	100 Marks	Total Hours	28L + 2E= 30
Course Objective: Provide a formal platform for students to communicate and connect with their surroundings and create a responsible connection with society. Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Describe societal challenges and build solutions to alleviate these complex social problems through immersion, design & technology.	3,5,6	
2.	Communicate and connect with their surroundings.	7,11	
Course Content			
MODULE – 1			5 Hrs
Plantation and adoption of a tree: Plantation of a tree that will be adopted by a group of students. They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature.			
MODULE – 2			5 Hrs
Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms.			
MODULE -3			5 Hrs
Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus.			
MODULE -4			5 Hrs
Water Conservation: knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices. Food Walk City's culinary practices, food lore, and indigenous materials of the region used in cooking.			
Course Conduction			
A total of 15-20 hours engagement per semester is required for the course. Students will be divided into teams and each team will be handled by two faculty mentors . Faculty mentors will design the activities for evaluation.			
Guideline for Assessment Process: Continuous Internal Evaluation (CIE) After completion of, the social connect, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. • Dairy recording the details of activity conducted • Planning and scheduling the social connect • Information/Data collected during the social connect • Analysis of the information/data and report writing Considering all above points allotting the marks as mentioned below			
Excellent		80 to 100	
Good		60 to 79	
Satisfactory		40 to 59	
Unsatisfactory and fail		<=39	

Teaching - Learning – Evaluation Scheme:														
Sl No.	Teaching and Learning Method						No. of Hours/Week		No. of Weeks		Hours/ Semester			
1	Class Room Teaching & Learning						-		-		-			
2	Lab Component						2		14		28			
3	Student Study Hours – Self Learning													
4	Activity Based Learning (ABL1)													
5	Evaluation of Learning Process						-		-		2			
Total Learning Hours/Semester											30			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool					Remarks							Marks		
CIE		CIE1												
		CIE2												
		CIE3												
Activity Details														
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	-	-	3	-	2	3	-	-	-	-	-	-	-	
CO2	-	-	-	-	-	-	3	-	-	-	3	-	-	

Course Title		NATIONAL SERVICE SCHEME (NSS)											
Course Code		24NYP1						L-T-P-C				(0-0-2)0	
Exam Hrs.								Hours / Week				2	
								Total Hours				28	
Course Objective: To use GitLab/Git and utilize it for software development.													
Course Outcomes (COs): Upon completion of the course, students shall be able to:													
#	Course Outcomes							Mapping to POs			Mapping to PSOs		
1.	Understand the importance of his / her responsibilities towards society							6			-		
2.	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.							3,6			-		
3.	Evaluate the existing system and to propose practical solutions for the same for sustainable development.							3,6			-		
4.	Implement government or self-driven projects effectively in the field.							11			-		
5.	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.							11			-		
Course Contents:													
Module 1											8 Hrs		
Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing													
Module 2											8 Hrs		
Waste management– Public, Private and Govt. organization, 5 R’s.													
Module 3											8 Hrs		
Setting of the information imparting club for women leading to contribution in social and economic issues.													
Reference Books:													
Sl.No	Book Title			Authors			Edition	Publisher			Year		
1.	NSS Course Manual			VTU Belagavi			1 st	NSS Cell					
2.	Activities reports and its manual			Government of Karnataka			1 st	NSS cell					
3.	Activities reports and its manual			Government of India			1 st	NSS cell					
Proposed Assessment Plan (for 50 marks of CIE):													
Tool				Remarks								Marks	
CIE		CIE1											
		CIE2											
		CIE3											
Activity Details													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2													

Course Title		PHYSICAL EDUCATION (PE)											
Course Code		24NYP1						L-T-P-C				(0-0-2)0	
Exam Hrs.								Hours / Week				2	
								Total Hours				28	
Course Objective: To use GitLab/Git and utilize it for software development.													
Course Outcomes (COs): Upon completion of the course, students shall be able to:													
#	Course Outcomes							Mapping to POs			Mapping to PSOs		
1.	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness.							9, 10, 12			-		
2.	Familiarization of health-related Exercises, Sports for overall growth and development.							9,12			-		
3.	Create a foundation for the professionals in Physical Education and Sports							12			-		
4.	Participate in the competition at regional/state / national / international levels.							9,10,12			-		
5.	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.							9,10,12			-		
Course Contents:													
Module 1											4 Hrs		
Orientation - Lifestyle, Health & Wellness, Pre-Fitness test.													
Module 2											4 Hrs		
General Fitness & Components of Fitness - Warming up (Free Hand exercises), Strength – Push-up / Pull ups, Speed – 30 mtr Dash													
Module 3											16 Hrs		
Specific games (Any one to be selected by the student) 1. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. 2. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.													
Proposed Assessment Plan (for 50 marks of CIE):													
Tool			Remarks									Marks	
CIE	CIE1												
	CIE2												
	CIE3												
Activity Details													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2													

Course Title		YOGA											
Course Code		24NYP1						L-T-P-C				(0-0-2)0	
Exam Hrs.								Hours / Week				2	
								Total Hours				28	
Course Objective: To use GitLab/Git and utilize it for software development.													
Course Outcomes (COs): Upon completion of the course, students shall be able to:													
#	Course Outcomes							Mapping to POs			Mapping to PSOs		
1.	Understand the Philosophical and Scientific Basis of Yoga							12			-		
2.	Demonstrate Proficiency in Basic Yoga Practices							9			-		
3.	Analyze the Role of Yoga in Managing Stress and Enhancing Lifestyle							7, 12			-		
4.	Apply Yoga Principles for Personal and Professional Growth							10, 12			-		
Course Contents:													
Module 1											8 Hrs		
Introduction of Yoga Aim and Objectives of yoga, Prayer, Brief introduction of yogic practices for common man, Rules and regulations, Misconceptions of yoga													
Module 2											8 Hrs		
Suryanamaskara Suryanamaskar prayer and its meanitrg, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds													
Module 3											8 Hrs		
Different types of Asanas a. Sitting 1. Padmasana 2. Vajrasana b. Standing 1. Vrikshana 2. Trikonasana c. Prone line 1. Bhujangasana 2. Shalabhasana d. Supine line 1. utthitadvipadasana 2. Ardhalahasana													
Proposed Assessment Plan (for 50 marks of CIE):													
Tool			Remarks									Marks	
CIE	CIE1												
	CIE2												
	CIE3												
Activity Details													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2													

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS		
Course Code	24CS401	L-T-P-C	(4-0-0)4
Exam Hrs.	3	Hours / Week	4
SEE	50 Marks	CIE	50 Marks
Total Hours			56L+ 14SL+43ABL + 7 EV = 120
Course Objective: To develop algorithms using suitable design technique and analyze it.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describe the algorithm analysis framework and design strategies.	1	-
2.	Apply algorithms to solve a given computational problem.	1	2
3.	Analyze algorithms with respect to time complexity.	2	2
4.	Design algorithm for a given problem using suitable algorithm design strategy.	3	2
Course Contents:			
MODULE – 1			14 Hrs
Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms, Examples. Brute Force: Selection Sort and Bubble Sort, Sequential Search and String Matching, Exhaustive Search			
MODULE – 2			14 Hrs
Brute Force (continued...): Depth First and Breadth First Search, Divide-and-Conquer: Merge sort, Quick sort, Multiplication of large Numbers, Strassen's Matrix Multiplication Decrease-and-Conquer: Insertion Sort, Topological Sorting, Algorithms for Generating, Combinatorial Objects, Binary Search.			
MODULE – 3			14 Hrs
Transform-and—Conquer: Presorting, Heaps and Heapsort. Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching-Horspool algorithm, Hashing. Dynamic Programming: The knapsack Problem, Warshall's Algorithm, Floyd's Algorithm			
MODULE – 4			14 Hrs
Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees. Limitations of Algorithm Power Lower-bound Arguments, Decision Trees, P, NP and NP-Complete Problems. Coping with the Limitations of Algorithm Power: Backtracking – N Queens, Branch-and-Bound – Assignment Problem, Knapsack Problem, Travelling Salesmen problem			
Text Books : 1. Anany Levitin, Introduction to The Design and Analysis of Algorithms, 3 rd Edition, Pearson Education, 2022 2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2 nd Edition, Press 2014.			
Reference Books: 1. Cormen T.H., Leiserson C. E., and Rivest R. L., Introduction to Algorithms, 3rd edition, PHI, 2015. 2. R.C.T. Lee, S.S. Tseng, R.C. Chang and Y.T. Tsai, Introduction to the Design and Analysis of Algorithms A Strategic Approach, 1st Edition, Tata McGraw Hill, 2005.			

Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method					No. of Hours/ Week		No. of Weeks		Hours/ Semester			
1	Class Room Teaching & Learning					4		14		56			
2	Self Learning Component					-		-		23			
3	Activity Based Learning (ABL)					-		-		35			
4	Evaluation of Learning Process					-		-		6			
Total Learning Hours/Semester										120			
Self-Learning													
MOOC course with certificate submission – 23 Hrs													
Activity Based Learning													
ABL1 : Simulation based Assignment (Any online simulation tool) – 35 Hrs													
1.	Implement and compare the execution time of Bubble Sort, Merge Sort, and Quick Sort for varying input sizes (e.g., 100, 1000, 5000, 10000). Plot the time vs. input size graph and analyze the results.												
2.	Simulate and compare the performance of Linear Search and Binary Search on a sorted array of increasing size. Record the number of comparisons made for each search.												
3.	Use a simulation to analyze how Binary Search behaves when run on unsorted data. What insights can you gain?												
4.	Simulate Dijkstra’s Algorithm on randomly generated weighted graphs with different sizes and densities. Measure time taken and path correctness.												
5.	Generate a directed graph using a simulation tool and apply Depth First Search (DFS) and Breadth First Search (BFS). Compare node visitation orders and execution time.												
6.	Use a simulation to solve the 0/1 Knapsack problem using both Greedy and Dynamic Programming approaches. Compare the total value obtained and execution time.												
7.	Simulate the Job Scheduling Problem using a greedy strategy. How does the performance vary with an increasing number of jobs?												
8.	Implement a simulation of Merge Sort and Quick Sort using the Divide and Conquer strategy. Record recursion depth and number of comparisons.												
9.	Use a simulation tool to analyze the time complexity of Strassen’s Matrix Multiplication vs. naive matrix multiplication for matrices of size $2^n \times 2^n$.												
10.	Simulate the N-Queens problem using a backtracking algorithm. Track the number of recursive calls made as N increases.												
Proposed Assessment Plan (for 50 marks of CIE):													
Tool					Remarks							Marks	
CIE		CIE1			Conducted for 20 marks & reduced to 10 marks							10	
		CIE2			Conducted for 20 marks & reduced to 10 marks							10	
		CIE3			Conducted for 20 marks & reduced to 10 marks							10	
Activity Details		Activity-1			Simulation based Assignment							10	
		Activity - 2			Problem Solving							10	
Total										50			
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	3	-	-	-	-	-	-	-	-	-	3

Course Title	MICROCONTROLLER AND EMBEDDED SYSTEMS				
Course Code	24CS402	L-T-P-C	(3-0-2)4		
Exam Hrs.	3	Hours/Week	5		
CIE	50 Marks	SEE	50 Marks		
Total Hours			42L+28P+ 50ABL=120		
Course Objective: To develop programs for microcontroller based embedded systems.					
Course Outcomes(COs):Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Describe the concepts of RISC philosophy, ARM Processor Fundamentals and ARM instruction set	1	-		
2.	Write assembly code for a given problem or a given ‘C’ language code	1	-		
3.	Analyze the given assembly language code for its correctness and output	1,2	-		
4.	Develop ARM based programs using IDE for a given problem with/without external hardware devices	3,5	1,2		
Course Contents:					
MODULE – 1			11 Hrs		
ARM Systems: The RISC Design Philosophy, The ARM Design Philosophy, ARM based Embedded System Hardware and Software. ARM Processor Fundamentals : ARM core data flow model, Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts and the Vector Table, Core Extensions					
MODULE – 2			11 Hrs		
Introduction to the ARM Instruction Set: Data Processing Instructions-move, barrel shifter, arithmetic, logical, comparison, multiply. Branch Instructions, Load-store instructions-single register transfer, single register load- store addressing modes, multiple register transfer, stack operations, and swap instruction ,Program Status Register Instructions, Loading Constants, and conditional execution.					
MODULE – 3			10 Hrs		
Introduction to Thumb Instruction Set: Thumb Register Usage, ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single-Register Load-Store Instructions, Multiple-Register Load-Store Instructions. Efficient C Programming: Overview of C Compilers and Optimization, Basic C Data Types, C Looping Structures, Register Allocation					
MODULE – 4			10 Hrs		
Introduction to ARM7 LPC2148 Microcontroller: Introduction, Features of the LPC 214X Family, Internal Block Diagram of LPC 2148, LPC 2148 GPIO. Interfacing: LED interfacing, 7 segment LED display interfacing, stepper motor interfacing, LCD interfacing, Keyboard interfacing and DAC interfacing.					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	ARM system developers guide(1.1 to 1.4, 2.1 to 2.5.1, 3.1 to 3.3, 3.5 to 3.6 (Excluding 3.5.1, 3.5.2), 3.8, 4.1 to 4.6, 5.1 to 5.4)	Andrew N Sloss, Dominic Symes and Chris Wright		Elsevier, Morgan Kaufman	
2.	Hardware interfacing Manual	Shashidhara H V		Malnad College of Engineering, Hassan	

Reference Books:					
1.	The Insider’s Guide to the ARM7 Based Microcontrollers Hitex Ltd	Hitex Ltd	1 st		2005
2.	ARM System-on-Chip Architecture	Steve Furber	2 nd	Pearson	2015
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning		3	14	42
2.	Integrated Lab Component		2	14	28
3.	Self-Study Hours-Self Learning		1	14	14
4.	Evaluation of Learning Process		-	-	06
5.	Activity Based Learning		-	-	30
Total Learning Hours/Semester					120
Proposed Assessment Plan (for 50 marks of CIE):					
Tool		Remarks			Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks			10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks			10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks			10
Activity Details	Activity 1	Laboratory CIE			10
	Activity 2	Activity Based Learning			10
Integrated Laboratory Component (28 Hours)					
PART- A (Software)					
1.	In a class of strength 10 students, I need to find the tallest guy in the class to reach the projector of the classroom. Help me to identify the tallest guy.				
2.	To illustrate the working of lookup table in ARM processor, find the square of a number (1 to 10) stored in a look-up table.				
3.	Write a procedure FACT to find the factorial of a given number. Use this procedure to compute Binomial coefficient for given two numbers.				
4.	Write an ALP to add an array of 16 bit numbers and store the 32-bit result in memory.				
5.	Write an ALP to count the number of ones and zeros in N words stored in consecutive memory locations.				
6.	Write an ALP to search for a given number in a set of 32-bit numbers, using linear search algorithm.				
PART- B (Hardware Interface)					
1.	In the retail shop, the owner wants to know how many customers have been using the service of the shop. A device is used to keep count of incoming customers in the shop. Program the device to carry out the counting. Also the device should reset back to ZERO by down counting. Implement the above using Logic Controller Interface.				
2.	In a petrol bunk, if a fire occurs accidently you need to display messages FIRE and HELP alternately on a 7-segment display interface to alarm the people. Implement the above scenario.				
3.	A toy car uses a Stepper Motor interface to rotate the motor in specified direction. Program the toy to rotate (Clockwise or Counter-Clockwise) by N steps. Introduce suitable delay between successive steps. (Any arbitrary value for the delay may be assumed by the student).				
4.	Generate Sine Wave using DAC interface (The output of the DAC is to be displayed on the CRO).				
5.	Write a program to display the text message “COMPUTER SCIENCE” on a LCD display.				

6.	Scan a 4X4 keypad for a key pressed and display the key pressed on LCD screen												
Self-Study Component (14 Hours)													
1.	Comparison between Microprocessor and Microcontroller.												
2.	History of the ARM processor, ARM processor families.												
3.	Real world applications of ARM based embedded systems.												
4.	Number systems: Decimal, Binary and Hexadecimal.												
5.	Number systems: Conversions between Decimal, Binary and Hexadecimal numbers.												
6.	Pipeline hazards.												
7.	Conversion of C code into assembly code: Arithmetic and Logical operations.												
8.	Conversion of C code into assembly code: Branching concepts.												
9.	Conversion of C code into assembly code: Load-Store concepts.												
10.	Assembly programs on array: Vector addition and subtraction.												
11.	Assembly program to transfer N blocks of data from source address location to destination address location, considering the case of with and without overlapping.												
12.	Application of program status register instructions: Masking/unmasking interrupts, set/reset conditional flags.												
13.	Implementation of conditional execution.												
14.	Find the hexadecimal codes, to display a given message on seven segment LED display.												
Activity Based Learning (30 Hours)													
Learn the Proteus simulation environment and implement various LPC2148-based hardware interfacing projects.												Hours	
1.	Learn the Proteus simulation environment											5	
2.	Simulation of Projects given below: 1. LED array: Flash multiple LEDs in patterns (e.g. running light). 2. Switch + LED: Interface a digital switch to turn an LED ON/OFF. 3. IR Sensor + 7-Segment Display: Detect motion via IR sensor, increment a counter, and display on 7-segment. 4. Traffic Light Controller: Simulate a 4-way traffic intersection with timed red, yellow and green LEDs per lane. 5. Relay & Buzzer Security System: Activate relay and buzzer, possibly with simple sensor-triggered alarm.											15	
3.	Documentation and Presentation											10	
Total												30	
Evaluation of Learning Process (6 Hours)													
Type of Evaluation												Hours	
Test (1, 2 and 3)												3	
Semester End Exam												3	
Total												6	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	-	-	-	-	3	3

Course Title	DATABASE MANAGEMENT SYSTEMS				
Course Code	24CS403	L-T-P-C	(3-0-2) 4		
Exam Hrs.	3	Hours / Week	5		
CIE	50 Marks	SEE	50 Marks		
Total Hours			42L+14SL+28LC+30ABL = 120		
Course Objective: Design a database and write SQL queries.					
Course Outcomes (COs) : Upon completion of the course, students shall be able to					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Explain the concepts of DBMS.		1	-	
2.	Formulate and execute SQL queries for a given problem		3, 5,11	1, 2	
3.	Apply normalization techniques to enhance the quality of database schema		2,4	-	
4.	Design and create database for a given scenario.		3, 5	1, 2	
Course Contents:					
MODULE – 1				11 Hrs	
Introduction: Introduction; An example; Characteristics of Database approach; Actors on the screen; Advantages of using DBMS approach. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems. Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An sample Database Application; Entity Types, Entity Sets, Attributes and Keys. Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; ER Diagrams, Naming Conventions and Design Issues.					
MODULE – 2				11 Hrs	
Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN-variations of JOIN, OUTER JOIN operations					
MODULE – 3				10 Hrs	
SQL: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Basic Retrieval queries in SQL; Insert, Delete and Update statements in SQL; Additional features of SQL, More complex SQL Retrieval Queries; Views; Schema Change Statements in SQL.					
MODULE – 4				10 Hrs	
Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys-1NF, 2NF, 3NF, Boyce-Codd Normal Form. Multi-valued Dependencies and Fourth Normal Form; Concurrency control techniques: Two- Phase Locking Techniques for Concurrency control; Concurrency Control Based on Timestamp Ordering					
Text Book:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Database Systems	Elmasri and Navathe	7 th	Pearson	2015
2.	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke	3 rd	McGraw-Hill	2007
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year

1.	Database System Concepts	Silberschatz, Korthand Sudharshan	5 th	Mc-GrawHill	2006
2.	An Introduction to Database Systems	C.J.Date, A.Kannan, S.Swamynatham	8 th	Pearson education	2006

MOOC:

1. <http://nptel.ac.in/courses/106106093>
2. <https://www.edx.org/course/database-systems-concepts-design-gtx-cs6400x>

Self-Learning

1.	Use DBDiagram.io or Lucidchart to practice drawing ER diagrams for real-world scenarios
2.	Use db-fiddle to write and visualize SELECT, PROJECT, JOIN queries.
3.	Design a Mini Database – Model and implement a real-world system with proper keys and constraints.
4.	Practice identifying and correcting schema anomalies through normalization up to 4NF using functional and multivalued dependencies

Laboratory Component

1. Design an Employee database and answer following queries:
 - a) List all the employees who are above 40 years of age
 - b) List the employees who work in a particular department
 - c) List the female employees who are 30 years of age and drawing salary >8000
 - d) List the employee number, employee name and his department name of all employees
2. Design a video parlour database and solve the following queries as outlined below using SQL.
 - a) List only videos in the Children category with a daily rental rate of less than 100 and sorted according to video title.
 - b) List the catalogNo, title and category of the Video table, ordered by video title
 - c) List all videos with a certification of “U” or “B” in the Video table.
3. Consider the Insurance database. Create the tables by properly specifying the primary keys and the foreign keys, Enter at least five tuples for each relation.
 - a) Demonstrate how you
 - i. Update the damage amount for the car with a specific regno in accident with report number 12 to 25000
 - ii. Add a new accident to the database \
 - b) Find the total number of people who owned cars that were involved in accidents in 2006.
 - c) Find the number of accidents in which cars belonging to a specific model were involved.
4. Consider the database of student enrollment in courses and books adopted for each course.
 - a) Demonstrate how you add a new text book to the database and make this book be adopted by some department.
 - b) Produce a list of text books(include course # ,book_isbn, book-title) in the alphabetical order for courses offered by the cs department that use more than 2 books.
 - c) List the department that has adopted books published by specific publisher.
5. Consider an order processing database application in a company. Create the tables by properly specifying the primary keys and the foreign keys. Enter at least five tuples for each relation.
 - a) Produce a listing: CUSTNAME, NO_OF_ORDERS, and AVG_ORDER_AMT, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
 - b) List the Order# for the orders that were shipped from all the warehouses that the company has in a specific city.
 - c) Demonstrate how you delete a customer from the CUSTOMER table and make that field *null* in the ORDER table.

6. Design a relational database for a real estate agency. It should store information about houses for sale, seller information, Buyer information, agents information (who can act on behalf of either the buyer or the seller), and the sale of houses. Answer the following queries in SQL.
- What are the ids, addresses, asking_price, and selling_price of all houses that sold for less than the asking price?
 - What are names of all of (prospective) buyers who have not bought a house? Each name should appear only once.
 - Find the addresses and asking prices of all houses that have at least 3 bedrooms and two bathrooms that have not sold. Each address, asking price pair should appear only once.
7. Consider the details maintained by a book dealer. Create the tables by properly specifying the primary keys and the foreign keys. Enter at least five tuples for each relation.
- Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
 - Find the author of the book which has maximum sales.
 - Demonstrate how you increase the price of books published by a specific publisher by 10%.
8. Consider the following schema:
 Suppliers(sid: integer, sname: string, address: string)
 Parts(pid: integer, pname: string, color: string)
 Catalog(sid: integer, pid: integer, cost: real)
 Design a database to satisfy the above requirements and answer the following queries
- Find the names of parts for which there is some supplier.
 - Find the names of suppliers who supply every part.
 - Find the id's of suppliers who supply red parts.

Activity Based Learning (30 Hours)

ABL 1 (15 Hours) : Activity 1 details

Selecting a real-world scenario (e.g., Hospital Management, Library System, Online Store, or University Course Registration), analyzing its requirements, and designing an Entity-Relationship (ER) diagram to visually represent the data model.

ABL 2 (15 Hours): Activity 2 details

Formulate and execute queries in SQL for a given database application to retrieve and manipulate data based on specified requirements.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2 and 50% of Module 3) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Remaining of Module 3 and part of Module 4) & reduced to 10 marks	10
Activity Details		- Lab Program Execution – 10 Marks - Activity Based Learning – 10 Marks	20
Total			50

Teaching - Learning – Evaluation Scheme

Sl. No	Teaching - Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
3.	Class Room Teaching	3	14	42
4.	Integrated Lab Component	2	14	28
5.	Student Study Hours – Self Learning	1	14	14
5.	Tutorial component	-	-	-

6.	Activity Based Learning (ABL1 & ABL2)							-	-			30	
7.	Evaluation of Learning Process											06	
Total Learning Hours / Semester											120		
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	2	-	-	-	-	-	3	3	3
CO3	-	3	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	2	-	-	-	-	-	-	3	3

Course Title	ALGORITHMS LABORATORY		
Course Code	24CS404	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
SEE	50 Marks	CIE	50 Marks
		Total Hours	28P + 2 EV= 30
Course Objective: To demonstrate various algorithmic design techniques.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Exercise various algorithm design strategies for various problems	3, 5	2
2.	Conduct time complexity analysis of the algorithms	2,11	2
3.	Demonstrate and document the executed algorithms	9	-
Course Contents:			
Practice Programs			
1. Find GCD of two numbers using Euclid's algorithm and consecutive integer checking method 2. Implement Selection sort. 3. Implement string matching using brute force method 4. Sort a given set of elements using Insertion sort method. 5. Obtain the topological ordering of vertices in a given digraph. 6. Write a program using Transform and Conquer technique for checking whether the digits of mobile number of a person are unique. 7. Implement computing a mode using pre-sorting method. 8. Find the Binomial Co-efficient using Dynamic Programming 9. Implement 0/1 Knapsack problem using dynamic programming.			
Guided Experiments			
1. A. Generating consecutive primes using Sieve Eratosthenes algorithm B. Element Uniqueness 2. Print all the nodes reachable from a given starting node in a digraph using BFS and DFS method. 3. Employees in an organization need to be grouped for a tournament based on their ages. Sort the ages using Merge sort and find the time required to perform the sorting. 4. Students in a department need to be selected for a high jump competition based on their height (integer values only). Sort the heights of students using Quick sort and find the time required for the Sorting. 5. Sort a given set of elements using the Heap sort method. 6. Implement Horspool algorithm for String Matching. 7. Consider N cities. The shortest path between every pair of cities needs to be determined. Implement Floyd's algorithm for the All-Pairs- Shortest-Paths problem. Also find transitive closure by implementing Warshall's algorithm 8. There are N different routes from hostel to college. Each route incurs some cost. Find the minimum cost route to reach the college from hostel using Prim's algorithm. 9. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm. 10. Consider the distance between Hassan and N different cities. Every city can be reached from Hassan directly or by using intermediate cities whichever costs less. Find the shortest distance from Hassan to other cities using Dijkstra's algorithm. 11. Consider the problem having weights and profits are: Weights: {3, 4, 6, 5} Profits: {2, 3, 1, 4} The weight of the knapsack is 8 kg. Find the optimal set of items to include in the knapsack using dynamic programming. 12. Implement N-Queens problem applying backtracking			

Proposed Assessment Plan (for 50 marks of CIE):													
Tool				Remarks								Marks	
CIE				Laboratory CIE								30	
Record				Laboratory Record Submission								10	
Continuous Evaluation				Conduction of experiments								10	
Total											50		
Teaching - Learning – Evaluation Scheme													
Sl. No		Teaching - Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester	
1.		Class Room Teaching						2		14		28	
2.		Evaluation of Learning Process										2	
Total Learning Hours / Semester											30		
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	-	-	3
CO2	-	3	-	-	-	-	-	-	-	-	3	-	3
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-

Course Title		UNIX AND SHELL PROGRAMMING LABORATORY	
Course Code	24CS405	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	SEE	50 Marks
Total Hours			28L+2EV = 30
Course Objective: Design and Learn various unix utilities and shell scripting			
Course Outcomes (COs): Upon the completion of the course the students will be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Execute and document the commands related to Shell basics, vi editor.	1,3,5,9,10	-
2.	Design the solutions for a given problem using the concepts of shell concepts and document.	1,3,5,9,10	-
Course Contents:			
Self-Guided Programs			
1.	To practice on UNIX commands: man, echo, passwd, uname, who, date, cal, banner, tty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat,touch, clear, more, wc, cmp, diff, comm, head, tail, cut, paste, sort, tr and vi editor commands.		
Guided Programs			
1.	a) Write a shell script to read a message “Good Morning” and display it 10 times at regular intervals of 60 seconds. b) Write a shell script that accepts a string as a command line argument and reverse it.		
2.	a) Write a shell script to generate multiplication table. b) Write a shell script to print sum of individual digits of a number.		
3.	Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number.		
4.	Write a shell script to search a given pattern in file, if found display the message “Found” or else display “Not found”. Accept the pattern and input file as command line arguments. Display appropriate message if the input is not properly entered.		
5.	Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else. Also check whether the given file has read, write and execute permission.		
6.	Write a shell script that searches a given string in a given file and prints the number of times it repeats, else display proper error message. The script should accept the file as command line argument.		
7.	Write a shell script to display all the process running in the system every 30 seconds for 5 times using a) while b) for.		
8.	Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.		
9.	Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it		
10.	Write a shell script that computes the gross salary of an employee according to the following rules: i) If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic. ii) If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic the basic salary is entered interactively through the key board.		

11.	Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the User for the necessary information, such as the file name, new name and so on.
12.	Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.
13.	Write a shell script to perform the following string operations: i. To find the length of a given string. ii. To extract a sub-string from a given string.
14.	Write a menu driven shell script to perform the following: i. List of users who are logged in ii. List of files in the current directory iii. List of processes of users iv. Today's date v. Quit to Unix

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Laboratory CIE	30
Record	Laboratory Record Submission	10
Continuous Evaluation	Conduction of experiments	10
Total		50

Teaching - Learning – Evaluation Scheme

Sl. No	Teaching - Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching	2	14	28
2.	Evaluation of Learning Process	-	-	2
Total Learning Hours / Semester				30

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	3	-	3	-	-	-	2	2	-	-	-
CO2	3	-	3	-	3	-	-	-	2	2	-	-	-

Course Title		OPTIMIZATION TECHNIQUES			
Course Code		24CS406A	L-T-P-C		(3-0-0)3
Exam Hrs.		3	Hours / Week		3
CIE		50 Marks	SEE		50 Marks
Total Hours					42L+ 48ABL=90
Course Objective: To solve optimization problems using various methods.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Develop mathematical model for a given problem.			1	-
2.	Apply techniques of Operations Research to solve problems.			2	2
3.	Solve prediction and estimation problems.			1, 2	2
4.	Apply various methods for solving optimization problems.			3, 5	2
Course Contents:					
MODULE – 1					11 Hrs.
Introduction : Introduction: The origin, nature and impact of OR; Overview of the Operations Research Modeling Approach: Defining the Problem and Gathering Data; Formulating a Mathematical Model; Deriving Solutions from the Model; Testing the Model; Preparing to Apply the Model; Implementation Linear Programming – 1 : Prototype example; The Linear Programming (LP) Model, Assumptionsof LP, Additional Examples					
MODULE – 2					11 Hrs.
Simplex Method - 1 : The Essence of the Simplex Method; Setting up the Simplex Method; The Algebra of the Simplex Method; The Simplex Method in Tabular Form; Tie Breaking in the SimplexMethod Simplex Method – 2 : Adapting to other Model Forms; Post Optimality Analysis, Computer implementation					
MODULE – 3					10 Hrs.
Revised Simplex Method: Foundations of the Simplex Method, The revised simplex method, A Fundamental Insight Duality Theory: The Essence of Duality Theory; Economic Interpretation of Duality. Primal-Dual Relationships , Adapting to other primal forms, The role of duality in sensitive analysis; The essenceof sensitivity analysis; Applying sensitivity analysis, The dual simplex method ; Parametric linear programming; The upper bound technique.					
MODULE – 4					10 Hrs.
Transportation Model: Definition of the Transportation Model, Nontraditional Transportation Models, The TransportationAlgorithm. Assignment Model and Network Models : The Assignment Model, CPM and PERT					
Text Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Operations Research	Frederick S. Hillier and Gerald J. Lieberman (Chapters: 1.1 to 1.3, 2, 3.1 to 3.3, 4.1 to 4.7, 5, 6.1 to 6.7, 7.1)	9 th	Tata McGraw Hill	2012
2.	Operations Research: An Introduction	Hamdy A Taha	8 th	Prentice Hall India	2005
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Operations Research Applications and Algorithms	Wayne L. Winston	4 th	Thomson Course Technology	2013

MOOCs:

1. https://onlinecourses.nptel.ac.in/noc21_ma62/preview
2. https://onlinecourses.swayam2.ac.in/cec23_ma02/preview
3. https://onlinecourses.nptel.ac.in/noc24_cs03/preview

Web links and Video Lectures (e-Resources):

1. Optimization Toolbox (<https://in.mathworks.com/products/optimization.html>)
2. S.N. Sivanandam, S.N. Deepa, Principles of Soft Computing, 2nd Edition, 2011
3. Principle of Soft computing (<https://archive.nptel.ac.in/courses/106/105/106105173/>)

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Activity Based Learning (ABL)	-	-	41
3	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details	Activity-1	ABL-1	10
	Activity-2	ABL-2	10
Total Hours			50

Activity Based Learning (48 Hours)

ABL-1		30 hrs
Sl No	Problems on	Hours
1.	Formulating a Mathematical model and deriving solution.	3
2.	Linear Programming (LP) Model.	3
3.	Essence of the Simplex Method.	3
4.	Simplex Method in Tabular Form.	3
5.	Post Optimality Analysis.	3
6.	Revised Simplex Method.	3
7.	Duality Theory.	3
8.	Relationships.	3
9.	Transportation Model.	3
10.	Assignment Model and Network Models.	3
ABL-2		11 hrs
1.	Develop any of the above optimization technique using MATLAB/Python, for the real world problems.	11

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	3
CO3	2	2	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	3	-	3	-	-	-	-	-	-	-	3

Course Title		DISCRETE MATHEMATICAL STRUCTURES			
Course Code	24CS406B	L-T-P-C		(3-0-0)3	
Exam Hrs.	3	Hours / Week		3	
CIE	50 Marks	SEE		50 Marks	
Total Hours				42L+ 48ABL=90	
Course Objective: Deploying concepts of mathematical logic for analyzing propositions and proving theorems.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Apply logic, mathematical proof and counting principles to given problem.			2 , 3	-
2.	Use concepts of functions in analyzing problems on algorithms.			2	-
3.	Analyze programming problems related to Group theory and Coding theory.			2	-
Course Contents:					
MODULE – 1					11 Hrs.
Principles of Counting: The rule of sum and product, permutation principle, combination principle, Combination with repetition					
Fundamentals of Logic: Basic logic connectives and truth tables. Logical equivalence and Tautologies. Statement of laws of logic					
Self-study: Set theory – set operations, Venn diagram, Inclusion Exclusion principle.					
MODULE – 2					11 Hrs.
Fundamentals of Logic (contd...): Logic implication - Rules of inference theory. Application of switching network.					
Relation: Cartesian Product of Sets, Relations, Zero-one Matrix, Directed graph, Properties of Relation, Equivalence Relation, Partially ordered sets, Hasse diagram, Lattice.					
Self-study: Quantifiers					
MODULE – 3					10 Hrs.
Functions: Ceiling function, Floor function, Functions, Types of Functions, Properties of Functions, Composition of Functions, and Inverse Functions, Application of Stirling numbers of second kind. The Pigeon hole principle.					
Self-study: Application of functions in vending machine, Application to algorithm testing using computational complexity.					
MODULE – 4					10 Hrs.
Group theory: Examples and elementary properties					
Coding theory: Elements of coding theory, the humming matric, the parity – check and Generator matrices, Group codes: Decoding with coset leaders. Hamming matrices.					
Self-study: sub-groups, cosets, Matrix row operations.					
Text Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Discrete and Combinatorial Mathematics	R C Grimaldi	5 th	Pearson’s publications	2007
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Discrete Mathematical Structures	D. S. Malik & M. K. Sen	1st	Thomson’s Publications	2006

MOOCs:

1. https://onlinecourses.nptel.ac.in/noc22_cs33/preview
2. <https://www.coursera.org/specializations/discrete-mathematics>

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=UwYJUKVc-Hs>
2. <https://www.youtube.com/watch?v=FMh8qNV3PHk>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Activity Based Learning (ABL)	-	-	41
3	Evaluation of Learning Process	-	-	07

Total Learning Hours/Semester**42L+ 48ABL=90****Proposed Assessment Plan (for 50 marks of CIE):**

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details	Activity-1	ABL-1	10
	Activity-2	ABL-2	10

Activity Based Learning (48 Hours)

ABL-1			30 hrs
Sl No	Problems on		Hours
1.	Problems on permutation and combination.		3
2.	Problems on logic connectives and Logical equivalence		3
3.	Problems on laws of logic		3
4.	Problems on Logic implication		3
5.	Problems on Relation		3
6.	Problems on Hasse diagram and Lattice		3
7.	Problems on Functions		3
8.	Problems on Group theory		3
9.	Problems on Coding theory		3
10.	Problems on Group codes		3
ABL-2			11 hrs
1.	Develop any of the above problem (ABL-1) using MATLAB/Python, for the real world problems.		11

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	3	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-

Course Title		GRAPH THEORY AND COMBINATORICS			
Course Code	24CS406C	L-T-P-C	(3-0-0)3		
Exam Hrs.	3	Hours / Week	3		
CIE	50 Marks	SEE	50 Marks		
Total Hours			42L+48ABL = 90		
Course Objective: Understand the fundamentals of graph theory and combinatory.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Describe the concepts of graphs and counting principles.	1	-		
2.	Apply the concepts of graphs and counting principles in solving problems	2	-		
3.	Analyze various concepts of graph and counting techniques	2	-		
4.	Solve a given problem adopting the concepts of graph and counting principles	3 , 5	2		
Course Contents:					
MODULE – 1			11 Hrs		
An Introduction to Graph theory: Definitions and examples, Sub graphs, Complements and Graph isomorphism, Vertex degree, Euler Trails and Circuits, Hamilton paths and cycles,					
MODULE – 2			11 Hrs		
Planar Graphs and Colouring: Planar and non-planar graphs, Euler’s Formula, Detection of planarity, Dual of a planar graph, Graph coloring, chromatic number, and chromatic polynomials. Optimization and Matching: Cut-sets, Edge connectivity, Vertex connectivity, Transport Networks: The Max-Flow Min-Cut Theorem, MatchingTheory.					
MODULE – 3			10 Hrs		
The Principles of Inclusion and Exclusion: The Principle of Inclusion and Exclusion, generalizations of the principle, derangements, Rook Polynomials, Arrangements with forbidden Positions. Generating function: Introductory examples, Definition and examples; Partitions of Integers.					
MODULE – 4			10 Hrs		
Generating function (conti.): The exponential generating function, the Summation Operator. Recurrence relations: First-order and second order linear recurrence relations, with constant coefficients, The non- homogeneous recurrence relation, The Method of Generating Functions.					
Text Books :					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	5th	Pearson Education	2004
2	Graph Theory and Combinatorics	Dr. D.S. Chandrashekar	4th	Prism	2012
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Graph Theory with applications to Engineering and Computer Science	Narsing Deo		PHI Publications	

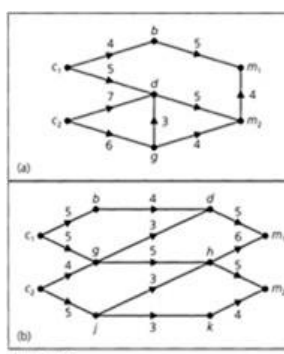
2	Combinatorics	V Balakrishnan	Schaum Series,	Tata-McGraw Hill Publications	
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MOOCs:

1. <http://nptel.ac.in/courses/111106050/>
2. <http://nptel.ac.in/courses/106108051/>

Activity:

1. Two cases of soft drinks, 24 bottles of one type and 24 of another are distributed among five surveyors who are conducting taste tests. In how many ways can the 48 bottles be distributed so that each surveyors gets (a) at least two bottles of each type? (b) At least two bottles of one particular type and at least three of the other?
2. How can Mary split up 12 hamburgers and 16 hot dogs among her sons Richard, Peter Christopher, and James in such a way that James gets at least one hamburger and three hot dogs, and each of his brothers gets at least two hamburgers but at most five hot dogs?
3. Sergeant bueti must distribute 40bullets (20 for rifkes and 20 for handguns) among four officers so that each officer gets at least two, but no more than seven, bullets of each type. In how many ways can he do this
4. Nineteen students in a nursery school play a game each day where they hold to hands to form a circle. For how many days can they do this with no students holding hands with the same playmate twice?
5. In each of the following “transport networks” two companies c1 and c2, produce a certain product that is used by two manufactures, m1 and m2. For the network shown in part(a) of Fig. 13.23, company c1 can produce 8 units and company c2 can produce 7 units; manufacturer m1 requires 7 units and manufacturerm2 needs 6 units. In the network shown in Fig 13.22 (b), each company can produce 7 units and each manufacturer needs 6 units. In which situation(s) can the producers meet the manufactures demands?



6. Fritz is in charge of assigning students to part-time jobs at the college where he works. He has 25 student applications, and there are 25 different part-time jobs available on the campus. Each applicant is qualified for at least four of the jobs, but each job can be performed by at most four of the applicants. Can Fritz assign all the students to jobs for which they are qualified? Explain. Characterize the type of graph in which an Euler trail (circuit) is also a Hamilton path (cycle).

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details		Activity Based Learning	20
Total			50

Teaching - Learning – Evaluation Scheme													
Sl. No	Teaching - Learning Method				No. of Hours/ Week				No. of Weeks		Hours/ Semester		
1.	Class Room Teaching				3				14		42		
2.	Self-Learning				3				13		39		
3.	Evaluation of Learning Process										9		
Total Learning Hours											90		
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-		3	-	2	-	-	-	-	-	-	-	3

Course Title	COMPUTER ASSEMBLY AND NETWORKING		
Course Code	24CS407A	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
SEE	50 Marks	CIE	50Marks
Total Hours			28P + 2ABL = 30
Course Objective: Acquire hands on experience on computer assembly and disassembly, trouble shooting and computer networking			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Demonstrate computer assembly and disassembly and troubleshooting of computer systems hardware, software and other peripheral equipment.	1	-
2	Familiar with wired and wireless communication and computer networks instruments.	2,3	-
3	Gain practical experiences in networking hardware, device configuration, testing and troubleshooting.	1	-
4	Demonstrate network simulation using virtual network simulator software and analyze their performances.	5	1
Course Contents:			
Lab 1: Computer assembly and disassembly			02 Hrs.
Computer Assembly: Open the case, Install the power supply, Attach the components to the motherboard and install the motherboard, install internal drives, connect all internal cables, install motherboard power connections, connect external cables to the computer, Boot the computer for the first time. Computer Disassembly: Unplugging, Open the case, disconnect all the connectors, Remove the fan, Remove the power supply, Removing HDD and optical drive, Remove RAM (random access memory), modules, remove expansion cards, remove motherboard, Reassemble the components.			
Lab 2: Troubleshooting			02 Hrs.
Diagnose and troubleshooting microcomputer/computer systems hardware and software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Troubleshooting printer and scanner problems, troubleshooting hard drive problems.			
Lab 3: Network cables assembling and testing			01 Hrs.
This lab introduces three types of cabling, i.e. twisted pairs, coaxial cable, and fiber optic. Students assemble connectors to a twisted pair cable using crimping tool, and then they test the cable to ensure properly wired connections. This is important because many of the network installation problems are related to cable errors.			
Lab 4: Network cards installation and test			01 Hrs.
This lab shows how to install and configure the network card into a PC expansion slot of a client computer. Connect the client computer to the network. Install the cable and document all network connections on a classroom LAN network.			
Lab 5: LAN configuration			02 Hrs.
Once the network operating system and the physical hardware are installed and configured, shares must be set up on the workstations. The lab introduces how to locate the network configuration screen used with Windows XP and configure a workstation with a unique computer name and configure a hub with an IP address. Each workstation becomes a client for Microsoft Networks, and File and Print Sharing is enabled. The basic elements will be in place to share files between workstations on the LAN. In this procedure students examine the user-level access control, that is, access is granted based upon access privileges granted to a single user or a group of users. Another lab activity is the configuration of a client computer for print sharing.			

Lab 6: Wireless Networks					02 Hrs.
In this lab students will install and configure the TP-Link Wireless Access point, which allows laptops and other mobile computer systems wireless access to a network and perform a link test to assess the performance of the RF link. Also, students learn how to implement a strong network security by changing the Service Set Identifier (SSID), and establish a strong Wi-Fi Protected Access (WPA) passphrase on the router or access point. Then configure all the wireless computers and devices on the network to associate with the SSID of WPA-enabled router or access point using the same WPA passphrase.					
Lab 7: Router configuration					02 Hrs.
This lab introduces the concepts of IP forwarding and routing between IP networks. The lab exercise shows how to set up a Windows PC and a TP-Link router as an IP router and reveals the similarities of IP forwarding and routing tables on a Windows PC and a TP-Link router. Students learn how to interpret and edit routing-table entries in a network with multiple IP networks and IP routers.					
Lab 8: Client-Server Network Configuration					02 Hrs.
Students are introduced to the installation of Windows Server tools on a Windows Professional workstation and set up a user account on the Windows server. Also create and manage networked groups and manage the security policies of users and the network.					
Lab 9: Routing Information Protocol					01 Hrs.
The lab explores a routing protocol based on the distance-vector algorithm using network simulator. The goal of the lab is to configure and analyze the performance of the Routing Information Protocol (RIP) model. Here students study how RIP provides a distributed, dynamic way to solve the problem of finding the lowest-cost path in the presence of link and node failures and changing edge costs. A lab exercise with the routing protocol RIP explores the analysis of the routing tables generated in the routers based on distance-vector algorithm, and how RIP is affected by link failures.					
Textbook:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Data and Communications and Networking	Behrouz A Forouzan	5 th Indian	McGraw Hill,	2013
2.	Computer-Networks	Andrew S. Tanenbaum and David J. Wetherall	5 th Indian	Pearson Education	2012
3.	Computer Networking a Top-Down Approach	James F. Kurose and Keith W. Ross	7th Indian	Pearson Education	2010
Reference Books:					
Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Network Simulation Experiments Manual	E. Aboelela,	3 rd Indian	Morgan Kaufmann	2003
2.	Mastering Networks, An Internet Lab Manual	J. Liebeherr, M. El Zarki	4 th Indian	Pearson Education	2004
3.	Networking	J. S. Beasley	4 th Indian	Pearson Education	2004.

Proposed Assessment Plan (for 50 marks of CIE):													
Tool				Remarks								Marks	
CIE	CIE1			CIE will be conducted for 20 marks								20	
	Record Writing			For record writing 10 marks will be awarded								10	
Activity Details				Group activity will be carried out for 20 marks; individual students will be asked to prepare a report on the activity that they carry out.								20	
Activity Based Learning (ABL) Details:													
Sl No.	Teaching and Learning Method						No. of Hours/Week		No. of Weeks		Hours/Semester		
1.	Classroom Teaching & Learning						2		14		28		
2.	Activity Based Learning (ABL)						-		-		2		
ABL 1: Simulation based Assignment (2 Hrs.)													
Simulation based Assignment				Tool selection and demonstration of usage of the selected tool								1	
				Evaluating the student based on report and presentation								1	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	3	-

Course Title	INTRODUCTION TO POWER BI		
Course Code	24CS407B	L-T-P-C	(0-0-2) 1
Exam Hrs.	3	Hours / Week	02
CIE	50 Marks	SEE	50
Total Hours			28P + 2EV = 30
Course Objective: To learn and Practice Programming techniques using Microsoft Power BI.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Prepare the dataset in suitable format with required preprocessing using Power Query Editor.	1, 2	1
2.	Apply suitable visualization techniques to generate report for the various problem.	3, 5, 9	2
3.	Implement, document and present the data visualization projects for the chosen problems.	3, 5, 9, 11	2
Course Contents:			
Practice Programs: (Self-Learning)			
1. Installation of Power BI 2. Building Blocks and Components of Power BI 3. Overview of GU 4. Introduction to Power Query Editor			
Guided Laboratory Experiments			
1. You have a dataset in an Excel file named SalesData.xlsx with the following columns: Date, Product, Quantity, and Price. You want to: - Import the data. - Filter out rows where the Quantity is less than 10. - Remove duplicate rows. - Add a new column TotalSales which is the product of Quantity and Price.			
2. ABC Retailers deals with various data sources and formats, leading to inconsistencies and errors in the data. To derive meaningful insights, the data must be transformed and prepared using Power BI. This includes establishing appropriate data types, replacing erroneous values, handling nulls and errors, performing pivoting and un-pivoting operations, merging and appending queries, and importing data from folders.			
3. ABC Retailers needs to perform advanced data transformations to derive more meaningful insights from their data. This involves creating custom columns, conditional columns, summarizing data with group by, managing queries, and optimizing report performance by enabling/disabling load and report refresh options.			
4. ABC Corporation has a diverse dataset comprising sales transactions, product details, customer information, and category classifications. The company seeks to utilize Power BI to establish and manage relationships between these datasets to facilitate comprehensive data analysis and reporting.			
5. XYZ Corporation is leveraging Power BI to analyze their sales and customer data. They need to understand how to configure cross-filter directions and effectively manage relationships between their datasets to enhance data analysis capabilities.			
6. ABC Corporation is looking to enhance its data analysis capabilities using Power BI. Employee's need comprehensive training on understanding various visualization types, utilizing the Format tab effectively, and mastering the creation of tables and bar charts for insightful reporting.			

7. XYZ Corporation aims to enhance its data analysis capabilities by leveraging Power BI for insightful data visualization. Employees need training on creating and customizing Clustered Column Charts, Matrix Visuals, Pie Charts, and Donut Charts to effectively present data and derive actionable insights.													
8. XYZ Corporation is leveraging Power BI to analyze sales and operational data. Employees need training on creating Clustered Column charts, applying Conditional Formatting, and understanding various types of Filters in Power BI to enhance data visualization and analysis capabilities.													
9. ABC Corporation is enhancing its data analytics capabilities using Power BI. Employees require training on utilizing Slicers, managing Edit Interactions, creating Bookmarks, and implementing Drill Down and Drill Through features to optimize data exploration and reporting.													
10. XYZ Corporation is adopting Power BI for enhanced data visualization and analytics. Employees need training on using Tooltips, creating interactive Buttons, incorporating KPI Cards, generating Waterfall Charts, and integrating Custom Visuals to develop compelling and actionable reports.													
Text Book :													
Sl.No	Book Title				Authors			Edition	Publisher			Year	
1.	Introducing Microsoft Power BI				Alberto Ferrari and Marco Russo			1 st	Microsoft Press			2016	
2.	Mastering Microsoft Power BI				Brett Powell			1 st	Packt			2018	
Teaching - Learning – Evaluation Scheme:													
Sl No.	Teaching and Learning Method						No. of Hours/Week		No. of Weeks		Hours/Semester		
1	Class Room Teaching & Learning						-		-		-		
2	Lab Component						2		14		28		
3	Student Study Hours – Self Learning												
4	Activity Based Learning (ABL1)												
5	Evaluation of Learning Process						-		-		2		
Total Learning Hours/Semester											30		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE		CIE conducted for 30 marks										30	
Lab Report		Lab Report Submission										10	
Activity Details		Project based group activity										10	
Activity Based Learning													
ABL1: Implementing Real Time Project using R Programming													
1.	Identifying areas in which students want to carry out the project												
2.	Meeting and Discussion (Online or offline) with the faculty and fixing the Problem Statement												
3.	Designing and implementing the project												
4.	Presentation and submitting the final report												
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-
CO2	-	-	3	-	3	-	-	-	3	-	-	3	3
CO3	-	-	3	-	3	-	-	-	3	-	3	3	3

Course Title		TECHNICAL WRITING USING LATEX				
Course Code	24CS407C	L-T-P-C	(0-0-2)1			
Exam Hrs.	3	Hours / Week	2			
CIE	50 Marks	SEE	50 Marks			
		Total Hours	28L+2EV = 30			
Course Objective: To prepare a LaTeX document.						
Course Outcomes (COs): Upon completion of the course, students shall be able to:						
#	Course Outcomes	Mapping to POs	Mapping to PSOs			
1.	Design a document layout using a given problem.	2,3	1			
2.	Prepare the document using mathematical equations, tables and figures.	1, 5	1			
3.	Demonstrate and document the work carried out.	5, 9, 11	1			
Course Contents:						
Guided Laboratory Programs						
1.	Design an Introduction chapter with two sections, each containing a subsection with the relevant information, and include a header [title of document] and a footer [institute name, page number].					
2.	Create a document that displays the sample Abstract and Summary consists of relevant information.					
3.	Develop a LaTeX script to create a simple title page of the MCE project Report [Use suitable Logos and text formatting].					
4.	Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]					
5.	Develop a LaTeX script to create a document that contains the following table with proper labels.					
	Sl No.	USN	Student Name	Marks		
				Subject 1	Subject 2	Subject 3
	1	4MC23XX001	Name 1	70	80	85
	2	4MC23XX002	Name 2	80	84	90
	3	4MC23XX003	Name 3	88	98	50
6.	Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept					
7.	Develop a LaTeX script to create a document that consists of the following two mathematical equations					
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$= \frac{-2 \pm \sqrt{2^2 - 4 \cdot (1) \cdot (-8)}}{2 \cdot 1}$$= \frac{-2 \pm \sqrt{4+32}}{2}$ $\varphi_{\sigma}^{\lambda} A_t = \sum_{\pi \in C_t} \text{sgn}(\pi) \varphi_{\sigma}^{\lambda} \varphi_{\pi}^{\lambda}$$= \sum_{\tau \in C_{\sigma t}} \text{sgn}(\sigma^{-1} \tau \sigma) \varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda}$$= A_{\sigma t} \varphi_{\sigma}^{\lambda}$					
8.	Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document					
9.	Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section					
10.	Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library					
11.	Develop a LaTeX script to present an algorithm in the document using algorithm/algorithmic/algorithm2e library					
12.	Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.					

Text Book :															
Sl.No		Book Title					Authors			Edition		Publisher		Year	
1.		LATEX Beginner’s Guide					Stefan Kottwitz			-		-		-	
MOOC: https://www.my-mooc.com/en/mooc/latex-for-students-engineers-and-scientists															
Proposed Assessment Plan (for 50 marks of CIE):															
Tool			Remarks										Marks		
CIE			Laboratory CIE										20		
Record			Laboratory Record Submission										10		
Activity Details			Project based activity										10		
Total												50			
Teaching - Learning – Evaluation Scheme															
Sl. No		Teaching - Learning Method						No. of Hours/ Week		No. of Weeks			Hours/ Semester		
1.		Classroom Teaching						2		14			28		
2.		Evaluation of Learning Process											2		
Total Learning Hours / Semester												30			
Course Articulation matrix															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	-	3	3	-	-	-	-	-	-	-	-	3	-		
CO2	3	-	-	-	3	-	-	-	-	-	-	3	-		
CO3	-	-	-	-	3	-	-	-	3	-	3	3	-		

Course Title		UI/UX LABORATORY		
Course Code	24CS407D	L-T-P-C	(0-0-2)1	
Exam Hrs.	3	Hours / Week	3	
CIE	50 Marks	SEE	50 Marks	
Total Hours			28L+2EV = 30	
Course Objective: To gain a solid understanding of fundamental UI/UX principles, including visual design, user-centred design, usability, and user experience.				
Course Outcomes (COs): Upon completion of the course, students shall be able to:				
#	Course Outcomes	Mapping to POs	Mapping to PSOs	
1.	Apply design principles and guidelines to create visually appealing and user-friendly interfaces for websites and mobile applications.	2	-	
2.	Develop wireframes and interactive prototypes using design tools to visualize and communicate interface concepts and user flows.	5	-	
Guided Programs:				
1. Chat App Redesign: Create a Wireframe and redesign any popular chat app. 2. Food App: Create a wireframe, Design and Prototype the UI Pages for the food application. 3. Social Media App: Create a wireframe Design and Prototype social media photo sharing app. 4. Product Website: Design and prototype a product website page. Create web pages and rollovers for the web pages 5. Travel Agency Website: Create a wireframe, Design and prototype the UI for the website including design for Home Page with search bar, Activities page, Client Testimonial Page, Image Gallery 6. UI/UX Designer Portfolio Design: Create a wireframe, Design and prototype a UI for a portfolio including design for About page, Work showcase page, Blog page, contact page 7. Dashboard Design: Create a wireframe, Design and Prototype Dashboard UI page, add some Dashboard details, statistics and graphs, Add dropdown options for some dashboard details 8. E-Commerce Website: Create a wireframe, Design and prototype Web pages including product category pages (example: mobiles, gaming consoles, Speakers), product pages in each category, buy now page, add to cart page 9. Educational Website: Create a wireframe, Design and Prototype the UI for an educational website include a Homepage with footer, About Us Page, Programs page, Instructors page, Pricing page, Payments page with radial buttons. Design dropdowns for programs button 10. Music Player App: Create a wireframe, Design and prototype the pages with a background and a Rollover button, and Song selection Page with a Home Rollover button. The third page may include animated play and pause button, play music animation, timer animation.				
Proposed Assessment Plan (for 50 marks of CIE):				
Tool		Remarks	Marks	
CIE		Laboratory CIE	30	
Record		Laboratory Record Submission	10	
Continuous Evaluation		Conduction of experiments	10	
Total			50	
Teaching - Learning – Evaluation Scheme				
Sl. No	Teaching - Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Lab Conduction	2	14	28
2.	Evaluation of Learning Process			2
Total Learning Hours / Semester				30

Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	3	2
CO2	-	-	-	-	3	-	-	-	-	-	-	3	2

Course Title	BIOLOGY FOR ENGINEERS		
Course Code	24CS408	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours/Week	2
CIE	50 Marks	SEE	50 Marks
		Total Hours	14L + 2EV= 30
Course Objective:			
Course Outcomes: At the end of the course, student will be able:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	To familiarize engineering students with basic biological concepts	1	-
2.	To involve students in an interdisciplinary vision of biology and engineering	2	-
3.	To gain an appreciation for how biological systems can be designed and engineered to substitute natural system	2	-
4.	To develop biological models using AI tools	3	-
MODULE-1			3 Hrs
Introduction to Human Anatomy: Overview of human anatomy, Structural organization of the human body - cardiovascular system, endocrine system, digestive system, respiratory system, excretory system, lymphatic system, nervous system, muscular system and skeletal system.			
MODULE-2			4 Hrs
Bioinspired Engineering based on human physiology: Circulatory system (artificial heart, pacemaker, stents), Nervous system (Artificial neural network).			
MODULE-3			4 Hrs
Bioinspired Algorithms and Applications: Genetic algorithm, Gene expression modelling. Parallel Genetic Programming: Methodology, History, and Application to Real-Life Problems. Dynamic Updating DNA Computing Algorithms. Beehive: New Ideas for Developing Routing Algorithms Inspired by Honey Bee Behaviour.			
MODULE-4			3 Hrs
Artificial Intelligence and Biology: Applications of AI in medical imaging, neural engineering, systems biology, microbiome and data mining.			
Text Books:			
1. Jenkins, C.H. Bioinspired Engineering, NY: Momentum press, 2012 ISBN: 97816066502259			
2. A Practical Guide to Bio-inspired Design, Hashemi Farzaneh, Helena, Lindemann, Udo, Springer 2019, ISBN 978-3-662-57683-0			
Evaluation :			
Continuous Internal Evaluation (CIE)			
Two CIEs will be conducted for 20 marks each.			
For the activity component students should form a team of 3 to 4 members each. A group activity should be assigned to each team based on the modules covered in the course. Students should show the progress in this activity as a preliminary phase for SEE.			
CIE	Schedule	Assessment Method	Marks
CIE I	At the end of 8 weeks	Objective Questions	20
			Duration (Min.)
			60

CIE II	At the end of 11 weeks	Objective Questions	20	60
Activity	After CIE 2	Presentation/Role Play/Prototype development	10	-

Semester End Examination

SEE will be conducted for 50 marks in practical mode based on the assigned activity which may be a presentation/ prototype development/any other activity.

Course Title	UNIVERSAL HUMAN VALUES		
Course Code	24UHV	L-T-P	(0-0-2)1
CIE	50 marks	Hours/Week	2
SEE	50 marks	Total Hours	28L +2EV=30
Course Objective: The course aims at the development of the value education by the right understanding through the process of self-exploration (about themselves), family, society and nature/existence. Strengthening of self-reflection by development of commitment and courage to act are presented as the prime focus throughout the course towards qualitative transformation in the life of the student. Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to POs
1.	Start exploring themselves, get comfortable with each other and with the teacher and they start appreciating the need and relevance for the course. Also they are able to note that the natural acceptance (intention) is always for living in harmony.	6, 7, 8, 9, 12	-
2.	Differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them and need to take appropriate steps to ensure right participation (in terms of nurturing, protection and right utilization) in the nature.	6, 7, 8, 9, 12	-
3.	Present sustainable solutions to the problems in society and nature. They are also able to see that these solutions are practicable and draw roadmaps to achieve them.	6, 7, 8, 9, 12	-
Course Contents			
MODULE - 1			8 Hrs
Introduction to Value Education : Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.			
MODULE – 2			6 Hrs
Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Lecture, Understanding Harmony in the Self Tutorial, Harmony of the Self with the Body to ensure self-regulation and Health.			
MODULE-3			8 Hrs
Harmony in the Family, Nature and Existence: Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order. Whole existence as Coexistence: Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.			
MODULE-4			6 Hrs
Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education,			

Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

Self-Learning Activities-

1. Sharing about One self and Exploring Natural Acceptance
2. Exploring Harmony of Self with the Body
3. Exploring the Feeling of Respect
4. Exploring the Four Orders of Nature Lecture and Exploring Co-existence in Existence
5. Exploring Humanistic Models in Education, Exploring Steps of Transition towards Universal Human Order

Text Book and Teachers Manual-

1. The Textbook: A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. The Teacher's for a Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books-

1. Jeevan Vidya:EkParichaya, ANagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.
2. HumanValues, A.N.Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth-by Mohandas Karamchand Gandhi
5. Small is Beautiful-E.F Schumacher.
6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence-J C Kumarappa
8. Bharat Mein Angreji Raj-Pandit Sunderlal.
9. Redis covering India-by Dharampal
10. Hind Swarajor Indian Home Rule-by Mohandas K. Gandhi.
11. India Wins Freedom-Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland(English)
13. Gandhi-Romain Rolland(English)

Evaluation :

Continuous Internal Evaluation (CIE)

Two CIEs will be conducted for 20 marks each.

For the activity component students should form a team of 3 to 4 members each. A group activity should be assigned to each team based on the modules covered in the course. Students should show the progress in this activity as a preliminary phase for SEE.

CIE	Schedule	Assessment Method	Marks	Duration (Min.)
CIE I	At the end of 8 weeks	Objective Questions	20	60
CIE II	At the end of 11 weeks	Objective Questions	20	60
Activity	After CIE 2	Presentation/Role Play/Prototype development	10	-

Semester End Examination

SEE will be conducted for 50 marks in practical mode based on the assigned activity which may be a presentation/ prototype development/any other activity.

Course Title	FINITE AUTOMATA AND FORMAL LANGUAGES				
Course Code	24CS501	(L-T-P) C	(2-2-0) 3		
Exam Hrs.	3	Hours/Week	4		
CIE	50 Marks	Total Hours	28L + 28T+24SL+10EV=90		
SEE	50 Marks				
Course Objective: To understand and apply automata theory and formal languages for computational problem solving					
Course Outcomes (COs): Upon Completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply the knowledge of Automata Theory, Grammars & Regular Expressions to solve problems involving formal languages	1	-		
2.	Analyse and verify the given Automata to identify the formal language it represents	2	-		
3.	Design automata and grammar for a given formal language.	3	-		
4.	Work effectively in a team and demonstrate the working of different automata in real life applications.	5,8,9	1		
Course Contents:					
MODULE – 1			7 Hrs		
Introduction to Finite Automata: Why Study Automata Theory? The Central Concepts of Automata Theory. Finite Automata: An Informal Picture of Finite Automata, Deterministic Finite Automata, Non-Deterministic Finite Automata, Finite Automata with Epsilon-Transitions.					
MODULE – 2			7 Hrs		
Regular Expressions and Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions. Properties of Regular Languages: Proving Languages Not to Be Regular – Pumping Lemma, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.					
MODULE – 3			7 Hrs		
Context-Free Grammars and Languages: Context-Free Grammars, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Pushdown Automata: Definition of the Pushdown Automata, The languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.					
MODULE – 4			7 Hrs		
Properties of Context-Free Languages: Normal Forms for Context-Free Grammars- Eliminating Useless symbols, Eliminating epsilon productions, Eliminating Unit productions, Chomsky Normal Form (CNF), Griebach Normal Form (GNF). Introduction to Turing Machines: Problems that Computers cannot Solve, The Turing Machine Programming Techniques for Turing Machines.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman	3 rd	Pearson Education	2013
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	An Introduction to Formal Languages and Automata	Peter Linz	4 th	Narosa Publishing House	2011
2.	Introduction to Languages and Automata Theory	John C Martin	3 rd	Tata McGraw-Hill	2007
EBOOKS/MOOC:					
https://methodist.edu.in/web/uploads/files/Introduction%20To%20Automata%20Theory_john%20hopcroft.pdf					

Online Courses and Video Lectures:													
https://www.youtube.com/watch?v=T5twacMzBFo													
Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning						2		14		28		
2.	Tutorial Component						2		14		28		
3.	Student Study Hours – Self Learning						-		-		24		
4.	Activity Based Learning (ABL1 & ABL2)						-		-		-		
5.	Evaluation of Learning Process						-		-		10		
Total Learning Hours / Semester											90		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks									Marks		
CIE		CIE1	Conducted for 20 marks and reduced to 10 marks									10	
		CIE2	Conducted for 20 marks and reduced to 10 marks									10	
		CIE3	Conducted for 20 marks and reduced to 10 marks									10	
Activity Details		Activity 1	Design and simulate automata and verify grammar using JFLAP for the real time problems									20	
Total Marks											50		
Self-Learning													
1. Explore and understand the various simulation tools that can be used to generate automata’s													
2. Design various automata for real-world scenarios (e.g., traffic light system, vending machine, login validation) using JFLAP or any other tool.													
3. Convert regular expressions to DFA/NFA and verify using simulation													
4. Design context-free grammars for given languages and validate them													
5. Compare DFA vs NFA through examples and simulations in JFLAP													
6. Prepare short reports on applications of automata in real-world systems (compilers, AI, networking)													
Evaluation of Learning Process													
CIE and Activity done using JFLAP													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	2	2	-	-	1	-

Course Title		SOFTWARE ENGINEERING AND PROJECT MANAGEMENT			
Course Code	24CS502	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 28ABL+14SL+6EV=90		
SEE	50 Marks				
Course Objective: Use Software Engineering Principles for Application development					
Course Outcomes (COs): At the end of course, student will be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Apply software process models and agile methodologies to real-world software development scenarios and project management		1	2	
2.	Analyze software requirements, architectural decisions, and risk management practices to optimize project outcomes		2	2	
3.	Design software architectures and detailed project plans using UML and other industry-standard tools		3, 5	2	
4.	Collaborative effectively in teams and conduct an activity to simulate professional software development environment and demonstrate the same.		5, 8, 9, 10, 11	2	
Course Contents:					
MODULE – 1				11 Hrs	
Introduction: Professional Software Development, Software Engineering Ethics. Case studies: An insulin pump control system, Software Processes: Software Processes models, Process activities, coping with change, The Rational Unified Process. Agile Software Development: Agile Methods, Plan- driven and Agile Development, Extreme programming. Agile Project Management. Scaling Agile Methods.					
MODULE – 2				11 Hrs	
Requirements Engineering: Functional and non-functional requirements. The software Requirements Document. Requirements Specification, Requirements Engineering Processes. Requirements Elicitation and Analysis. Requirements validation. Requirements Management. System Models: Context models. Interaction models. Structural models.					
MODULE – 3				10 Hrs	
Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open-source development. Software Testing: Development testing, Release testing, and User testing. Software Evolution: Evolution processes, Program evolution dynamics. Software maintenance, Legacy system management.					
MODULE – 4				10 Hrs	
Software Project Management: Software Project Management Complexities, Responsibilities of a software project Manager, Project Planning and Metrics for project size estimation, Project estimation techniques, Empirical estimation techniques, Scheduling, Organization and Team Structures.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Software Engineering (Chapters:1,2,3,4,5,7,8,9)	Ian Sommerville	9 th	Person Education	2014
2.	Fundamentals of Software Engineering	Rajib Mall	1 st	Prentice-Hall Of India Pvt. Ltd	2015
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Software Engineering - A Practitioners Approach	Roger S. Pressman	7 th	McGraw-Hill	2007
2.	Software Engineering Principles and Practice	Waman S. Jawadekar	1 st	TMH	2004
3.	Software Engineering: A	Pankaj Jalote	1 st	Springer	-

	concise introduction to Software Engineering				
EBOOKS/MOOC:					
https://nptel.ac.in/courses/106/105/106105182/					
Online Courses and Video Lectures:					
https://www.coursera.org/specializations/software-engineering https://www.edx.org/learn/software-engineering https://www.udemy.com/topic/project-management/					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester	
1.	Classroom Teaching & Learning	3	14	42	
2.	Student Study Hours – Self Learning	1	14	14	
3.	Activity Based Learning (ABL1 & ABL2)	2	14	28	
4.	Evaluation of Learning Process	-	-	06	
Total Learning Hours / Semester				90	
Proposed Assessment Plan (for 50 marks of CIE):					
Tool	Remarks			Marks	
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks			10
	CIE2	Conduction for 20 marks & reduced to 10 marks			10
	CIE3	Conduction for 20 marks & reduced to 10 marks			10
Activity Details	Activity 1	Create SRS document for given scenario.			10
	Activity 2	Scrum tool and Version Controller demonstration			10
Total Marks				50	
Self-Learning (14 Hours)					
- Case Studies- A patient information system for mental health care, A wilderness weather station - Behavioral models as applied to case study - COCOMO—A Heuristic Estimation Technique					
Activity Based Learning(28 Hours)					
- Requirement specification for (functional and nonfunctional) the specified scenario. - Write sequence diagram for the given case. - Write a SRS document for the given case study. - Write behavioral model and interaction model for the given scenario. - By referring to embedded device depict requirement specification. - Employ software testing tool to address a given problem. - Practice scrum tool for Project management. - Develop a simplified version control system that enables tracking of file changes, maintaining version history, and restoring previous versions. The system should support basic operations such as repository initialization, commit, log, and checkout, with optional support for branching and merging. - Design and implement a system to manage software defects and feature requests. The system should allow users to report issues, assign priorities, track status, and generate reports for project monitoring.					
Evaluation of Learning Process (6 Hours):					
Type of Evaluation				Hours	
CIE (1, 2 and 3)				3	
Activity				-	
Semester End Exam				3	
Total				06	

Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	3
CO2	-	2	-	-	-	-	-	-	-	-	-	-	3
CO3	-	-	2	-	2	-	-	-	-	-	-	-	3
CO4	-	-	-	-	3	-	-	3	3	3	3	-	3

Course Title	COMPUTER NETWORKS				
Course Code	24CS503	(L-T-P) C	(3-0-2) 4		
Exam	3	Hours/Week	5		
CIE	50 Marks	Total Hours	42L+28P+28SL+22EV		
SEE	50 Marks				
Course Objective: Students will be able to apply data communication principles, network architectures, and communication protocols in computer networks.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply the fundamentals of data communication, network models, and transmission techniques in computer networks.	1	-		
2.	Analyze network protocols, switching techniques, routing Mechanism, and layering services in computer networks.	2	-		
3.	Design network solutions using IPv4/IPv6 addressing, routing algorithms and appropriate protocols.	3	-		
4.	Develop computer network solutions using network protocols, routing algorithms, and network simulation tool.	3,5,8,9	-		
Course Contents:					
MODULE – 1			11 Hrs		
Introduction: Data Communications, Network Types, Network Models: TCP/IP Protocol Suite. Introduction to Physical Layer: Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate limits, Performance. Digital Transmission: Digital-to-Digital Conversion - Line Coding, Line Coding Schemes.					
MODULE – 2			11 Hrs		
Switching: Introduction, Circuit-Switched Networks, Packet Switching. Introduction to Data-Link Layer: Introduction, Link-Layer Addressing. Error Detection and Correction: Introduction, Block Coding, Cyclic Codes, Checksum, Media Access Control (MAC): Random Access.					
MODULE – 3			10 Hrs		
Introduction to Network Layer: Network Layer Services, Packetizing, Routing and Forwarding, Packet Switching, Network Layer Performance, IPV4 Addresses – Address Space, Classful Addressing, Classless Addressing, DHCP message format Introduction. Routing Algorithms, Distance vector routing, link state routing, Path vector routing. Multicast Routing: Introduction, Multicasting Basics.					
MODULE – 4			10 Hrs		
Next Generation IP: IPV6 Addressing, The IPv6 protocol, Transition from IPv4 to IPv6.Transport Layer protocols: Introduction: Services, Port Numbers, User Datagram Protocol (UDP): User Datagram, UDP Services, UDP Applications Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, Windows in TCP; Flow Control, Error Control, TCP Congestion Control; TCP Timer and Options;					
Pre-requisite: Basic knowledge of computer fundamentals, digital logic, and programming concepts					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Data Communications and Networking,	Behrouz A. Forouzan	5 th	Tata McGraw-Hill	
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Communication Networks– Fundamental Concepts and Key architectures	AlbertoLeon-Garcia and Indra Widjaja	2 nd	Tata McGraw-Hill	-
2.	Data and Computer Communication	William Stallings	8 th	Pearson Education	-
3.	Computer and Communication Networks	Nader F. Mir	-	Pearson Education	2014

EBOOKS/MOOC:													
https://www.netacad.com/courses/networking-essentials?courseLang=en-US													
Online Courses and Video Lectures:													
https://nptel.ac.in/courses/106105183													
Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning						3		14		42		
2.	Integrated Lab Component						2		14		28		
3.	Student Study Hours – Self Learning						2		14		28		
4.	Activity Based Learning								-		-		
5.	Evaluation of Learning Process								-		22		
Total Learning Hours / Semester											120		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks									Marks		
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks									10		
	CIE2	Conduction for 20 marks & reduced to 10 marks									10		
	CIE3	Conduction for 20 marks & reduced to 10 marks									10		
Activity Details	Activity 1	Conduction of lab CIE									10		
	Activity 2	Record and Continuous Evaluation									10		
Total Marks											50		
Self-Learning:													
Cisco Packet Tracer will be used as a self-learning tool to design, configure, simulate, and troubleshoot computer networks through activities such as IP addressing, routing, switching, VLAN configuration, and network troubleshooting. Transmission Media will be used to study and analyze guided and unguided transmission media, enhancing students' practical and analytical networking skills													
Evaluation of Learning Process:													
Conducting Lab CIE for the listed program													
Laboratory Component (if required)													
1.	Implement of error detection using CRC												
2.	Write a program to perform Bit Stuffing at the sender and Bit Unstuffing at the receiver												
3.	Encode data using Hamming Code, detect and correct single-bit errors at the receiver												
4.	Simulate the transmission of ping messages over a network topology consisting of 6 nodes.												
5.	Simulate three nodes point– to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped												
6.	Simulate five nodes point– to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets sent with different types of traffic.												
7.	Implement distance vector algorithm to find the suitable path for transmission between sender and receiver.												
8.	Simulation of Link State Routing algorithm												
9.	Simulate an Ethernet LAN using n nodes, change error rate and data rate and compare throughput												
10.	Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source/destination.												
11.	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets												
12.	Simulate multicast communication with one sender and multiple receivers, and analyze the packet flow.												
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	-	2	2	-	-	-

Course Title		COMPUTER GRAPHICS AND VISUALIZATION			
Course Code	24CS504	(L-T-P) C		(2-0-2) 3	
Exam Hrs.	3	Hours/Week		4	
CIE	50 Marks	Total Hours		28L + 28P + 34(TW/SL) = 90	
SEE	50 Marks				
Course Objective: To learn the concepts of computer graphics to design a 2D and 3D scene usingOpenGL.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Apply the core concepts of computer graphics to create an image.			1	-
2.	Analyse geometric transformations, projections, and illumination models to render image.			2	-
3.	Design a 2D/3D image using graphical concepts throughOpenGL			3, 5	1
4.	Implement computer graphics applications using OpenGL, document the outcomes and collaborate through team-based activities.			3, 5, 8, 9	1
Course Contents:					
MODULE – 1					7 Hrs
Introduction: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model; The programmer’s interface: Pen Plotter Model, Graphics architectures; Graphics Programming: The Sierpinski gasket; Programming two - dimensional applications.					
MODULE – 2					7 Hrs
The OpenGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket. Input and Interaction: Interaction; Input devices; Clients and Servers; Display lists; Display lists and modeling; Programming event-driven input; Menus.					
MODULE – 3					7 Hrs
Geometric Objects and Transformations: Three-dimensional primitives; Coordinate systems and frames; Frames in OpenGL; Modeling a colored cube; Affine transformations; Rotation, translation and scaling; Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices.					
MODULE – 4					7 Hrs
Viewing: Classical and computer viewing; Viewing with a computer; Positioning of the camera-Positioning of the Camera Frame; Projections in OpenGL. Lighting and Shading: Light and Matter; Light Sources; The Phong Lighting Model; Polygonal Shading; Light sources in OpenGL; Specification of materials in OpenGL.					
Pre-requisite: C Programming, Data Structures, 2D and 3D geometry.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Interactive Computer Graphics A Top-Down Approach with OpenGL	Edward Angel	5th	Addison-Wesley	2013
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Computer Graphics Using OpenGL	F.S. Hill,Jr	2nd	Pearson education	2011.
EBOOKS/MOOC:					
-					
Online Courses and Video Lectures:					
https://onlinecourses.nptel.ac.in/noc20_cs90					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester	
1.	Class Room Teaching & Learning	02	14	28	
2.	Integrated Lab Component	02	14	28	
3.	Student Study Hours – Self Learning	-	10	10	

4.	Activity Based Learning	-	16	16									
5.	Evaluation of Learning Process	-	08	08									
Total Learning Hours / Semester			90										
Proposed Assessment Plan (for 50 marks of CIE):													
Tool	Remarks			Marks									
CIE	CIE1	Conducted for 20 Marks (Module 1) & reduced to 10 marks		10									
	CIE2	Conducted for 20 Marks (Module 2) & reduced to 10 marks		10									
	CIE3	Conducted for 20 Marks (Module 3) & reduced to 10 marks		10									
Activity Details	Activity 1	Laboratory CIE		10									
	Activity 2	Activity Based Learning		10									
Total Marks			50										
Integrated Laboratory Component													
Write C program using OpenGL functions to													
1. Create two dimensional sierpinski gasket using bisection method.													
2. Recursively subdivide a tetrahedron to form 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.													
3. Draw a Rocket and allow the user to change the color.													
4. Create robot face using display list.													
5. Generate square for right click and to exit for left click using mouse function.													
6. Draw box at each location on the screen where the mouse cursor is located.													
7. Create hierarchical menus.													
8. Create a house like figure and rotate it about a given fixed point using OpenGL functions.													
9. Create a Rotating Square.													
10. Draw a color cube and spin it using OpenGL transformation matrices.													
Self-Learning				10 Hrs									
Programmable pipelines, Animating interactive programs, Interactive Mesh Displays, Shading of sphere models.													
Activity Based Learning				16 Hrs									
Create an interactive 2D graphics application using OpenGL and GLUT. The application should employ OpenGL primitives for object creation, support user interaction through input devices, utilize menus or display lists for efficient rendering, apply suitable transformations and projections, and implement a basic lighting model to enhance visualization.													
Evaluation of Learning Process													
	Type of Evaluation		Hours										
	Test (1, 2 and 3)		3										
	Laboratory CIE (Activity 1)		2										
	Activity based learning (Activity 2)		2										
	Self-study component		1										
	Total		8										
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	3	-	-	-	-	-	-	3	-
CO4	-	-	3	-	3	-	-	3	3	-	-	3	-

Course Title		WEB PROGRAMMING LABORATORY	
Course Code	24CS505	L-T-P-C	(0-0-2) 1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	Total Hours	28P+2EV = 30
SEE	50 Marks		
Course Objective: Create web pages with client side and server-side scripting			
Course Outcomes (COs): Upon the completion of the course the students will be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Apply HTML/XHTML and CSS concepts to develop web pages.	1,5	1, 2
2.	Design client and server side scripts using appropriate technologies to create interactive and dynamic web pages.	3, 5	1, 2
Course Contents:			
Practice Programs			
1.	Create and test an HTML document that describes a table with the following contents: The columns of the table must have the headings “Pine,” “Maple,” “Oak,” and “Fir.” The rows must have the labels “Average Height,” “Average Width,” “Typical Life Span,” and “Leaf Type.” You can make up the data cell values.		
2.	Demonstrate a program to display Nested list.		
Guided Programs			
1.	Create a JavaScript that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers using alert window.		
2.	Write a java script to validate the following fields in a registration page Name (should contains alphabets and the length should not be less than 6 characters) Password (should not be less than 6 characters) E-mail(should not contain invalid addresses).		
3.	Develop and demonstrate, using JavaScript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.		
4.	Design an HTML page that captures and displays the mouse cursor’s position when the user clicks anywhere on the page. Use JavaScript to show: • The x and y coordinates relative to the browser’s client area. • The x and y coordinates relative to the screen.		
5.	Create an XHTML page that collects name, email, userId and password. Design an Assistance to a user filling out a form can be provided with an associated text area called help box the content of the help box can change depending on the placement of the mouse cursor.		
6.	Develop and demonstrate, using JavaScript, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough space for each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.		
7.	Create a simple web application using HTML and PHP to maintain student records stored in a text file. The application should provide an easy-to-use HTML form that allows users to perform the main CRUD operations — add, view, search, and delete student records.		
8.	a) Write a PHP program to store current date-time in a COOKIE and display the Last visited on date-time on the web page upon reopening of the same page. b) Write a PHP program to Send SESSION ID to the Browser.		
9.	Develop a PHP-based student information dashboard. Each student has a unique name (used as the key in an associative array) and an associated value that could be their age or a descriptor (e.g., "wizard", "hobbit"). Display this information in various sorted orders depending on the administrator’s preference.		
10.	+1Write XHTML form and PHP to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.		
Proposed Assessment Plan (for 50 marks of CIE):			

Tool		Remarks								Marks			
CIE		Laboratory CIE								30			
Record		Laboratory Record Submission								10			
Continuous Evaluation		Conduction of experiments								10			
Total										50			
Teaching - Learning – Evaluation Scheme													
Sl. No	Teaching - Learning Method					No. of Hours/ Week			No. of Weeks		Hours/ Semester		
1.	Class Room Teaching					2			14		28		
2.	Evaluation of Learning Process										2		
Total Learning Hours / Semester										30			
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	-	-	-	3	-	-	-	-	-	-	3	2
CO2	-	-	3	-	3	-	-	-	-	-	-	3	2

Course Title		DIGITAL IMAGE PROCESSING			
Course Code	24CS561	(L-T-P) C	(3-0-0)3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 22ABL+ 20SL+ 6EV=90		
SEE	50 Marks				
Course Objective: To study the image fundamentals and mathematical transforms necessary for image processing.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Apply the fundamental concepts of digital image processing, solve basic image processing problems.		1	-	
2.	Analyze image enhancement, restoration, filtering, color processing, and compression techniques.		2	-	
3.	Design and implement image processing solutions using histogram processing, filtering, compression, and segmentation.		3,5	1	
4.	Implement digital image processing applications using appropriate software tools, document the outcomes and collaborate effectively through team based activities		3,5,8,9	1	
Course Contents:					
MODULE – 1				11 Hrs	
Introduction: Basic concepts, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Elements of visual perception. Image sensing and acquisition: Image sampling and quantization. Basic concepts in sampling and quantization, Representing digital images, Spatial and Intensity resolutions, some basic relationships between pixels: An Introduction to the Mathematical tools used in digital image processing.					
MODULE – 2				10 Hrs	
Intensity Transformations and Spatial Filtering: Background: The basics of intensity transformations and spatial filtering, Some basic intensity transformation functions, Histogram Processing. Fundamentals of spatial filtering: The mechanics of spatial filtering, Spatial correlation and convolution. Image Restoration: A model of the image restoration/degradation process. Noise Models: Spatial and Frequency properties of Noise.					
MODULE – 3				10 Hrs	
Image Restoration: Some important noise probability density functions, Periodic noise, Estimation of noise parameters, Restoration in the presence of Noise only- Spatial Filtering, Mean Filters. Color Image Processing: Color fundamentals, Color models: The RGB color model. Image Compression: Fundamentals: Coding redundancy, Spatial and Temporal redundancy, Irrelevant information, Measuring image information, Fidelity Criteria.					
MODULE – 4				11 Hrs	
Image Compression: Some basic compression methods: Arithmetic coding, LZW coding, Bit_Plane coding, Digital image watermarking. Image Segmentation : Fundamentals, Point, Line, and Edge Detection, background, Detection of Isolated Points, Line Detection, Edge Models, Basic Edge Detection: The Image Gradient and its Properties, Gradient Operators, Combining the Gradient with Thresholding, Thresholding: Foundation, The Basics of Intensity Thresholding, The Role of Noise in Image Thresholding, The Role of Illumination and Reflectance in Image Thresholding.					
Pre-requisite (If any): Digital images, pixels, coordinate systems and Linear algebra.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Digital Image Processing	Rafael C. Gonzales, Richard E. Woods	4th	Pearson publications	2018
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Digital	A.K. Jain	2nd	Pearson	2018

	Image Processing				
2.	Digital Image Processing and Analysis	B. Chanda , Dutta Majumdeer	2nd	Prentice-Hall of India Pvt.Ltd	2011
3.	Introduction to Digital Image Processing with Matlab	Rafael C. Gonzales, Richard E. Woods, Steven L.Eddins	2nd	Mcgraw Higher Ed	2010

EBOOKS/MOOC:

<https://www.pearson.com/en-gb/subject-catalog/p/digital-image-processing-global-edition/P200000004313/9781292223070>

Online Courses and Video Lectures:

<https://nptel.ac.in/courses/117105135>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	03	14	42
2.	Integrated Lab Component	-	-	-
3.	Student Study Hours – Self Learning	-	20	20
4.	Activity Based Learning	-	22	22
5.	Evaluation of Learning Process	-	06	06

Total Learning Hours / Semester **90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 Marks (Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 Marks (Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 Marks (Module 3) & reduced to 10 marks	10
Activity Details	Group activity	Activity Based Learning	20

Total Marks **50**

Self-Learning

20Hrs

Fundamentals of human visual perception in the context of digital image processing, convolution, types of noise (Gaussian and salt-and-pepper), and the importance of spatial filtering in image processing. JPEG compression, and noise probability distributions, gradient-based edge detection techniques and image segmentation methods.

Activity Based Learning

22 Hrs

1. Demonstrate the effects of sampling, quantization, and pixel relationships in digital images.
2. Design and perform experiments to demonstrate histogram processing and spatial filtering in digital image processing.
3. Design and perform experiments to demonstrate noise handling, color processing, and image compression in digital image processing.
4. Design and perform experiments to demonstrate edge detection, thresholding, and basic object detection in digital image processing.

Evaluation of Learning Process

Type of Evaluation	Hours
Test (1, 2 and 3)	3
Semester End Exam	3
Total	6

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	3	-	-	-	-	-	-	3	-
CO4	-	-	3	-	3	-	-	3	3	-	-	3	-

Course Title	DATA MINING AND WAREHOUSING				
Course Code	24CS562	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 48TW = 90		
SEE	50 Marks				
Course Objective: Students will be able to apply appropriate Data mining and warehousing techniques for real time application					
Course Outcomes (COs):Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply the fundamentals of data mining and data warehousing to knowledge discovery.	1	-		
2.	Analyze datasets to identify and apply appropriate data preprocessing techniques for effective data mining	2	-		
3.	Implement classification, clustering, and association analysis techniques to solve data mining problems	3	1		
4.	Develop Python programs to implement data mining algorithms for data analysis.	3,5,8,9	2		
Course Contents:					
MODULE – 1			10 Hrs		
Introduction: Data: Why Data Mining? What is Data Mining? What kinds of data can be mined? What kinds of pattern can be mined?, Which technologies are used? Major issues in data mining. Getting to know your data: Data objects and attribute types, Basic statistical description of data: measuring the central tendency, Measuring the dispersion of data, measuring data similarity and dissimilarity					
MODULE – 2			11 Hrs		
Data Pre-processing: Data Pre-processing: An overview, Data cleaning, Data integration, Data Reduction: overview of data reduction strategies, Principal component analysis, attributes subset selection, Data Transformation: min-max normalization and Z-score normalization. Data Warehouse and online Analytical processing: Data Warehouse: Basic Concepts, Data Warehouse modelling: Data cube and OLAP, Data warehouse design and usage: A business analysis frame work for data warehouse design, Data warehouse design process.					
MODULE – 3			11 Hrs		
Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Rule-based classification, K- Nearest- neighbour Classifier. Mining frequent patterns. Association and correlations: Basic Concepts and Methods: Basic Concepts, Frequent item set mining methods: Apriori Algorithm, generating association rules from frequent item sets, Improving the efficiency of Apriori, A Pattern growth Approach for Mining Frequent item sets.					
MODULE – 4			10 Hrs		
Cluster Analysis: Basic Concepts and Methods, Cluster Analysis, Partitioning Methods, Agglomerative versus divisive hierarchical clustering, DBSCAN. Data Mining Trends and research frontiers: Data Mining Applications, Data mining and society, Data mining trends					
Pre-requisite: DBMS & SQL, Programming fundamentals, Statistics & linear algebra.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Data Mining – Concepts and Techniques,	Jiawei Han and Micheline Kamber, V	3rd	MK Publishers	2013
2.	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	1st	Pearson Education	2014
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Insight into Data Mining – Theory and Practice	K.P. Soman, Shyam Diwakar, V.Ajay 1st PHI	1st	PHI	2006

2.	Introduction to Data Mining with Case Studies	G. K. Gupta	3rd	PHI	2009								
EBOOKS/MOOC:													
1. http://nptel.ac.in/courses/110106064/													
2. http://nptel.ac.in/courses/106106093/													
3. https://www.edx.org/course/analytics-for-decision-making													
Online Courses and Video Lectures:													
Infosys Springboard Course													
Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester								
1.	Class Room Teaching & Learning		3	14	42								
2.	Student Study Hours – Self Learning		1	14	14								
3.	Activity Based Learning (ABL1 & ABL2)		-	-	28								
4.	Evaluation of Learning Process		-	-	06								
Total Learning Hours / Semester					90								
Proposed Assessment Plan (for 50 marks of CIE):													
Tool	Remarks				Marks								
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks			10								
	CIE2	Conduction for 20 marks & reduced to 10 marks			10								
	CIE3	Conduction for 20 marks & reduced to 10 marks			10								
Activity Details	Activity 1	Implement Data mining algorithms for a given scenario using Python – Project based learning			10								
	Activity 2	Infosys Springboard Certification			10								
Total Marks					50								
Self-Learning													
Relational databases and SQL fundamentals													
Web mining: extracting patterns from online data.													
Sequential pattern mining (discovering trends over time).													
Evaluation of Learning Process													
CIE and Activity evaluation.													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	-	3	-	-	2	3	-	-	-	3

Course Title	INTERNET OF THINGS				
Course Code	24CS563	(L-T-P) C	(3-0-0)3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L+14SL+20ABL+14EV=90		
SEE	50 Marks				
Course Objective: Explore the interconnection, integration of the physical world and design IOT applications.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply IoT principles and protocols to configure endpoint devices for smart object and sensor interaction.	1	-		
2.	Analyze IoT architectures, communication technologies, and networking protocols for real-world IoT applications.	2	-		
3.	Design end-to-end IoT solutions using sensing, networking, and computing components for real-world applications	3	-		
4.	Develop IoT applications using Raspberry Pi, networking protocols, and appropriate IoT development tools.	3,5,8,9	-		
Course Contents:					
MODULE – 1			10 Hrs		
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, IoT Data Management and Compute Stack.					
MODULE – 2			11 Hrs		
Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and IEEE 802.15.4e.					
MODULE – 3			10 Hrs		
IP as the IoT Network Layer: The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances. Application Protocols for IoT: The Transport Layer, IoT Application Transport Methods.					
MODULE – 4			11 Hrs		
IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, Exploring the RaspberryPi Board; Operating System setup on RaspberryPi, RaspberryPi commands, Programming RaspberryPi with Python. Smart City Use-Case Examples: Connected Street Lighting, Street Lighting Architecture, Smart Parking, Smart Parking Use Cases, Smart Parking Architecture, Smart Traffic Control, Smart Traffic Control Architecture, Smart Traffic Application.					
Pre-requisite: Knowledge of Computer Networks, Programming Fundamentals and Basic Operating System concepts					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	1 st	Pearson Education (Cisco Press Indian Reprint).	
2.	Internet of Things	Srinivasa K G, Siddesh G M Hanumantha Raju R	1 st	CENGAGE Leaning India	2017
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Internet of Things - A Hands on Approach	Arshdeep Bahga and Vijay Madiseti	1 st	Universities Press	2015
2.	The Internet of Things: Key Applications and Protocols	Olivier Hersent, David Boswarthick, Omar Elloumi	2 nd	Wiley	2012

EBOOKS/MOOC:														
https://onlinecourses.nptel.ac.in/noc26_cs37/preview														
Online Courses and Video Lectures:														
https://www.youtube.com/playlist?list=PL_RcVnBPGmSIce3i6ayTgGjDaHxfVGbH1														
Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method							No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning							3		14		42		
2.	Integrated Lab Component							-		-		-		
3.	Student Study Hours – Self Learning							-		-		14		
4.	Activity Based Learning							-		-		20		
5.	Evaluation of Learning Process							-		-		14		
Total Learning Hours / Semester											90			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks									Marks			
CIE		CIE1	Conduction for 20 marks & reduced to 10 marks									10		
		CIE2	Conduction for 20 marks & reduced to 10 marks									10		
		CIE3	Conduction for 20 marks & reduced to 10 marks									10		
Activity Details		Activity 1	Group based simulation activity									10		
		Activity 2	Demonstration and Presentation of Simulation									10		
Total Marks											50			
Self-Learning														
Students independently explore Arduino simulation tools to design and simulate IoT-based applications. They gain hands-on experience in interfacing sensors, actuators, and communication modules while validating system functionality in a virtual environment. This activity enhances practical skills, creativity, and self-directed learning.														
Activity Based Learning: Students are evaluated based on their ability to implement IoT concepts using simulation tools and hardware platforms. Assessment includes demonstration of the developed solution, submission of a technical report documenting the implementation and results, and a viva voce to evaluate conceptual understanding and practical skills.														
Evaluation of Learning Process (6 Hours)														
Type of Evaluation												Hours		
Test (1, 2 and 3)												3		
Semester End Exam												3		
Total												6		
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	
CO4	-	-	3	-	3	-	-	2	2	-	-	-	-	

Course Title		ADVANCED JAVA			
Course Code	24CS564	(L-T-P) C		(3-0-0)3	
Exam Hrs.	3	Hours/Week		3	
SEE	50 marks	Total Hours		42L + 28ABL+14SL+6EV=90	
Course Objective: Students will be able to apply J2EE concepts to create an application.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Apply Java enumerations, collections, wrapper classes, and event handling concepts to develop modular programs.			1	1
2.	Analyse the given scenarios and use the suitable java constructs and give inference.			2	1,2
3.	Design and implement Java programs to solve real-world problems.			3,5,6	1,2
4.	Collaborate in teams to develop dynamic web applications using Servlets, JSP, and JDBC.			3,5,8,9	1,2
Course Contents:					
MODULE – 1					11 Hrs
Enumeration and Autoboxing: Enumeration fundamentals, values() and valuesOf() Methods, Java Enumerations are class types, example, Type Wrappers, Autoboxing and Autounboxing. Event Handling The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes					
MODULE – 2					11 Hrs
User Interface components with Swing Components and containers, Layout managers, A first simple swing example, Event Handling, Creating a swing applet, Exploring Swing Controls-JLabel and ImageIcon, Jtextfield The Swing buttons, JTabbedPane, JScrollPane, JList, JCombobox.					
MODULE – 3					10Hrs
The Collections Framework – Collections overview, The collection Interfaces, The collection classes, Accessing collection via an iterator. Database Access- The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Statement Objects, Result Set					
MODULE – 4					10 Hrs
Servlets and JSP - Lifecycle of a sevelet, A simple servlet, The Servlet API, javax.servlet Package, Reading Servlet parameters, The javax.servlet.http Package, Handling HTTP Request and Responses, Using Cookies, Session tracking. Java Server Pages (JSP): JSP, JSP Tags, User Sessions, Cookies, Session Objects. RMI -. Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side.					
Pre-requisite (If any) • Core Java Programming. • Object-Oriented Programming (OOP) concepts such as classes, objects, inheritance, polymorphism, abstraction, and encapsulation.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Java The Complete Reference	Herbert Schildt	8th	McGraw Hill	2013
2.	J2EE The Complete Reference	Jim Keogh	-	Tata McGraw Hill	2007
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Java Programming	Uttam.K.Roy		Oxford Press	2015
2.	Head First Servlets and JSP	Shroff	2nd	O,Reilly Publications	2008
EBOOKS/MOOC:					
1. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php					
2. https://www.youtube.com/watch?v=0KL_zftem4g/					

Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning						3		14		42		
2.	Activity Based Learning						2		14		28		
3.	Student Study Hours – Self Learning						1		14		14		
4.	Evaluation of Learning Process						-		-		6		
Total Learning Hours / Semester											90		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks									Marks		
CIE		CIE1	Conducted for 20 marks & reduced to 10 marks									10	
		CIE2	Conducted for 20 marks & reduced to 10 marks									10	
		CIE3	Conducted for 20 marks & reduced to 10 marks									10	
Activity Details		Activity 1	ABL(Group based activity to implement java concepts)									15	
		Activity 2										5	
Total Marks											50		
Activity Based Learning:													
- Design and develop an application using Advanced Java concepts such as Swings, Servlets, JSP and JDBC. - Identify a real-world problem and implement an appropriate solution that integrates backend processing and database connectivity to meet user requirements. Present the solution with proper functionality, usability.													
Self- Learning:													
Hibernate framework, Spring framework Practice coding daily on platforms like: - HackerRank - LeetCode													
Evaluation of Learning Process (6 Hours)													
Type of Evaluation											Hours		
CIE (1, 2 and 3)											3		
Semester End Exam											3		
Total											06		
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	2	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	2	-	2	2	-	-	-	-	-	3	2
CO4	-	-	3	-	3	-	-	2	2	-	-	3	2

Course Title	ADVANCED ALGORITHMS				
Course Code	24CS565	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 22ABL+ 20SL+ 6EV =90		
SEE	50 Marks				
Course Objective: To study advanced algorithmic techniques and computational methods for solving complex problems in string processing, number theory, graph optimization, and computational geometry.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply asymptotic, recurrence-based, and amortized analysis techniques to evaluate efficiency of algorithm.	1	-		
2.	Analyze string matching and number theoretic algorithms to solve computational and cryptographic problems.	2	-		
3.	Design solutions for graph optimization, network flow, and signal processing problems using advanced algorithmic techniques.	3, 5	1		
4.	Implement computational geometry algorithms for geometric modeling, document outcomes, and collaborate effectively through team-based activities.	3, 5,8,9	1		
Course Contents:					
MODULE – 1			11 Hrs		
Analysis Techniques: Growth functions, Recurrences and solution of recurrence equations; Amortized analysis: Aggregate, Accounting, and Potential methods, String Matching Algorithms: Naive Algorithm; Robin-Karp Algorithm, String matching with Finite Automata, Knuth-Morris-Pratt and Boyer-Moore Algorithms.					
MODULE – 2			10 Hrs		
Number Theoretic Algorithms: Elementary notions, GCD, Modular arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element RSA Cryptosystem, Primality testing, Integer factorization, - Huffman Codes, Polynomials. FFT-Huffman codes: Concepts, construction, Proof correctness of Huffman's algorithm; Representation of polynomials, DFT and FFT efficient implementation of FFT,ss					
MODULE – 3			11 Hrs		
Graph Algorithms, Bellman-Ford Algorithm Shortest paths in a DAG, Johnson's Algorithm for sparse graphs, Flownetworks and the Ford-Fulkerson Algorithm, Maximum bipartite matching. Computational Geometry-I: Geometric data structures using, C, Vectors, Points,Polygons, Edges Geometric objects in space.					
MODULE – 4			10 Hrs		
Computational Geometry-I(Contd...) Finding the intersection of a line and a triangle, Finding star-shaped polygons using incremental insertion. Computational Geometry-II: Clipping: Cyrus-Beck and Sutherland-Hodman Algorithms; Triangulating, monotonic polygons; Convex hulls, Gift wrapping and Graham Scan; Removing hidden surfaces.					
Prerequisites: Data Structures and Algorithms					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Algorithms	Thomas H. Cormen et al	-	Prentice Hall India	1990
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
4.	Fundamentals of Computer Algorithms	E. Horowitz, S. Sahni and S. Rajasekaran	2nd	University Press	2007
EBOOKS/MOOC:					
-					
Online Courses and Video Lectures:					
https://www.coursera.org/learn/advanced-algorithms-and-complexity					

Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method							No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning							03		14		42		
2.	Integrated Lab Component							-		-		-		
3.	Student Study Hours – Self Learning							-		20		20		
4.	Activity Based Learning							-		22		22		
5.	Evaluation of Learning Process							-		06		06		
Total Learning Hours / Semester											90			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks									Marks			
CIE		CIE1	Conducted for 20 Marks (Module 1) & reduced to 10 marks									10		
		CIE2	Conducted for 20 Marks (Module 2) & reduced to 10 marks									10		
		CIE3	Conducted for 20 Marks (Module 3) & reduced to 10 marks									10		
Activity Details		Group activity	Activity Based Learning									20		
Total Marks											50			
Self-Learning											20 Hrs			
1. Students shall independently study any one of the following topics and submit a report/presentation on recent applications of FFT in image and signal processing. 2. Modern cryptographic protocols based on number theory. 3. Geometric algorithms in computer graphics and GIS. 4. Algorithmic challenges in large-scale graph analytics. 5. Applications of network flow algorithms in transportation and communication systems.														
Activity Based Learning											22 Hrs			
1. Performance comparison of string matching algorithms on real datasets. 2. Implementation of RSA cryptosystem and primality testing. 3. Simulation of shortest-path and network flow algorithms. 4. Visualization of FFT and graph algorithms using software tools. 5. Computational geometry mini-project involving convex hulls and clipping algorithms.														
Evaluation of Learning Process														
			Type of Evaluation					Hours						
			Test (1, 2 and 3)					3						
			Activity based learning					2						
			Self-study component					1						
			Total					6						
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	
CO3	-	-	3	-	3	-	-	-	-	-	-	3	-	
CO4	-	-	3	-	3	-	-	3	3	-	-	3	-	

Course Title		MINI PROJECT			
Course Code	24CS507	L-T-P-C	(0-0-2) 1		
Exam Hrs.	3	Hours / Week	4		
CIE	50 Marks	Total Hours	30		
SEE	50 Marks				
Course Objective: To provide students with hands-on experience in identifying, designing, and implementing innovative solutions to real-world problems through mini projects.					
Course Outcomes (COs): Upon the completion of the course the students will be able to:					
#	Course Outcomes	Mappin gto POs	Mapping to PSOs		
1.	Identify a real-world engineering problem, conduct a comprehensive literature review, and formulate a clear set of project objectives and methodology.	2	1,2		
2.	Design and develop a systematic solution, prototype, or model by applying engineering principles, modern tools, and sustainable design methodologies.	3,5	1,2		
3.	Test, analyse, and evaluate the performance of the developed solution against the defined objectives to draw validated, data-driven conclusions.	4	1,2		
4.	Demonstrate professional ethics, manage project timelines and resources, and communicate the outcomes effectively through a technical report and team presentation.	7,8,9,10,11	1,2		
- A team of 3-4 students must develop the mini project. However, during the final evaluation, each student must demonstrate the project individually. - The team must submit a Project Report (25 to 30 Pages) after completion with the following contents - Introduction - Requirements - System Architecture - Implementation - Testing - Conclusion and Future work - References					
The project will be evaluated in three phases as outlined below.					
Rubrics for Evaluation of Mini Project					
Phase I (Project Proposal Submission and Evaluation Scheme):					
After finalizing the topic with the guidance of Supervisor, students should submit the project proposal along with Synopsis not exceeding 10 pages. Approval of synopsis is done for 15 marks by concerned project committee.					
SI. No	Performance Indicators	Needs Improvement (0-1 mark)	Average	Good	Max marks
1	Literature Survey	Survey of literature is not recent or no (0-1 mark) literature survey	Survey of literature is not clear (2-3 marks)	Literature survey is sufficient. (4-5 marks)	5

2	Synopsis writing	Objective of the work is not identified. (0-3 mark)	Objective of the work is identified but no evidence of Inter disciplinary approach found. (4-7 marks)	Objective of the work is identified with evidence of Inter disciplinary approach found. (8-10 marks)	10
3	Presentation	Contents not delivered completely. (0-1 mark)	Contents not delivered clearly. (2-3 marks)	Contents delivered clearly with confidence. (4-5 marks)	5

TOTAL					20
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Phase II (Project Demonstration with Report):

Sl. No	Performance Indicators	Needs Improvement	Average	Good	Total marks allocated
1.	Design and implementation	Not done (0-3 mark)	Incomplete (4-7 marks)	Complete (8-10 marks)	10
2.	Demonstration	Incomplete (0-3 mark)	Complete but not satisfactory. (4-7 marks)	Complete and satisfactory (8-10 marks)	10
3.	Documentation	Organization and clarity of report and technical content is not clear and complete (0-1 mark)	Organization and clarity of report and technical content is clear but not complete (2-3 marks)	Organization and clarity of report and technical content is clear and complete. (4-5 marks)	5
4.	Oral Presentation	Presentation with ppt is not clear (0-1 mark)	Presentation with ppt is clear but not satisfactory (2-3 marks)	Presentation with ppt is clear and satisfactory. (4-5 marks)	5
				Total	30

Semester End Evaluation

Evaluation committee consists of panel of examiners containing external as well as internal evaluators. This evaluation is carried out for 50 marks.

SN	Performance Indicators		Marks allocated	Marks awarded
1.	Project execution	Project specification	5	10
		Progress	5	
2.	Methodology /Result Analysis	System Design	5	15
		System Implementation	5	
		System Testing	5	
3.	Project Report	Organization and Clarity	5	15
		Technical content	5	
		Conclusion and Future Work	5	
			Final presentation	10

								Total			50		
Rubrics for Semester End Exam													
SLNO				Marks				Over Criteria					
1.				48-50				Project is reaching professional standards.					
2.				40-47				Project is excellent and may contain publishable material. Presentation is excellent.					
3.				35-39				Project and presentation are very good. All design aims are met.					
4.				30-34				Project and presentation are good. Most design aims are met.					
5.				25-29				Minimum core of design aims has been met. Presentation is satisfactory.					
6.				20-24				Design aims and implementation are met partially. Presentation is moderate.					
7.				0-20				Most design aims are not met and implementation does not work. Presentation is not satisfactory.					
Proposed Assessment Plan (for 50 marks of CIE):													
Tool					Remarks					Marks			
CIE			Phase-1		Evaluation of Phases					20			
			Phase-2							30			
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	3	3
CO2	-	-	3	-	3	-	-	-	-	-	-	3	3
CO3	-	-	-	3	-	-	-	-	-	-	-	3	3
CO4	-	-	-	-	-	-	3	3	3	3	3	3	3

Course Title	RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS		
Course Code	24RIP	L-T-P	(3-0-0) 3
Exam Hrs.	3	Hours/Week	3
CIE	50 Marks	Total Hours	42L + 48ABL = 90
SEE	50 Marks		
Course Objective: To give an overview of technical research activities and patenting methodology. Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Carry out Literature Review and write technical paper	1, 2, 7, 9,11	-
2.	Describe the fundamentals of patent laws and the patent drafting procedure.	2,4,5,7,9,11	-
3.	Elucidate the copyright laws and subject matters of copyright	2,3,4,5,9,11	-
MODULE-1			10 Hrs.
Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research. Ethics in Engineering Research: Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship. Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art, Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward, Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading.			
MODULE-2			10 Hrs.
Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions. Technical Writing and Publishing : Free Writing and Mining for Ideas, Attributes and Reasons of Technical Writing, Patent or Technical Paper?— The Choice, Writing Journal Paper :Structure and Approach : Title, Abstract, and Introduction, Methods, Results, and Discussions, Table, Figures, Acknowledgments, and Closures			
MODULE-3			11 Hrs.
Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP, Major Amendments in IP Laws and Acts in India. Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non- Patentable Matters. Patent Infringements. Process of Patenting: Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. DoI Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications.			
MODULE-4			11 Hrs
Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory			

Council (CEAC).

Trademarks: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration.

Self-study: Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, IP Organizations in India.

Text Books:

Sl No	Book Title	Authors	Edition	Publisher	Year
1	Engineering Research Methodology	Dipankar Deb, Rajeeb Dey, Valentina E. Balas	-	Springer	2019
2	Intellectual Property	Prof. Rupinder Tewari, Ms. Mamta Bhardwa	6 th	Publication Bureau, Panjab University	2021

Reference Text Books:

Sl No	Book Title	Authors	Edition	Publisher	Year
1	Research Methods for Engineers	David V. Thiel	-	Cambridge University Press	2014
2	Intellectual Property Rights	N.K. Acharya	8 th	Asia Law House	2021

E Books and online course materials:

1. <https://sl1nk.com/y4ggnaa>
2. <https://dst.gov.in/sites/default/files/E-BOOK%20IPR.pdf>

Online Courses and Video Lectures:

1. <http://digimat.in/nptel/courses/video/127106227/L05.html>
2. https://onlinecourses.swayam2.ac.in/e-learning/preview/aic25_ge09

Teaching -Learning- Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning (ABL)	-	-	14+13=27
Total Learning Hours / Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	CIE1 Conducted for 20 Marks (Module 1) & reduced to 10 marks	10
	CIE2 Conducted for 20 Marks (Module 2) & reduced to 10 marks	10
	CIE3 Conducted for 20 Marks (Module 3) & reduced to 10 marks	10
Activity Details	Details of activities to be conducted Activity 1: Students select any research topic and perform a literature review, identifying existing knowledge, synthesizing prior art, and compiling relevant citations leading to structured survey paper ready for publication.	10
	Activity 2: Students analyze real world case studies for legal issues and propose solutions to infringement cases.	10
Total Marks		50

Activity Based Learning (27 Hours)

ABL 1: Drafting survey paper (14 Hrs.)		
	Research Topic Selection	02

Drafting survey paper	Literature review & Identifying existing knowledge											05	
	Synthesizing prior art & compiling relevant citations											04	
	Presentation of structured paper											03	
ABL 1: Total												14	
ABL 2: Students analyse real world case studies (13 Hrs.)													
Real world case studies analysis	Legal issues											04	
	Propose solutions to infringement cases											04	
	Presentation, demonstration, viva-voce											05	
ABL 2: Total												13	
ABL1 + ABL2: Total												27	
Evaluation of Learning Process (07 Hours)													
Type of Evaluation												Hours	
CIE (1, 2 and 3)												03	
Activity (1 and 2)												01	
Semester End Exam												03	
Total												07	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PS O2
CO1	2	2	-	-	-	-	3	-	1	-	2	-	-
CO2	-	2	-	2	2	-	1	-	3	-	1	-	-
CO3	-	3	1	3	2	-	-	-	2	-	2	-	-

Course Title		ENVIRONMENTAL STUDIES											
Course Code		24EVS		L-T-P								(0-0-2) 1	
Exam Hrs.		3		Hours/Week								2	
CIE		50 Marks		Total Hours								20	
SEE		50 Marks											
Course Objective: To create environmental awareness among the students.													
Course Outcomes: At the end of the course, student will be able to:													
#	Course Outcomes (CO)								Mapping to POs		Mapping to PSOs		
1.	Acquire an awareness of sensitivity to the total environment and its allied problems.								7, 9, 11		-		
2.	Develop strong feelings of concern, sense of ethical responsibility for the environment and the motivation to act in protecting and improving it.								6, 8		-		
3.	Analyze and evaluate environmental measures in real world situations in terms of ecological, political, economical, societal and aesthetic factors.								6, 7, 8, 9		-		
MODULE-1											5 Hrs		
Environment: Definition, Ecosystem, Balanced ecosystem, Effects of human activities on environment Agriculture Housing Industry Mining and Transportation.													
MODULE-2											5 Hrs		
Natural Resources: Water resources, Availability and Quality, Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources - Forest Resources - Material Cycles - Carbon, Nitrogen and Sulphur Cycles.													
MODULE-3											5 Hrs		
Pollution: Effects of pollution - Water pollution - Air pollution Land pollution - Noise pollution.													
MODULE-4											5 Hrs		
Current Environmental issues of importance: Acid Rain, Ozone layer depletion - Population Growth, Climate change and Global warming. Environmental Impact Assessment and Sustainable Development Environmental Protection - Legal aspects. Water Act and Air Act.													
Text Books:													
1. Environmental Studies - Dr. D.L Manjunath, Pearson Education -2006													
2. Environmental Studies - Dr. S. M. Prakash - Elite Publishers - 2006													
Reference Books:													
1. Environmental Studies - Benny Joseph - Tata McGraw ill- 2005													
2. Principles of Environmental Science and Engineering P. Venugopala Rao, Prentice Hall of India.													
Assessment Strategy													
CIE	Schedule			Assessment Method				Marks		Duration (Min.)			
CIE I	At the end of 8 weeks			Objective Questions				25		60			
CIE II	At the end of 11 weeks			Objective Questions				25		60			
Project	At the end of 14 weeks			Project/Presentation/Prototype development/Plantation				50		-			
Proposed Assessment Plan (for 50 marks of CIE):													
Tool				Remarks								Marks	
CIE		CIE1											
		CIE2											
		CIE3											
Activity Details													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	3	-	3	-	-	-	-
CO2	-	-	-	-	-	3	-	3	-	-	-	-	-
CO3	-	-	-	-	-	3	3	3	2	-	-	-	-

SIXTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW/SL	Total	CIE	SEE	Total	
1.	IPCC	24CS601	Machine Learning	42	0	28	50	120	50	50	100	4
2.	HSMC	24CS602	Technology Management and Entrepreneurship	28	28	0	34	90	50	50	100	3
3.	PCC	24CS603	System Software and Compiler Design	28	28	0	34	90	50	50	100	3
4.	PCCL	24CS604	Full Stack Web Development Laboratory	0	0	56	4	60	50	50	100	2
5.	PI	24CS605	Main Project Phase - I	0	0	56	4	60	50	50	100	2
6.	PEC	24CS66X	Professional Elective Course - II	42	0	0	48	90	50	50	100	3
7.	OEC	24OEC6X	Open Elective – I	42	0	0	48	90	50	50	100	3
8.	AEC	24CS607X	Ability Enhancement Course	0	0	28	2	30	50	50	100	1
9.	MC	24NYP3	NSS, YOGA, PE	0	0	28	2	-	50	50	100	AUDIT
10.	HSMC	24ASK	Analytical skills	0	0	28	2	30	50	50	100	1
Total												22

Ability Enhancement Course		
1	24CS607A	Application Development Laboratory
2	24CS607B	Generative AI Tools
3.	24CS607C	Automated Software Testing
4.	24CS607D	Devops

Sl. No.	Professional Elective Course - II	
	Course Code	Course Title
1.	24CS661	Introduction to Computer Vision
2.	24CS662	Artificial Intelligence
3.	24CS663	Wireless Networks
4.	24CS664	Social Network Analysis
5.	24CS665	Robotic Process Automation

Sl. No.	Open Electives	
	Course Code	Course Title
1.	24OEC61	Introduction to Cloud Computing
2.	24OEC62	Introduction to JAVA programming
3.	24OEC63	Web Technology

Course Title	MACHINE LEARNING		
Course Code	24CS601	(L-T-P) C	(3-0-2) 4
Exam	3	Hours/Week	5
CIE	50 Marks	Total Hours	42L + 28P+28SL+22EV = 120
SEE	50 Marks		
Course Objective: To apply techniques of machine learning for real time projects.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Apply preprocessing, Modelling, Evaluation, supervised and unsupervised machine learning algorithms and concept learning for the given problem.	1	-
2.	Analyze the given problem and identify the appropriate data modelling and machine learning methods to solve the same	2	-
3.	Design and develop a machine learning models to solve the given problem	3	1, 2
4.	Conduct experiments to solve given problems using appropriate machine learning techniques	3, 5	1, 2
Course Contents:			
MODULE – 1			11 Hrs
Introduction to Machine learning: Human learning and its types, Machine learning and its types, Applications, tools and issues in machine learning, Activities in machine learning, Types of data, Exploring structure of data, Data quality and Preprocessing. Modelling and Evaluation: Introduction, selecting a model, training a model, model representation and interpretability, Evaluating performance of a model.			
MODULE – 2			11 Hrs
Learning Problems and Concept Learning: Well Posed learning problems, designing Learning systems, Concept Learning Tasks, Search, Find-S, Version Spaces and Candidate Elimination Algorithm, Inductive bias. Supervised Learning: Introduction, example, classification model, classification learning steps, and Common algorithms – KNN, Decision Tree, and Random Forest model.			
MODULE – 3			10 Hrs
Supervised Learning (contd.): SVM, Regression-Simple linear regression, Multiple linear regression, Assumptions in Regression analysis. Unsupervised Learning: Supervised Vs Unsupervised, Application, clustering, finding pattern using Association rule.			
MODULE – 4			10 Hrs
Basics of Neural Networks: Exploring the artificial neuron, Types of activation function, Early implementations of ANN, Architectures of NN, Learning process in ANN, Backpropagation algorithm. Bayesian learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Bayesian Belief Networks. Other types of Learning – Representation learning, Active Learning, Instance based Learning, Association rule Learning, Ensemble learning			
Demonstration: 1. Demonstration of Python Libraries for Machine Learning-Pandas, Sklearn, numpy, matplotlib. 2. Demonstration of Exploratory Data Analysis and Data Visualization. Practical Component: 1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file. 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. 3. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem. 4. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. 5. Implement a clustering algorithm using K-means clustering for the given dataset.			

6. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.					
7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.					
Pre-requisite (If any)					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Machine Learning	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das	-	Pearson,	2019
2.	Machine Learning	Tom M. Mitchell	Indian Edition	McGraw-Hill Education	2013
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	The Elements of Statistical Learning	T. Hastie, R. Tibshirani, J. H. Friedman,	1st edition	Springer	2001
2.	Pattern Recognition and Machine Learning	Bishop C.M	-	Springer	2006
3.	Artificial Neural Networks	Yeganarayana B	-	PHI Learning Pvt., Ltd.	-
4.	Introduction to Machine Learning	Ethem Alpaydin	2 nd Edition	PHI Learning Pvt. Ltd.	2013
EBOOKS/MOOC:					
MOOCS:					
1. https://swayam.gov.in/nd1_noc19_cs52/preview					
2. https://www.coursera.org/learn/machine-learning/					
3. https://nptel.ac.in/courses/106105152					
Online Courses and Video Lectures:					
https://www.youtube.com/@MaheshHuddar					
https://www.coursera.org/learn/machine-learning-with-python					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning		3	14	42
2.	Integrated Lab Component		2	14	28
3.	Student Study Hours – Self Learning		2	14	28
4.	Activity Based Learning (ABL1 & ABL2)		-	-	-
5.	Evaluation of Learning Process		-	-	22
Total Learning Hours / Semester					120
Proposed Assessment Plan (for 50 marks of CIE):					
Tool	Remarks				Marks
CIE	CIE1	Conducted for 20 marks (Module 1) & reduced to 10 marks			10
	CIE2	Conducted for 20 marks (Module 2) & reduced to 10 marks			10
	CIE3	Conducted for 20 marks (Module 3) & reduced to 10 marks			10
Activity Details	Activity 1	Lab CIE Conducted for 10 marks			10
	Activity 2	Infosys Springboard Certification/ any MOOC Course			10
Total Marks					50

Self-Learning													
Infosys Springboard online course/ any MOOC Course													
Activity Based Learning													
Applied problem solving: Students solve various problems on any online programming													
Evaluation of Learning Process													
Conducting Lab CIE for the listed program													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	3	3
CO4	-	-	2	-	3	-	-	-	-	-	-	3	3

Course Title		TECHNOLOGY MANAGEMENT AND ENTREPRENEURSHIP			
Course Code	24CS602	(L-T-P) C	(2-2-0) 3		
Exam Hrs.	3	Hours/Week	4		
CIE	50 marks	Total Hours	28L +28T+28ABL+6EV=90		
SEE	50 marks				
Course Objective: To lead and manage teams, become entrepreneur and to prepare project proposal					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Apply knowledge of planning frameworks, human resource organizing, and decision-making matrices to manage technical organizations and resolve structural challenges.		1	-	
2.	Analyse product and technology life cycles, research strategies, and Intellectual Property Rights (IPR) to identify issues and formulate creative engineering solutions.		2	2	
3.	Design comprehensive project plans and strategic feasibility frameworks that incorporate market demands, technological requirements, and financial constraints.		3	-	
4.	Appraise the socio-economic impacts of Small-Scale Industries (SSIs) and global trade policies (GATT/WTO) by collaborating effectively in diverse teams, producing technical project reports, and presenting strategic solutions.		6, 8, 9, 10, 11	-	
Course Contents:					
MODULE – 1				7 Hrs	
Planning, and Decision making: Planning: Preview. Nature of planning, the foundation for planning, some planning concepts. Decision Making: Preview .Nature of decision making. Types of decisions/decision making. Some human aspects of organizing; Preview. Staffing technical organizations .Authority and power .Delegation.					
MODULE – 2				7 Hrs	
Motivating & Leading Technical People and Controlling: Motivating and leading technical people: Preview. Motivation. Leadership. Motivating and leading technical professionals (methods). Managing the Research Functions: Preview. Product and technology life cycles .Nature of R&D. Research strategy and organization .Selecting R&D projects .Protection of ideas. Intellectual Property Rights (IPR).Creativity.					
MODULE – 3				7 Hrs	
Entrepreneurship: Meaning Evolution of the concept, functions of an Entrepreneur, Characteristics of an Entrepreneur, types of entrepreneurs, Intrapreneur. Entrepreneurship :Concept of Entrepreneurship, Characteristics of Entrepreneurship ,Development of Entrepreneurship ,Stages in Entrepreneurial process ,Role of Entrepreneurs in economic development, Entrepreneurship in India, Entrepreneurship barriers, Women entrepreneur – Concept & steps to develop Women Entrepreneur. Small Scale Industry: Definition ,Characteristics ,Objectives ,Scope and role of SSI in economic Development, Advantages of SSI, Problems of SSI ,Steps to start an SSI.					
MODULE – 4				7 Hrs	
Government Policy towards SSI; Different Policies of SSI, Introduction to GATT/ WTO. Supporting Agencies of Government for SSI: Meaning, Nature of support; Objectives, functions. Ancillary Industry and Tiny Industry. Institutional Support: Different Schemes: SSIDC, SSIB, DICs/ Single Window Concept, TCOs, ICICI, NSIC, SIDO, IDBI, SIDBI, SFCS, IFCI. Preparation of Project: Meaning, Project identification ,Project selection ,Project Report Need of Project, Contents ;formulation, Network Analysis Errors of project report ,Project Appraisal ,Feasibility Study, Market Feasibility Study, Technical Feasibility Study ,Financial Feasibility Study ,Social Feasibility Study					
Pre-requisite (If any)					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	“Managing Engineering and Technology”,	Daniel Babcock & Lucy C. Morse	6 th edition	PHI,	2014
2.	Management and Entrepreneurship	N. V. RNaidu, T Krishna Rao.	6th	PHI,	2012

Reference Books:														
Sl. No	Book Title				Authors		Edition		Publisher			Year		
1.	Entrepreneurship Development, Small Business Enterprises				Poornima .M. Charantimath,		5th		Pearson Education			2006.		
2.	Dynamics of Entrepreneurial Development &Management				Vasant Desai		4th		Himalaya Publishing House			2002		
EBOOKS/MOOC:														
1. https://nptel.ac.in/courses/110/106/110106141														
2. https://nptel.ac.in/courses/127/105/127105007														
Online Courses and Video Lectures:														
Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester			
1.	Class Room Teaching & Learning						2		14		28			
2.	Tutorial						2		14		28			
3.	Activity Based Learning (ABL)						2		14		28			
4.	Evaluation of Learning Process						-		-		6			
Total Learning Hours / Semester											90 hours			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks										Marks		
CIE		CIE1	Descriptive Questions										10	
		CIE2	Descriptive Questions										10	
		CIE3	Descriptive Questions										10	
Activity Details		Activity 1	Presentation on startups ideas and project proposal										10	
		Activity 2	Industry visit with report										10	
Total Marks											50			
Tutorial- Scenario based Assignment														
Self-Learning- NIL														
Activity Based Learning :														
- Presentation on start-ups ideas and project proposal - Industry visit with report														
Evaluation of Learning Process														
CIE and Activity marks will be evaluated														
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	-	3		-	-	-	-	-	-	-	-	-	2	
CO3	-	-	2	-	-	-	-	-	-	-	-	-	-	
CO4	-	-	-	-	-	3	-	2	2	3	2	-	-	

Course Title		SYSTEM SOFTWARE AND COMPILER DESIGN			
Course Code	24CS603	(L-T-P) C		(2-2-0) 3	
Exam Hrs.	3	Hours/Week		4	
CIE	50 Marks	Total Hours		28L + 28T+34SL=90	
SEE	50 Marks				
Course Objective: To understand and apply the concepts of system software and compiler design.					
Course Outcomes (COs):					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Apply the principles of system software and compiler design phases for a given problem		1	-	
2.	Analyze the concepts of System software and language processor to process the given input and interpret the features.		2	-	
3.	Design assemblers and parsers for the assembly language code.		3		
4.	Implement lexical and syntactic analyzers for the grammars using Lex and Yacc tools.		3, 5	1	
Course Contents:					
MODULE – 1				11 Hrs	
Machine Architecture, Assembler 1: The Simplified Instructional Computer (SIC) and SIC/XE Assemblers: Basic assembler functions, Machine dependent assembler features. Assembler 2: Machine Independent Assembler Features, Assembler Design Options.					
MODULE – 2				11 Hrs	
Loaders and Linkers: Basic Loader Functions, Machine-Dependent Loader Features, Machine- Independent Loader Features, Loader Design Options. Macro Processor: Basic Macro Processor Functions, Machine-Independent Macro Processor Features.					
MODULE – 3				10 Hrs	
Introduction: Language Processors, The structure of a Compiler, Applications of Compiler Technology, Programming Language Basics. Lexical Analysis: Role of Lexical Analyzer, Input buffering, Specifications of tokens, Recognition of Tokens.					
MODULE – 4				10 Hrs	
Syntax Analysis: Introduction, Context –free Grammar and Structure of Language, Parser and its Types, Top-Down parser-Recursive descent parsing and Non-Recursive descent parsing, Predicting parsing table, Error recovering strategies.					
Tutorial					
1. a) Write and execute a LEX program to count the number of characters, words, spaces & no. of lines in a given input file. b) Write a LEX program to count the number of comment lines in a given C program. Also eliminate them and copy that program into separate file.					
2. Write a LEX program to recognize a valid arithmetic expression and to recognize the identifiers and operators present and to print them separately.					
3. a) Write a LEX program to recognize and count the number of identifiers in a given input file. b) Write a LEX program to find & replace String.					
4. a) Write a LEX program to check the validity of a Date. b) Write LEX program by reading input file and copy the content with line number to another file.					
5. Write YACC program to recognize a valid arithmetic expression that uses operators +, -, * & /.					
6. Write YACC program to evaluate an arithmetic expression involving operators +, -, * and /.					
7. Write a YACC program to convert infix to postfix.					
8. a) Write YACC program to recognize the grammar ($a^n b$, $n \geq 10$). b) Write a YACC Program to recognize the grammar ($a^m b^n c^k$, $m, n, k \geq 0$ and $m=n+k$).					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	System Software – An	Leland Beck, D. Manjula	3rd	Pearson	2013

	Introduction to Systems Programming				Education	
2.	Compilers- Principles, Techniques and Tools	Alfred V Aho, Ravi Sethi, Jeffrey D Ullman	2 nd		Addison-Wesley	2014

Reference Books:

Sl. No	Book Title	Authors	Edition		Publisher	Year
1.	Systems Programming and Operating Systems	D. M. Dhamdhere	2nd		Tata McGraw Hill Company	2009
2.	Lex and Yacc	John. R. Levine, Tony Mason and Doug Brown			O'Reilly, SPD	2012
3.	Principles of Compiler Design	S. V. Raghavan			Tat McGraw Hill Education	2010

EBOOKS/MOOC:

<https://freecomputerbooks.com/Compiler-Design-Theory-Tools-and-Examples.html>

https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_cs07

Online Courses and Video Lectures:

<https://www.coursera.org/learn/formal-languages-and-applications-odc>

Teaching -Learning-Evaluation scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	2	14	28
2.	Tutorial Component	2	14	28
3.	Student Study Hours – Self Learning			24
4.	Activity Based Learning (ABL1 & ABL2)			
5.	Evaluation of Learning Process			10
Total Learning Hours / Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details	Activity 1	Develop two pass assembler for a given program using Simulator.	10
	Activity 2	Implement and execute programs using Lex and Yacc for Lexical and Syntactic analysis.	10
Total Marks			50

Self-Learning

1. Explore SIC/XE architecture and simulate sample assembly programs using SIC/XE Simulator or MARS. Prepare symbol tables and object code manually for simple programs.
2. Study dynamic linking and loading mechanisms used in modern operating systems. Analyze macro expansion in C preprocessor and compare with macro processors.
3. Install Lex/Flex tools and develop simple token recognizers for identifiers, keywords, comments, and operators.
4. Implement parsers for arithmetic expressions using Yacc/Bison.
5. Explore online parser generators and visualize parse trees for various context-free grammars using parser visualization tools.

[illegible]

CO3	-	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	3	-	-	-	-	-	-	2	-

Course Title	FULL STACK WEB DEVELOPMENT LABORATORY		
Course Code	24CS604	(L-T-P) C	(0-0-4) 2
Exam Hrs.	3	Hours/Week	4
CIE	50 Marks	Total Hours	56P+ 4EV= 60
SEE	50 Marks		
Course Objective: To build functional, cross platform web applications.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Execute full-stack web development lab programs, analyse the results obtained, and document the findings in technical laboratory records.	3, 9	-
2.	Investigate a real-world problem and develop a full-stack web application as a team-based mini project using appropriate modern development tools, planned milestones, and self-directed learning.	4, 5, 8, 10, 11	1
Course Contents:			
1.	(a) Build a Node.js server using Express.js that handles HTTP requests (GET, POST) and responds with JSON data, and extend it by integrating a database such as SQLite or MongoDB to implement full CRUD operations on a dataset. (b) Build a simple frontend page that consumes this API using fetch/axios, displaying the retrieved data and allowing a new record to be added through a form.		
2.	(a) Design and implement a RESTful API using Node.js, Express, and a database of your choice. Define endpoints for managing resources, such as creating, reading, updating, and deleting data. (b) Test all endpoints using Postman/Thunder Client and add request validation and proper error handling (e.g., 400 for bad input, 404 for missing resources).		
3.	(a) Create a library of reusable React components. Build components like buttons, cards, and modals and use them in a sample React application. (b) Use React Router to build a multi-page demo app that navigates between separate pages showcasing each component.		
4.	(a) Write a program to create a simple calculator application using React JS. (b) Build a second small app — a live digital clock or counter — using React Hooks (useState, useEffect) to reinforce state and lifecycle concepts.		
5.	(a) Build a real-time chat application using React for the front end and Node.js with Socket.IO for the back end. Enable users to send and receive messages in real-time. (b) Extend the chat app to persist messages using MongoDB (via Mongoose) so chat history survives a page refresh.		
6.	(a) Develop a Django app that displays the current date and time on the server. (b) Extend the app to display the date/time in multiple timezones (e.g., IST, GMT, EST) selected via a URL parameter or dropdown, using Django's timezone utilities.		
7.	(a) Develop a Django app that performs user registration and login. It should allow users to register, login, and view a welcome page after login using Django authentication. (b) Extend the same functionality using Django REST Framework, exposing registration/login as API endpoints that return a success/token response.		
8.	(a) Develop a simple Django app that displays an unordered list of fruits and an ordered list of selected students for an event. (b) Extend the app using a Django Form so users can dynamically add a new fruit or student to the list instead of it being hardcoded.		

9. Develop a Django app that manages employee records. It should allow adding new employees and display the list of all employees. Create an Employee model with fields name, designation, and salary.

10. Develop a Django app that performs student registration on a course. It should also display a list of students registered for any selected course. Create students and course as models with enrolment as a many-to-many field.

Pre-requisite : Basic knowledge of HTML, CSS, JavaScript and Fundamentals of Database Management Systems (SQL queries)

Text Books

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Full Stack Development with MERN	Vasan Subramanian	1st	Packt Publishing	2019
2.	Django 4 By Example	Antonio Melé	4th	Packt Publishing	2022

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Modern Full-Stack Development	Frank Zammetti	1st	Apress	2023

EBOOKS:

1. Jon Duckett, "JavaScript & jQuery: Interactive Front-End Web Development", Wiley, 2014.

2. Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node. Apress, 2019.

Online Courses and Video Lectures:

1. <https://www.coursera.org/specializations/full-stack-react>

2. <https://www.udemy.com/course/mern-stack-front-to-back/>

3. <https://docs.djangoproject.com/en/6.0/>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Laboratory	2	14	28
2.	Student Study Hours – Self Learning	-	-	-
3.	Activity Based Learning	2	14	28
4.	Evaluation of Learning Process	-	-	4
Total Learning Hours / Semester				60

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Lab CIE	10
	CIE2	Lab CIE	10
	Report	Submission of record	10
Activity Details	Activity	Design and Development of a Mini Full Stack Application	20
Total Marks			50

Activity Based Learning

Develop a full-stack web application that integrates frontend and backend technologies to manage users and data end-to-end.

The system should ensure:

- Full CRUD operations with proper data handling and storage

- Secure user authentication and input/form validation
- Interactive and reusable UI components
- Seamless integration between frontend and backend, with tested API endpoints
- (Optional) Real-time features such as live updates or notifications

Evaluation of Learning Process

Evaluates full-stack application development based on CRUD completeness, authentication and validation, API reliability, integration, and interactive user experience.

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	2	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	2	3	-	-	3	-	2	2	3	-

Course Title	MAIN PROJECT PHASE - I		
Course Code	24CS605	(L-T-P) C	(0-0-4) 2
Exam Hrs.	3	Hours/Week	4
CIE	50 Marks	Total Hours	56P+04EV=60
SEE	50 Marks		
Course Objective: To be able to identify a relevant problem that requires technical solution and conduct survey for the same.			
Course Outcomes (COs): Upon completion of the course the students will be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Identify a real-life problem, through Extensive literature Survey leading to publication of a survey paper.	1, 2, 4, 6	1
2.	Plan & design the feasible solution to the chosen problem.	3, 5, 6	1
3.	Collaborate and contribute to the teams to work effectively and present the work carried out and prepare the report	8, 9, 10	2
4.	Plan and manage the project and follow the schedules to meet the deadlines	10, 11	2
Course Contents:			
During VI semester, candidates in consultation with the guides shall carry out a literature survey to finalize the topic of the project. <i>The same project will be continued in Seventh semester.</i> Students are expected to present the project synopsis, system analysis, requirements specification and <i>should publish a technical paper on the Literature Survey. The evaluation will be carried out in three stages</i> • Project Phase 1 – Team Formation, Topic Selection & Guide allotment (No marks) • Project Phase 2 – Extensive Literature Survey, Problem Definition • Project Phase 3 – Preliminary Design, Report Preparation and Publication The evaluation of the project phases shall be carried out by the evaluation committee comprising of project guide & other faculty members. The committee will be constituted by the project coordinator in consultation with the Head of the department. <i>For Multidisciplinary projects guides will be allotted from each concerned branch.</i>			
Phase 2			
Literature Survey and Problem Definition (20 Marks)	Literature Survey not pertaining to the title of the project (0-8)	Incomplete literature survey and improper problem definition (9-14)	Extensive literature survey with clear state-of-the-art problem definition (15-20)
Preliminary Design (10 Marks)	Has no coherent strategies for problem Solving (0-4)	Has some strategies for problem – solving, but does not apply them consistently (5-7)	Formulates strategies for solving problems (8-10)
Group Participation(5)	Contributed less than peers; primarily listened without actively participating. Shared no ideas, which were often not aligned with the project (1-2)	Contributed nearly as much as others. They took part in discussions and occasionally offered suggestions. Consistently completed assigned tasks on time. (3-4)	Consistently completed their share of the work, going above and beyond—and willingly offered assistance to others. Contributed numerous valuable ideas, inspired peers, and communicated thoughts and needs effectively. Completed assigned tasks ahead of schedule (5)
Ethics(5)	Upholds the standards	Upholds the standards of honesty and integrity. Addressed few societal and environmental issues (3-4)	Upholds the standards of honesty and integrity. Addressed the society and environmental issues and responsibilities. (5)

Presentation (10 marks)			Disorganized and ineffective presentation (0-4)				Organized, but ineffective presentation (5-7)				Effectively organized presentation (8-10)			
Report Preparation (20 Marks)			Disorganized and contents are not sufficient (0-8)				Organized but not good content wise (9-14)				Effectively organized and well framed contents (15-20)			
Paper Publication (20 Marks)			Paper submitted & awaiting results (0-8)				National conference International Conference (9-14)				Journal (15-20)			
Punctuality (Project Dairy Maintenance) (10 marks)			Not meeting the guide regularly (0-4)				Meeting regularly but doesn't document details of every session (5-7)				Up to date dairy maintenance (8-10)			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks										Marks		
CIE		CIE1	Phase 1 evaluation will be conducted for 40 marks and scale down to 20 marks.										20	
		CIE2	Phase 2 evaluation will be conducted for 60 marks and scale down to 30 marks.										30	
Total Marks												50		
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	3	-	3	-	3	-	-	-	-	-	3	-	
CO2	-	-	3	-	3	3	-	-	-	-	-	3	-	
CO3	-	-	-	-	-	-	-	3	3	3	-	-	3	
CO4	-	-	-	-	-	-	-	-	-	3	3	-	3	

Course Title	INTRODUCTION TO COMPUTER VISION				
Course Code	24CS661	L-T-P-C	(3-0-0) 3		
Exam Hrs.	3	Hours / Week	3		
CIE	50 Marks	Total Hours	42L + 48TW = 90		
SEE	50 Marks				
Course Objective: To learn basic principles of image formation, image processing algorithms and different algorithms for recognition from single or multiple images (video).					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply mathematical, geometric, and linear filtering principles to calculate camera parameters and analyze image formation from single or multiple images.	1	-		
2.	Identify, formulate, and analyze complex vision problems in image segmentation, tracking, and object recognition to arrive at substantiated engineering conclusions	2	-		
3.	Design creative computer vision solutions for motion computation, shape analysis, and object detection while considering public safety, societal, and environmental sustainability factors	3	-		
4.	Develop and demonstrate computer vision solutions for real-world problems by working effectively in collaborative teams, utilizing modern engineering tools, and delivering inclusive technical presentations	5,8,9	-		
Course Contents:					
MODULE – 1			11 Hrs		
Introduction and Image Formation: What is computer vision? A brief history, Geometric primitives and transformations, Photometric image formation, The digital camera. Pinhole Perspective, Weak Perspective, Cameras with Lenses, The Human Eye, Intrinsic Parameters and Extrinsic Parameters, Geometric Camera Calibration.					
MODULE – 2			11 Hrs		
Early Vision – One Image: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Local Image Features, Texture.					
MODULE – 3			10 Hrs		
Early Vision – Multiple Images: Stereopsis and Structure from Motion Early Vision – Mid-level Vision: Segmentation by Clustering, Grouping and Model fitting, Tracking.					
MODULE – 4			10 Hrs		
High-level Vision: Registration, Smooth Surface and their Outlines, Range Data Detecting Objects in Images, Recognition.					
Pre-requisite (If any)					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Computer Vision: Algorithms and Applications (CVAA)	Richard Szeliski	2nd	Springer, http://szeliski.org/Book/	2020
2.	Computer Vision – A modern approach	by D. Forsyth and J. Ponce	2nd	Prentice Hall	2012
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Digital Image Processing	R. C. Gonzalez, R. E. Woods.		Addison Wesley Longman, Inc.	1992
2.	Computer Vision	D. H. Ballard, C. M. Brown		Prentice-Hall, Englewood	1982

[illegible]

Course Title	ARTIFICIAL INTELLIGENCE				
Course Code	24CS662	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 48ABL = 90		
SEE	50 Marks				
Course Objective: Students will be able to apply the concepts of Artificial intelligence to construct knowledge-based systems.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply various search strategy and learning algorithms to a given problem	1	-		
2.	Analyze different types of Artificial Intelligence agents and various search strategies to trace their execution and evaluate effectiveness.	2	-		
3.	Design intelligent agents by applying rational agent architectures, search algorithms, knowledge representation, logical inference and machine learning techniques for solving a real world problem.	3	-		
4.	Demonstrate collaborative team work by implementing various learning techniques to improve decision-making and communicate the same through report and presentation.	3,5,8,9	1		
Course Contents:					
MODULE – 1			11 Hrs		
Introduction: What is AI? Intelligent Agents: Agents and environment; Good behavior: The Concept of Rationality; The nature of environment; The structure of agents. Problem-solving: Problem-solving agents. Example problems; Searching for solution; Uninformed search strategies: Breadth-first search, Uniform- cost search.					
MODULE – 2			11 Hrs		
Uninformed search strategies: Depth-first search, Depth-limited search, Iterative deepening depth first search, Bidirectional search, Comparing uninformed search strategies; Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Optimality of A*, Memory-bounded heuristic search; Heuristic functions; Local Search Algorithms and Optimization Problems: Hill-climbing search, Simulated annealing, Local beam search, Genetic algorithms.					
MODULE – 3			10 Hrs		
On-line search agents and unknown Environments: Online search problems, Online search agents, online local search, learning in online search, Logical Agents: Knowledge-based agents; The Wumpus world; First-Order Logic: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic, Knowledge engineering in first-order logic, Forward Chaining.					
MODULE – 4			10 Hrs		
Learning from Examples: Forms of Learning; supervised learning; Learning decision trees; Practical Machine Learning. Statistical and Reinforcement learning: Statistical learning, maximum likelihood parameter learning, Bayesian parameter, learning, passive reinforcement learning, active reinforcement learning.					
Pre-requisite:					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Artificial Intelligence - A Modern Approach	Stuart Russell and Peter Norvig	Third edition	Pearson	2014
2.					
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Artificial Intelligence	Elaine Rich, Kevin Knight and Shivashankar B Nair,	Third edition	McGraw- Hill Education	2015
2.	Introduction to Artificial Intelligence and Expert Systems	Dan W Patterson	-	Pearson	2015
EBOOKS/MOOC:					

<https://nptel.ac.in/courses/106102220>

Online Courses and Video Lectures:

<https://www.udemy.com/course/the-ai-engineer-course-complete-ai-engineer-bootcamp/?couponCode=KEEPLEARNING>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Integrated Lab Component	-	-	-
3.	Student Study Hours – Self Learning	1	14	14
4.	Activity Based Learning	2	14	28
5.	Evaluation of Learning Process	-	-	6

Total Learning Hours / Semester

90

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
	Activity 1	Real world scenarios based activity and search algorithm simulation visualization.	20

Total Marks

50

Self-Learning ()

Suggested to take Online courses related to AI

Activity Based Learning ()

Real world scenarios based activity and search algorithm simulation visualization.

Evaluation of Learning Process (6 Hours)

Demonstration of the work and make all the work available in the open sources

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	3	3	-	-	2	-

Course Title	WIRELESS NETWORKS				
Course Code	24CS663	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L+ 14SL+28ABL+6EV = 90		
SEE	50 Marks				
Course Objective: Apply the principles, algorithms, and methodologies of wireless communication networks to analyze communication scenarios.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply the concepts of wireless communication and transmission techniques to wireless network communication scenarios.	1	-		
2.	Analyze the architecture, operation, and mobility management mechanisms of cellular communication systems to optimize network performance.	2	-		
3.	Design mobile computing solutions by considering resource management, mobility, bandwidth utilization, and security issues	3	-		
4.	Collaborate in teams to develop and present network projects, focusing on optimized solution for wireless communication.	5, 8, 9, 11	-		
Course Contents:					
MODULE – 1			11 Hrs		
Introduction: Wired Network vs. Wireless Network, Overview of Wireless Applications, Wireless Transmission: Path loss, Multi-path propagation, Doppler shift, Fading, Time Division Multiplexing, Frequency Division Multiplexing, Code, Spread Spectrum Technique, Satellite Communication.					
MODULE – 2			11 Hrs		
Cellular System: Cellular Network Organization, Cellular System Evolution, Cellular Fundamentals: Capacity, Topology, Operation of Cellular Systems, Handoff, Power control, Case study: Global System for Mobile communication (GSM) Network, General Packet Radio Service (GPRS), Code Division Multiple Access (CDMA 2000), Cordless System, Wireless Local Loop, Mobility Management-Location Management, HLR-VLR scheme, Hierarchical scheme, Predictive location management schemes.					
MODULE – 3			10 Hrs		
Wireless Network: Protocols: Media Access Protocol, Mobile IP, Mobile Transport Layer Protocol, Wireless Access Protocol, Ad-Hoc Networks and Routing, Standards: IEEE 802.11, Wi-Fi, Wireless Broadband-Wi-MAX, Bluetooth, IEEE 802.15, Security in Wireless Network, Hyper LAN					
MODULE – 4			10 Hrs		
Mobile Computing: Mobile Computing, Issues: Resource Management, Interference, Bandwidth, Cell Splitting, Frequency reuse, Mobile Data Transaction Models, File Systems, Mobility Management, Security.					
Pre-requisite: Knowledge on Computer Networks					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Wireless Communications & Networks	William Stallings	2	Pearson Education India	2007
2	Mobile Communications	Jochen Schiller	2	Pearson Education India	2007
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	The Wireless Application Protocol	Sandeep Singhal	-	Addison Wesley	2011
2	Wireless Communications: Principles & Practice	T S Rappaport	2	Pearson Education	2002
EBOOKS/MOOC:					
https://onlinecourses.nptel.ac.in/noc20_ee61/preview					
Online Courses and Video Lectures:					
https://onlinecourses.nptel.ac.in/noc20_ee61/preview					

Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning						3		14		42		
2.	Integrated Lab Component						-		14				
3.	Student Study Hours – Self Learning						1		14		14		
4.	Activity Based Learning						-		-		28		
5.	Evaluation of Learning Process						-		-		06		
Total Learning Hours / Semester											90		
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks									Marks		
CIE		CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks									10	
		CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks									10	
		CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks									10	
Activity Details		Activity 1	Execution and documentation of programs listed in self-study and ABL									20	
Total Marks											50		
Self-Learning ()													
Develop a simulation to analyze path loss, free-space propagation, and fading for different transmission distances and frequencies. Compare the results graphically.													
Simulate a GSM cellular network with multiple users moving between cells and study handoff performance, throughput, and packet loss.													
Simulate Wi-Fi (IEEE 802.11) communication under varying numbers of users and compare throughput, delay, and packet delivery ratio.													
Create a Bluetooth Personal Area Network (PAN) and evaluate communication range, packet transmission, and power consumption.													
Develop a program to visualize cell splitting and frequency reuse in a cellular network. Analyze how system capacity changes with different cluster sizes.													
Activity Based Learning ()													
1. Design a wireless network for a small campus (library + classroom building). The system should support multiple users with secure access, and the performance (connectivity and throughput) must be analyzed under different user loads.													
2. Simulate a Mobile Ad Hoc Network and compare AODV and DSR routing protocols based on packet delivery ratio, delay, and routing overhead under node mobility.													
Evaluation of Learning Process (6 Hours)													
Type of Evaluation												Hours	
Test (1, 2 and 3)												3	
Semester End Exam												3	
Total												6	
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	3	3	-	3	-	-

Course Title	SOCIAL NETWORK ANALYSIS				
Course Code	24CS664	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L + 28ABL+14SL+6EV=90		
SEE	50 Marks				
Course Objective: To provide students with a comprehensive understanding of social network analysis, network growth models, link analysis, and community detection techniques for analyzing and solving real-world network problems.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply link analysis techniques, PageRank, similarity measures, and basic link prediction methods to analyze social networks.	1	1		
2.	Analyze the characteristics and growth models of social networks and compare different network models.	2	1		
3.	Design social network analysis models to identify influential nodes and communities.	3,5	1		
4.	Collaborate in teams to evaluate community detection techniques and interpret the structure of complex social networks for practical applications	5,8,9	1,2		
Course Contents:					
MODULE – 1			11 Hrs		
Networks and Society - What is Social Network Analysis, why do We Study Social Networks, Applications of Social Network Analysis, Preliminaries, Three Levels of Social Network Analysis. Network Measures - Network Basics, Node Centrality, Assortativity, Transitivity and Reciprocity, Similarity.					
MODULE – 2			11 Hrs		
Network Growth Models: Properties of Real-World Networks, Random Network Model, Ring Lattice Network Model, Watts–Strogatz Model, Preferential Attachment Model, Local-World Network Growth Model, Comparison of Network Models, Applications of Network Growth Models.					
MODULE – 3			10 Hrs		
Link Analysis - Applications of Link Analysis, Signed Networks, Strong and Weak Ties, Link Analysis Algorithms, PageRank, Personalised PageRank, Similarity Measures, Recommendation Systems Basic Introduction to Link Prediction.					
MODULE – 4			10 Hrs		
Community Structure in Networks - Applications of Community Detection, Types of Communities, Community Detection Methods, Disjoint Community Detection, Overlapping Community Detection, Local Community Detection, and Community Detection vs Community Search, Evaluation of Community Detection Methods.					
Pre-requisite: Fundamentals of Discrete Mathematics (Graph Theory), Basic knowledge of Data Structures and Algorithms. Fundamentals of Probability and Statistics.					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Social Network Analysis	Tanmoy Chakraborty	1st	Wiley India Pvt. Ltd	2021
2.	Networks: An Introduction	Mark Newman	1st	Oxford University Press	2010
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Network Science	Albert-Laszlo Barabas	1st	Cambridge University Press	2016
2.	Social Network Analysis: Methods and Applications	Stanley Wasserman, Katherine Faus	1st	Cambridge University Press	1994

EBOOKS/MOOC:														
https://networksciencebook.com/														
https://onlinecourses.nptel.ac.in/noc22_cs117/preview														
Online Courses and Video Lectures:														
• https://social-network-analysis.in/ • https://www.coursera.org/learn/social-network-analysis														
Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method							No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning							3		14		42		
2.	Integrated Lab Component							-		-		-		
3.	Student Study Hours – Self Learning							1		14		14		
4.	Activity Based Learning							2		14		28		
5.	Evaluation of Learning Process							6		-		06		
Total Learning Hours / Semester											90			
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks									Marks			
CIE		CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks									10		
		CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks									10		
		CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks									10		
Activity Details		Activity 1									10			
		Activity 2									10			
Total Marks											50			
Self-Learning (14 Hours)														
• Read one recent IEEE/ACM research paper on Social Network Analysis and present its methodology, findings, and future scope through a seminar or presentation. • Analyze a social media dataset (Twitter/X, Facebook, LinkedIn, Reddit, etc.) and identify key network metrics.														
Activity Based Learning (28 Hours)														
• Study real-world social networks (Facebook, LinkedIn, Twitter/X, citation networks, collaboration networks) and prepare a case study report on network properties and applications.														
• Learn and demonstrate one open-source SNA tool (Gephi, NetworkX, Cytoscape, or igraph) by analyzing a sample dataset and preparing a short report.														
Evaluation of Learning Process (6 Hours)														
Type of Evaluation												Hours		
CIE(1, 2 and 3)												3		
Semester End Exam												3		
Total												6		
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	2	-	-	-	-	-	-	-	-	-	-	2	-	
CO2	-	2	-	-	-	-	-	-	-	-	-	2	-	
CO3	-	-	2	-	3	-	-	-	-	-	-	2	-	
CO4	-	-	-	-	2	-	-	3	3	-	-	2	2	

Course Title	ROBOTIC PROCESS AUTOMATION				
Course Code	24CS665	(L-T-P) C	(3-0-0) 3		
Exam Hrs.	3	Hours/Week	3		
CIE	50 Marks	Total Hours	42L+ 14SL+28ABL+6EV = 90		
SEE	50 Marks				
Course Objective: To equip students with the knowledge and practical skills to design, develop, debug, and deploy Robotic Process Automation (RPA) solutions using UiPath for automating business processes efficiently.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes	Mapping to POs	Mapping to PSOs		
1.	Apply structural robot configurations using UiPath programming techniques and analyze diverse data extraction strategies.	1			
2.	Analyse advanced control flow mechanisms and manipulate structured or unstructured data types	2			
3.	Develop cross-platform automation sequences by integrating UiPath workflows with major third-party enterprise ecosystems	3			
4.	Collaborate in teams to develop and present projects focusing on debugging automated robotic workflows, evaluate runtime faults through structured logging and exception-handling frameworks	5,8,9,11			
Course Contents:					
MODULE – 1			11 Hrs		
What is Robotic Process Automation? What is Robotic Process Automation? Scope and techniques of automation Robotic process automation, About UiPath, The future of automation. Record and Play: Record and Play, UiPath stack, Downloading and installing UiPath Studio, Learning UiPath Studio.					
MODULE – 2			11 Hrs		
Sequence, Flowchart, and Control Flow: Sequence, Flowchart, and Control Flow, Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, Step-by-step example using Sequence and Flowchart, Step-by-step example, using Sequence and Control flow.					
Data Manipulation: Data Manipulation, Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example.					
MODULE – 3			10 Hrs		
Taking Control of the Controls: Taking Control of the Controls, Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Working with UiExplorer, Handling events, Revisit recorder, Screen Scraping,					
Tame that Application with Plugins and Extensions: Tame that Application with Plugins and Extensions, Terminal plugin, SAP automation, Java plugin.					
MODULE – 4			10 Hrs		
Handling User Events and Assistant Bots: Handling User Events and Assistant Bots, What are assistant bots? Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event. Exception Handling, Debugging, and Logging: Exception Handling, Debugging, and Logging, Exception handling Managing and Maintaining the Code: Managing and Maintaining the Code, Project organization					
Pre-requisite:					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool – Ui Path	AlokMani Tripathi,	-	Packtpub	2018
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Learning Service Now	Tim Woodruff	-	Packtpub	2017
EBOOKS/MOOC:					

https://miet.ac.in/assets/files/UiPATH_RPA_Training_Manual.pdf

Online Courses and Video Lectures:

<https://www.uipath.com/rpa/academy>

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Integrated Lab Component	-	14	
3.	Student Study Hours – Self Learning	1	14	14
4.	Activity Based Learning	-	-	28
5.	Evaluation of Learning Process	-	-	06
Total Learning Hours / Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details	Activity 1	Execution and documentation of programs listed in self study and ABL	20
Total Marks			50

Self-Learning

Develop automation in UiPath StudioX to demonstrate the following activities: Write Line: Message Box, Input Dialog, Modify Text., Text to Left/Right and Delay

Develop automation in UiPath StudioX to demonstrate the following activities: if, Switch., Repeat Number Of Times. , Skip Current, Exit Loop

Develop UI automation in UiPath StudioX to demonstrate the following activities: Use Application/Browser, Go To URL, Navigate Browser, Highlight and Take Screenshot.

Develop UI automation in UiPath StudioX to demonstrate the following activities: Check App State, Click, Type Into, Select Item, Check/Uncheck, Get Text, Get Attribute, Extract Table Data and Hover.

Develop UI automation in UiPath StudioX to demonstrate the following activities: Get Active Window, Maximize Window, Minimize Window, Hide Window, Restore Window and Move Window.

Develop Word automation in UiPath StudioX to demonstrate the following activities: Use Word File., Save Document As, Read Text, Replace Text in Document, Append Text, Replace Picture, Add Picture, Save Document as PDF.

Activity Based Learning

1. Installation of UiPath StudioX (<https://docs.uipath.com/studio/standalone/2022.10/userguide/install-studio>) and project to demonstrate the concepts learnt

Evaluation of Learning Process (6 Hours)

Type of Evaluation	Hours
Test (1, 2 and 3)	3
Semester End Exam	3
Total	6

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	3	3	-	3	-	-

Course Title		INTRODUCTION TO CLOUD COMPUTING			
Course Code	24OECs61	(L-T-P) C		(3-0-0)3	
Exam	3	Hours/Week		3	
SEE	50 Marks	Total Hours		42L + 48ABL=90	
SEE	50 Marks				
Course Objective: To expose students to frontier areas of cloud computing service models and applications.					
Course Outcomes (COs):					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Analyze the evolution of cloud computing and evaluate the challenges in delivering cloud-based IT services.		1, 2	-	
2.	Explore the key technical, organizational, architectural and virtualization techniques applied to different types of cloud environment with energy efficiency.		1,7	-	
3.	Ascertain different cloud platforms, Cloud Computing services, challenges of cloud computing and tools used in real life scenarios.		1,2,5	-	
4.	Explore the security and privacy issues that arise from cloud computing architectures intended for delivering Cloud based IT services.		6,8	-	
Course Contents:					
MODULE – 1				11 Hrs.	
Introduction: Cloud computing at a glance, historical developments, building cloud computing environments, computing platforms and technologies. Principles of parallel and Distributed computing: Eras of computing, parallel vs. Distributed computing, elements of parallel computing, elements of distributed computing, technologies for distributed computing.					
MODULE – 2				10 Hrs.	
Virtualization: Introduction, characteristics of virtualized environments, Taxonomy of virtualization techniques, virtualization and cloud computing, pros and cons of virtualization technology. Cloud Computing architecture: Introduction, Cloud reference model, types of clouds, economics of the cloud, open challenges.					
MODULE – 3				10 Hrs.	
Cloud platforms in industry: Amazon Web Services, Google App Engine, Microsoft Azure. Advanced topics in cloud computing: Energy efficiency in clouds, Market based management of clouds, Federated clouds/Inter clouds, Third party cloud services.					
MODULE – 4				11 Hrs.	
Infrastructure security, IAM: Infrastructure security: network level, host level, application level, Identity and Access management: trust boundaries and IAM, why IAM? IAM challenges, IAM definitions, IAM architecture and practices, getting ready for cloud, IAM standards and protocols for cloudservices, IAM practices in the cloud, cloud authorization management. Security management in the cloud: security management standards, security management in the cloud, availability management, Saas, Paas. Iaas availability management, access control, security vulnerability, patch and configuration management. Privacy: What is privacy? What is data life cycle? What are the key privacy concerns in cloud? who is responsible for protecting privacy?					
Pre-requisite (If any)					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Mastering Cloud Computing	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi		McGraw Hill publication	
2.	Cloud security and privacy an enterprise perspective on risks and compliances	Tin Mather, Subra Kumarswamy, Shahed Latif			2013
Reference Books:					

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Cloud Computing: Theory and Practice	Dan C Marinescuc	1 st	MK publishers	
2.	Cloud Computing- A practical approach	Anthony T. Velte, Toby J. Velte, Robert Elsenpeter.		McGraw Hill publication	

EBOOKS/MOOC:

1. <https://www.coursera.org/learn/cloud-computing>

Online Courses and Video Lectures:

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Integrated Lab Component	-	-	-
3.	Student Study Hours – Self Learning	-	-	-
4.	Activity Based Learning (ABL1 & ABL2)	-	-	28
5.	Evaluation of Learning Process	-	-	20
Total Learning Hours / Semester				90

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 marks and reduced to 10 marks	10
	CIE2	Conducted for 20 marks and reduced to 10 marks	10
	CIE3	Conducted for 20 marks and reduced to 10 marks	10
Activity Details	Activity 1	Group Activity will be conducted using various cloud platforms	20
	Activity 2		
Total Marks			50

Self-Learning

Activity Based Learning

Demonstrate working of different Cloud platforms.

Evaluation of Learning Process

Demonstration, Presentation and individual Report

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	2	-	-	-	-	-	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	2	-	-	-	-	-

Course Title		INTRODUCTION TO JAVA PROGRAMMING			
Course Code		24OECS62	(L-T-P) C		(3-0-0) 3
Exam Hrs.		3	Hours/Week		3
CIE		50 Marks	Total Hours		42L+ 14SL+28ABL+6EV = 90
SEE		50 Marks			
Course Objective: Develop java application programs using object-oriented concepts.					
Course Outcomes (COs): Upon completion of the course, students shall be able to:					
#	Course Outcomes			Mapping to POs	Mapping to PSOs
1.	Apply object-oriented programming principles to solve computational problems using Java.			1	
2.	Analyze the given java program to make suitable changes and write the output			2	
3.	Design error-tolerant and component-based Java applications using interfaces, packages, and exception handling mechanisms			3	
4.	Conduct practical experiments for demonstrating object oriented concepts through java			5,8,9,11	
Course Contents:					
MODULE – 1					11 Hrs
Object Oriented Concepts and Java: Concepts of Object-Oriented programming language: Object, Class, Message passing, inheritance, encapsulation, and polymorphism Difference between OOP and other conventional programming – advantages and disadvantages of OOP. Java Programming Fundamentals: The Byte Code, The Java Buzzwords, A first Simple program, The Java Keywords, Identifiers in Java. Data Types and Operators: Java’s Primitive Types, The Scope and Lifetime of Variables, Operators: Arithmetic, Bitwise, Relational, Boolean Logical, Assignment Operators, the ‘?’ Operator, Type conversion and Casting, Arrays, Strings					
MODULE – 2					11 Hrs
Program Control Statements: Input characters from the Keyboard, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nested switch statements, for Loop, While Loop, do-while Loop, Use of break and continue. Introducing Classes, Objects and Methods: Class Fundamentals, Declaring Objects, Object Reference Variables, Methods, Constructors, the “This” keyword, Garbage collection, Overloading Methods and constructors, Argument Passing, Returning Objects, Access Control, Understanding Static, Nested and Inner Classes.					
MODULE – 3					10 Hrs
Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and inheritance, Using super to C all Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Why overridden Methods, Using Abstract Classes, Using final.					
MODULE – 4					10 Hrs
Interfaces: Interface Fundamentals, Creating an Interface, Implementing an Interface, Implementing Multiple Interfaces, Packages: Package Fundamentals, Packages and Member Access, Importing Packages. Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and Catch, Multiple catch Clauses, throw, finally.					
Pre-requisite: Knowledge of basic C/Python programming language					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Java –The complete Reference	Herbert Schildt	8	Tata Mcgraw Hill	2017
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Java Programming	Hari Mohan Pandey	-	Pearson Education	2012
2.	Programming with Java – A Primer	E. Balagurusamy	8	McGraw Hill	2023

EBOOKS/MOOC:

1. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
2. https://www.youtube.com/watch?v=0KL_zftem4g

Online Courses and Video Lectures:

1. <http://nptel.ac.in/courses/106106147/>
2. <https://www.coursera.org/specializations/object-oriented-programming>

Teaching -Learning- Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1.	Class Room Teaching & Learning	3	14	42
2.	Integrated Lab Component	-	14	
3.	Student Study Hours – Self Learning	1	14	14
4.	Activity Based Learning	-	-	28
5.	Evaluation of Learning Process	-	-	06
Total Learning Hours / Semester				90

Total Learning Hours / Semester	90
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Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks		Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
Activity Details	Activity 1	Execution and documentation of programs listed in self study and ABL	20
Total Marks			50

Self-Learning

Write java programs

- To print Fibonacci series without using recursion and using recursion.
- To check prime numbers.
- To sort an array element using bubble sort algorithm

Create a class called account with the data members (accNum: integer, name: string, phoneNum:integer, balAmt:float) and following methods:

- getInput() to get input from the user.
- deposit() method which takes the amount to be deposited in to his/her account and do the calculation.
- withdraw() method which gets the amount to be withdrawn from hi/her account.
- Print the appropriate results

Write a Java program to create a class called Shape with a method called getArea(). Create a subclass called Rectangle that overrides the getArea() method to calculate the area of a rectangle

Write a Java program to create an abstract class BankAccount with abstract methods deposit () and withdraw (). Create subclasses: SavingsAccount and CurrentAccount that extend the BankAccount class and implement the respective methods to handle deposits and withdrawals for each account type

Write a Java program that reads a list of integers from the user and throws an exception if any numbers are duplicates.

Activity Based Learning ()

Develop a java application for the given real world problems using OOP concepts.

Evaluation of Learning Process (6 Hours)	
1. Understanding of the concept of a function and its domain and range.	2. Ability to identify the domain and range of a function.
3. Understanding of the concept of a composite function.	4. Ability to find the domain and range of a composite function.
5. Understanding of the concept of an inverse function.	6. Ability to find the inverse of a function.
7. Understanding of the concept of a monotonic function.	8. Ability to determine if a function is monotonic.
9. Understanding of the concept of a continuous function.	10. Ability to determine if a function is continuous.
11. Understanding of the concept of a differentiable function.	12. Ability to find the derivative of a function.
13. Understanding of the concept of a definite integral.	14. Ability to evaluate a definite integral.
15. Understanding of the concept of an indefinite integral.	16. Ability to find the indefinite integral of a function.

Type of Evaluation	Hours
Test (1, 2 and 3)	3
Semester End Exam	3
Total	6

Course Articulation matrix									
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[illegible]

C04	-	-	-	-	3	-	-	3	3	-	3	-	-
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Course Title	WEB TECHNOLOGY				
Course Code	24OECS63	(L-T-P) C	(3-0-0)3		
Exam	3	Hours/Week	3		
SEE	50 Marks	Total Hours	42L + 28ABL+14SL+6EV=90		
Course Objective: Create web pages with client-side and server-side scripting.					
Course Outcomes (COs): Upon completion of the course, students shall be able to					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
5.	Apply the knowledge of HTML/XHTML and CSS in designing webpage.		1	-	
6.	Analyze and develop dynamic web applications using JavaScript, XML, PHP, and MySQL		2,5	-	
7.	Develop client and server side script to design webpage.		3,5	-	
8.	Create database-driven web applications by integrating PHP and MySQL through effective teamwork for real-world problem-solving		3,5,6,8,9	-	
Course Contents:					
MODULE – 1				10 Hrs	
Fundamentals of Web, XHTML: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; the Web Programmers Toolbox. XHTML: Basic syntax; Standard structure; basic text markup; Images; Hypertext Links; Lists; Tables; Forms; the audio element, the video element, organization elements, time element					
MODULE – 2				10 Hrs	
CSS: Introduction; Levels of style sheets; Selector forms; Property value forms; Font properties. List properties; Color; Alignment of text; The box model; Background images; Theand<div>tags.					
JavaScript: Overview of JavaScript; Syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Arrays; Functions; Pattern matching using regular expressions.					
MODULE – 3				11Hrs	
JavaScript and HTML Documents: The JavaScript execution environment; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The navigator object.					
Dynamic Documents with JavaScript: Introduction to dynamic documents; Element positioning; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor.					
MODULE – 4				11 Hrs	
PHP: Origins and uses of PHP; Overview of PHP; General syntactic characteristics; Primitives, operations and expressions; Output; Control statements; Arrays; Functions; Pattern matching.					
Database Access :Form handling; Database Access using PHP and MySQL, Cookies; Session tracking;					
Pre-requisite (If any)					
Text Books					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Programming the World Wide Web	Robert W. Sebesta	8th Edition,	Pearson Education	2014
Reference Books:					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Internet and World Wide Web How to program	Deitel H.M. and Deitel P.J.	4th Edition.	Pearson International	2012
2.	Fundamentals of Web Development	Randy Connolly, Ricardo Hoar	-	Pearson	2015
3.	Internet Technology and Web Design	ISRD Group	-	Tata McGraw Hill	2011

				Publishing Ltd,	
EBOOKS/MOOC:					
1. https://www.mooc-list.com/course/programming-and-web-beginners-coursera					
2. https://archive.nptel.ac.in/courses/106/105/106105084/					
3. https://www.coursera.org/specializations/web-design					
4. http://www.w3c.org					
Online Courses and Video Lectures:					
1. https://www.mooc-list.com/course/programming-and-web-beginners-coursera					
2. https://archive.nptel.ac.in/courses/106/105/106105084/					
3. https://www.coursera.org/specializations/web-design					
4. http://www.w3c.org					
Teaching -Learning– Evaluation Scheme:					
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks	Hours/ Semester
6.	Class Room Teaching & Learning		3	14	42
7.	Student Study Hours – Self Learning		1	14	14
8.	Activity Based Learning (ABL1 & ABL2)		-	-	28
9.	Evaluation of Learning Process				06
Total Learning Hours / Semester					90
Proposed Assessment Plan (for 50 marks of CIE):					
Tool	Remarks				Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks			10
	CIE2	Conduction for 20 marks & reduced to 10 marks			10
	CIE3	Conduction for 20 marks & reduced to 10 marks			10
Activity Details	Activity	Group based activity to create web application.			20
Total Marks					90
Self-Learning(14 hours)					
- Personal Portfolio Website - Online Quiz Application - To-Do List using JavaScript - Student Registration Portal - Weather Information Website using REST API					
Activity Based Learning (28 hours)					
- Develop a Personal Portfolio Website using HTML5, CSS3, and responsive design techniques. - Design and Validate an Online Registration Form with HTML forms, CSS styling, and JavaScript validation. - Build a Simple E-Commerce Website Prototype with product pages, shopping cart interface, and responsive navigation.					
Evaluation of Learning Process					
Type of Evaluation					Hours
CIE (1, 2 and 3)					3
Activity					
Semester End Exam					3
Total					06

Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	2	-	3	-	-	-	-	-	-	-	-
CO4	-	-	2	-	3	2	-	2	2	-	-	-	-

Course Title		APPLICATION DEVELOPMENT LABORATORY		
Course Code	24CS607A	(L-T-P) C	(0-0-2) 1	
Exam Hrs.	3	Hours/Week	2	
CIE	50 Marks	Total Hours	28P+2EV = 30	
SEE	50 Marks			
Course Objective: Design and develop apps for android devices.				
Course Outcomes (COs): Upon completion of the course, students shall be able to				
#	Course Outcomes		Mapping to POs	Mapping to PSOs
1.	Develop simple applications, using built-in widgets and components of android studio.		3, 5, 11	1, 2
2.	Document and present the apps designed.		8, 9, 11	1
Course Contents:				
1. Develop an android application which accepts the SGPA of all the six semesters and displays your CGPA.				
2. Develop an android application to login into a system which is redirected to the Home screen.				
The login should be successful on email: admin@example.com password: rtWi2p_10 If the email/password is invalid display a Toast with an error message				
3. Assume you are accepting employee details: Name, Designation, Salary, Phone number. Develop app that displays an alert message if phone number entered is more than 10 digits.				
4. Design an app that displays the names of all planets in our universe. Clicking on “Solar System” in first activity should display all the planet’s names in second activity and it should return the total number of planets to first activity.				
5. Develop a QUIZ app that displays a question with four answers as options. Clicking an option should display whether the selected option is right or wrong.				
6. Assume you need to accept order online for fast food items. Design an app such that it accepts the order for multiple items and displays the total amount to be paid on placing the order.				
7. Design an app to display menu options on clicking a button “FILE”. The menu options are: New, Open, Save, Save as, And Print. Clicking on any option should display the relevant information.				
8. Design an app to accept your name, roll number and branch programmatically.				
9. Develop an android application to list all the engineering branches of MCE and displays a brief information of any department which the user clicks on in a separate page.				
10. Consider a scenario where you need to send an email to multiple users. Design an app to implement the same.				
11. Develop an android application to display a gallery view (Grid View) of at least 10 images.				
12. Develop an android application to render the text data into Text View from the remote server. Show progress bar when the data is loading or Toast message if data fails to load.				
Teaching -Learning– Evaluation Scheme:				
Sl. No	Teaching and Learning Method		No. of Hours/ Week	No. of Weeks
1.	Class Room Teaching & Learning		2	14
2.	Evaluation of Learning Process			2
Total Learning Hours / Semester				30
Proposed Assessment Plan (for 50 marks of CIE):				
Tool	Remarks			Marks
CIE	CIE1	Lab CIE		20
	CIE2	Report		10
Activity Details	Activity	Design an app for a given scenario		20
Total Marks				50
Evaluation of Learning Process				
Conducting Lab CIE for the listed program				
Course Articulation matrix				

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	3	2	2
CO2	-	-	-	-	-	-	-	3	3	-	3	2	-

Course Title		GENERATIVE AI TOOLS											
Course Code		24CS607B						(L-T-P) C				(0-0-2) 1	
Exam Hrs.		3						Hours/Week				2	
CIE		50 Marks						Total Hours				28P+2EV = 30	
SEE		50 Marks											
Course Objective: To gain knowledge of Generative AI Tools													
Course Outcomes (COs): Upon completion of the course, students shall be able to													
#	Course Outcomes							Mapping to POs		Mapping to PSOs			
1.	Apply the Generative AI tools to ease everyday tasks							1, 5					
2.	work effectively in collaborative teams, utilizing modern engineering tools, and delivering inclusive technical presentations							8, 9,10,11					
Course Contents:													
1. Write precise prompts to extract key statistical summaries, identify anomalous data points, and generate a clean Pandas data frame script to visualize the underlying distributions													
2. Generate a multi-card presentation layout using Gamma AI to present a comprehensive, structured overview of a cloud computing seminar topic.													
3. Create a sequence diagram using Mermaid.js that maps the end-to-end communication flow of a distributed Microservices-based Order Processing System.													
4. Upload a raw dataset in CSV format to Julius AI to perform automated data cleaning, execute an exploratory statistical analysis, and generate corresponding visualization charts using plain English prompts.													
5. Use Perplexity AI to conduct an in-depth, real-time technical exploration of a newly released machine learning library, extracting its installation protocols, core API methods, and verifiable source citations.													
6. Conduct a target literature review using Consensus AI to analyze the application of Convolutional Neural Networks (CNNs) in plant disease detection.													
7. Formulate a structured text prompt for v0 by Vercel to generate a responsive, dark-themed Student Hackathon Dashboard.													
8. Use Lovable AI to build and deploy a full-stack CRUD application by connecting a custom frontend dashboard to a live Supa base database backend using natural language prompts.													
9. Upload a set of technical documents to Notebook LM to generate a summarized project overview and an interactive study guide.													
10. Use Notebook LM to convert a set of lecture notes and textbook chapters into an automated audio briefing and an interactive revision quiz													
Teaching -Learning– Evaluation Scheme:													
Sl. No	Teaching and Learning Method						No. of Hours/ Week		No. of Weeks		Hours/ Semester		
3.	Class Room Teaching & Learning						2		14		28		
4.	Evaluation of Learning Process										2		
Total Learning Hours / Semester										30			
Proposed Assessment Plan (for 50 marks of CIE):													
Tool		Remarks										Marks	
CIE	CIE1	Lab CIE										20	
	CIE2	Report										10	
Activity Details	Activity	Design an solution for real world problem										20	
Total Marks										50			
Evaluation of Learning Process													
Conducting Lab CIE for the listed program													
Course Articulation matrix													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	-	-

Course Title	AUTOMATED SOFTWARE TESTING		
Course Code	24CS607C	(L-T-P) C	(0-0-2) 1
Exam Hrs.	3	Hours/Week	2
CIE	50 Marks	Total Hours	28P+2EV = 30
SEE	50 Marks		
Course Objective: To design and execute automated tests using Selenium for effective web application testing.			
Course Outcomes (COs): Upon completion of the course, students shall be able to			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Apply automated testing tools to validate software functionality in real-world scenarios.	1, 2	2
2.	Design and execute automated test cases for web applications and APIs using appropriate testing techniques.	3, 5	2
3.	Implement data-driven, cross-browser, and functional testing strategies to ensure software quality and reliability	9, 10, 11	1, 2
Course Contents:			
1. A college portal allows students to log in using a username and password. Task - Automate the login page, Verify successful login with valid credentials, Verify error messages for invalid credentials. Tool - Selenium WebDriver Expected Outcome - Automated validation of login functionality. 2. Students register for courses through an online portal. Task - Automate course registration, Validate mandatory fields, Verify successful registration message. Tool - Selenium WebDriver + TestNG Expected Outcome - Automated testing of registration workflow. 3. Customers search for products in an online shopping application. Task - Search for products using keywords, Verify search results, Validate no-result scenarios. Tool - Selenium WebDriver Expected Outcome - Automated search functionality testing. 4. A customer adds products to a shopping cart. Task - Add multiple products, Verify cart count and total amount, Remove a product and verify updates. Tool - Selenium WebDriver Expected Outcome - Validation of shopping cart operations. 5. Employees apply for leave through a web portal. Task - Automate leave application submission, Validate date fields, Verify leave request confirmation. Tool - Selenium + JUnit Expected Outcome - Automated testing of leave request workflow. 6. A banking application supports multiple users. Task - Read usernames and passwords from Excel, Execute login tests for multiple datasets, Generate pass/fail results. Tool - Selenium + Apache POI Expected Outcome - Implementation of data-driven testing. 7. A customer transfers funds between accounts. Task - Automate fund transfer, Verify account balance updates, Validate transaction success message. Tool - Selenium + TestNG Expected Outcome - Automated business transaction testing. 8. A Student Management System exposes REST APIs. Task - Test GET API for retrieving student records, Test POST API for adding a new student, Validate response status and JSON data. Tool - Postman / REST Assured Expected Outcome - Automated API testing. 9. A university portal should function correctly across browsers. Task - Execute the same test cases on Chrome, Firefox, and Edge, Compare execution results. Tool - Selenium WebDriver			

Expected Outcome - Validation of browser compatibility.														
10. A software company wants automated tests to run whenever code changes are pushed to the repository.														
Task - Configure Jenkins/GitHub Actions, Execute automated test suites, Generate execution reports.														
Tool - Jenkins + Selenium + TestNG														
Expected Outcome - Integration of automated testing into a CI/CD pipeline.														
Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method							No. of Hours/ Week		No. of Weeks		Hours/ Semester		
1.	Class Room Teaching & Learning							2		14		28		
2.	Evaluation of Learning Process							-		-		2		
Total Learning Hours / Semester												30		
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks										Marks		
CIE		CIE1	Lab CIE										20	
		CIE2	Report										10	
Activity Details		Activity	Design an solution for real world problem										20	
Total Marks												50		
Evaluation of Learning Process														
Conducting Lab CIE for the listed program														
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	
CO2	-	-	3	-	3	-	-	-	-	-	-	-	2	
CO3	-	-	-	-	-	-	-	-	2	2	2	2	2	

Course Title		DEVOPS			
Course Code	24CS607D	(L-T-P) C	(0-0-2) 1		
Exam Hrs.	3	Hours/Week	2		
CIE	50 Marks	Total Hours	28P+2EV = 30		
SEE	50 Marks				
Course Objective: To introduce the fundamental concepts, practices, and cultural philosophy of DevOps, emphasizing collaboration between development and operations teams.					
Course outcomes (Course Skill Set): Upon completion of the course, students shall be able to:					
#	Course Outcomes		Mapping to POs	Mapping to PSOs	
1.	Apply build tool to manage Java applications using Maven and Gradle.		1	1	
2.	Analyze Maven and Gradle build tools and their significance in modern software development for project build automation.		2,5	1	
Course Contents:					
1.	Demonstration: Introduction to Maven and Gradle: Overview of Build Automation Tools, Key Differences Between Maven and Gradle, Installation and Setup. Working with Maven: Creating a Maven Project, Understanding the POM File, Dependency Management and Plugins. Working with Gradle: Setting Up a Gradle Project, Understanding Build Scripts (Groovy and Kotlin DSL), Dependency Management and Task Automation				
	Practical Exercise: Build and Run a Java Application with Maven, Migrate the Same Application to Gradle				
2.	Demonstration: Introduction to Jenkins: Practical Exercise and Wrap-Up: Build and Deploy a Complete DevOps Pipeline, Discussion on Best Practices and Q&A Continuous Integration with Jenkins: Setting Up a CI Pipeline, Integrating Jenkins with Maven/Gradle, Running Automated Builds and Tests Configuration Management with Ansible: Basics of Ansible: Inventory, Playbooks, and Modules, Automating Server Configurations with Playbooks, Hands-On: Writing and Running a Basic Playbook				
	Practical Exercise: Set Up a Jenkins CI Pipeline for a Maven Project, Use Ansible to Deploy Artifacts Generated by Jenkins				
3.	Demonstration: Introduction to Azure DevOps: Overview of Azure DevOps Services, Setting Up an Azure DevOps Account and Project Creating Build Pipelines: Building a Maven/Gradle Project with Azure Pipelines, Integrating Code Repositories (e.g., GitHub, Azure Repos), Running Unit Tests and Generating Reports Creating Release Pipelines: Deploying Applications to Azure App Services, Managing Secrets and Configuration with Azure Key Vault, Hands-On: Continuous Deployment with Azure Pipelines				
	Practical Exercise and Wrap-Up: Build and Deploy a Complete DevOps Pipeline, Discussion on Best Practices and Q&A				
Course outcomes (Course Skill Set): At the end of the course the student will be able to: - Demonstrate different actions performed through Version control tools like Git. - Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle. - Experiment with configuration management using Ansible. - Demonstrate Cloud-based DevOps tools using Azure DevOps.					
Pre-requisite (If any)					
Textbooks					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	DevOps for Beginners	Jospeh Joyner	-	Tech Tron	2015

EBOOKS/MOOC:														
NPTEL – “Cloud Computing and DevOps”														
Online Resources and Video Lectures:														
Suggested Learning Resources: • https://www.geeksforgeeks.org/devops-tutorial/ • https://www.javatpoint.com/devops • https://www.youtube.com/watch?v=2N-59wUIPVI • https://www.youtube.com/watch?v=87ZqwoFeO88														
Proposed Assessment Plan (for 50 marks of CIE):														
Tool		Remarks										Marks		
CIE		CIE1	Conduction of CIE										30	
Activity Details		Activity 1	Project Based Learning										20	
Total Marks												50		
Teaching -Learning– Evaluation Scheme:														
Sl. No	Teaching and Learning Method							No. of Hours/ Week	No. of Weeks			Hours/ Semester		
1.	Classroom Teaching & Learning							2	14			28		
2.	Integrated Lab Component							-	-			-		
3.	Student Study Hours – Self Learning							-	-			-		
4.	Activity Based Learning (ABL1 & ABL2)							-	-			-		
5.	Evaluation of Learning Process							-	-			2		
Total Learning Hours / Semester												30		
Evaluation of Learning Process														
Type of Evaluation												Hours		
Test (1, 2 and 3)												2		
Semester End Exam												3		
Total												5		
Course Articulation matrix														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	
CO2	-	3	-	-	3	-	-	-	-	-	-	3	-	