Malnad college of Engineering

Scheme of Teaching and Examinations 2022-23

Outcome-Based Education (OBE)and Choice Based Credit System (CBCS) (Effective from the academic year 2022-23)

I Semester			**PHYSICS CYCLE**					**STREAMS: Civil, Mech, and Electrical**			
Sl. No	**Course Code**	**Course Title**		**Teaching Hours/Week**			**Examination**			**Credits**
			TD/PSB	**Theory Lecture**	**Tutorial**	**Practical/ Drawing**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	**T**	**P**				
1	22MATC11/ 22MATM11/ 22MATE11	Mathematics for CV/ME/EC Stream	Maths	2	2	2	30(Th)+20(Lb)	50	100	04
2	22PHYC12/ 22PHYM12/ 22PHYE12	Physics for CV/ME/EC stream	Phy	2	2	2	30(Th)+20(Lb)	50	100	04
3	22CIV13/ 22EME13/ 22BEE13 /22EEE13	Engg. Mechanics/ Elements of Mech. Engg./Basic Electronics/ Elements of Electrical Engg.	CV/ME/ EC/EEE	2	2	0	50	50	100	03
4	22ESC14x	Engineering Science Course-I	Respective Dept	3	0	0	50	50	100	03
5	22ETC15x	Emerging Technology Course	Any Dept	3	0	0	50	50	100	03
6	22ENG16	Communicative English	Humanities	1	0	0	50	50	100	01
7	22KSK17/ 22KBK17	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	50	50	100	01
8	22IDT18	Innovation and Design Thinking	PHYSICS (Coordinating Dept)	0	0	2	50	50	100	01
		TOTAL					**400**	**400**	**800**	**20**

ASC-Applied Science Course, **ESC**- Engineering Science Courses, **AEC**- Ability Enhancement Course, **HSMC**-Humanity and Social Science and management Course, **AEC**- Ability Enhancement Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **ETC**- Emerging Technology Course, **TD/PSB**- Teaching Department / Paper Setting Board, **SDA**-Skill Development Activities, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **Th**-Theory and **Lb**-Laboratory.

Malnad college of Engineering

Scheme of Teaching and Examinations 2022-23

Outcome-Based Education (OBE)and Choice Based Credit System (CBCS) (Effective from the academic year 2022-23)

I semester			**CHEMISTRY CYCLE**					**STREAMS: Computer Science**		
Sl. No	**Course Code**	**Course Title**	**TD/PSB**	**Teaching Hours/Week**			**Examination**			**Credits**
				Theory Lecture	**Tutorial**	**Practical/ Drawing**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	**T**	**P**				
1	22MATS11	Mathematics for CSE Stream	Maths	2	2	2	30(Th)+20(Lb)	50	100	04
2	22CHES12	Chemistry for CSE Stream	PHY	2	2	2	30(Th)+20(Lb)	50	100	04
3	22CED13	Computer-Aided Engineering Drawing	Civil/ME	2	0	2	50	50	100	03
4	22ESC14x	Engineering Science Course-I	Respective Engg. dept	3	0	0	50	50	100	03
5	22PLC15x	Programming Language Course	Any dept	3	0	0	30(Th)+20(Lb)	50	100	03
6	22ENG16	Communicative English	Humanities	1	0	0	50	50	100	01
7	22ICO17	Indian Constitution	Humanities	1	0	0	50	50	100	01
8	22SFH18	Scientific Foundations of Health	SPORTS	1	0	0	50	50	100	01
		TOTAL					**400**	**400**	**800**	**20**

ASC-Applied Science Course, **ESC**- Engineering Science Courses, **AEC**- Ability Enhancement Course, **HSMC**-Humanity and Social Science and management Course, **AEC**- Ability Enhancement Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **ETC**- Emerging Technology Course, **TD/PSB**- Teaching Department / Paper Setting Board, **SDA**-Skill Development Activities, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **Th**-Theory and **Lb**-Laboratory.

Malnad college of Engineering

Scheme of Teaching and Examinations 2022-23

Outcome-Based Education (OBE)and Choice Based Credit System (CBCS) (Effective from the academic year 2022-23)

II Semester			**PHYSICS CYCLE**					**STREAMS: Computer Science**			
Sl. No	**Course Code**	**Course Title**		**Teaching Hours/Week**			**Examination**			**Credits**
			TD/PSB	**Theory Lecture**	**Tutorial**	**Practical/ Drawing**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	**T**	**P**				
1	22MATS21	Mathematics for CS Stream-II	Maths	2	2	2	30(Th)+20(Lb)	50	100	04
2	22PHYS22	Physics for CS stream	Phy	2	2	2	30(Th)+20(Lb)	50	100	04
3	22PPC23	Principles of Programming Using C	CS	2	0	2	30(Th)+20(Lb)	50	100	03
4	22ESC24x	Engineering Science Course-II	Respective Dept	3	0	0	50	50	100	03
5	22ETC25x	Emerging Technology Course-II	Any Dept	3	0	0	50	50	100	03
6	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	50	50	100	01
7	22KSK27/ 22KBK27	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	50	50	100	01
8	22IDT28	Innovation and Design Thinking	PHYSICS (Coordinating Dept)	0	0	2	50	50	100	01
		TOTAL					**400**	**400**	**800**	**20**

ASC-Applied Science Course, **ESC**- Engineering Science Courses, **AEC**- Ability Enhancement Course, **HSMC**-Humanity and Social Science and management Course, **AEC**- Ability Enhancement Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **ETC**- Emerging Technology Course, **TD/PSB**- Teaching Department / Paper Setting Board, **SDA**-Skill Development Activities, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **Th**-Theory and **Lb**-Laboratory.

Malnad college of Engineering

Scheme of Teaching and Examinations 2022-23

Outcome-Based Education (OBE)and Choice Based Credit System (CBCS) (Effective from the academic year 2022-23)

II semester			**CHEMISTRY CYCLE**					**STREAMS: Civil, Mech, and Electrical**		
Sl. No	**Course Code**	**Course Title**	**TD/PSB**	**Teaching Hours/Week**			**Examination**			**Credits**
				Theory Lecture	**Tutorial**	**Practical/ Drawing**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	**T**	**P**				
1	22MATC21// 22MATM21/ 22MATE21	Mathematics for CV/ME/EE Stream-II	Maths	2	2	2	30(Th)+20(Lb)	50	100	04
2	22CHEC22/22CHEM22/22CHEE22	Chemistry for CV/ME/EE Stream	PHY	2	2	2	30(Th)+20(Lb)	50	100	04
3	22CED23	Computer-Aided Engineering Drawing	Civil/ME	2	0	2	50	50	100	03
4	22ESC24x	Engineering Science Course-II	Respective Engg. dept	3	0	0	50	50	100	03
5	22PLC25x	Programming Language Course	Any dept	3	0	0	30(Th)+20(Lb)	50	100	03
6	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	50	50	100	01
7	22ICO27	Indian Constitution	Humanities	1	0	0	50	50	100	01
8	22SFH28	Scientific Foundations of Health	SPORTS	1	0	0	50	50	100	01
		TOTAL					**400**	**400**	**800**	**20**

ASC-Applied Science Course, **ESC**- Engineering Science Courses, **AEC**- Ability Enhancement Course, **HSMC**-Humanity and Social Science and management Course, **AEC**- Ability Enhancement Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **ETC**- Emerging Technology Course, **TD/PSB**- Teaching Department / Paper Setting Board, **SDA**-Skill Development Activities, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **Th**-Theory and **Lb**-Laboratory.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Engineering Science Courses (ESC)

(ESC-I) Engineering Science Courses-I				
Code	**Title**	**L**	**T**	**P**
22ESC141	Introduction to Civil Engineering	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0
22ESC145	Introduction to C Programming	2	0	2

1.Introduction to Civil Engineering

Course Title	**INTRODUCTION TO CIVIL ENGINEERING**		
Course Code	22CIV141/241	**(L-T-P)C**	(2-1-0)1
SEE duration	3 hour	**Hours / Week**	04
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	50

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.	Compute the resultant of a force system and resolution of a force	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.	Analyse the frictional resistance offered by different planes and locate the centroid.	1,2
4.	Comprehend the importance of Transportation Engineering	1,2

Course Contents:

MODULE –1	12 Hrs.

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	12 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 wastemanagement, identification of Landfill sites, urban flood control

Built-environment:

Energy efficient buildings, recycling, Temperature and Sound control inbuildings, Security systems; Smart buildings.

MODULE –3	12 Hrs.

Analysis of force systems:

Concept of idealization, system of forces, principles of superposition 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

Centroid:

Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples

MODULE – 4	**14 hrs.**

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.

Concept of Green Construction, Carbon credits, recycled materials, Sustainable Construciton.

Text Books :

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 Books:

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

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

2.Introduction to Electrical Engineering

Course Title	**Introduction to Electrical Engineering**		
Course Code	22ESC142	**(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 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

Course Contents:

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.

Self-learning topics: 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-C circuits, phasor diagrams. 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.

Self-learning topics: 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 analog meters, digital multimeter and digital voltmeter.

Electrical Machines: Specifications of machines, classification of machines, DC machines - 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.

Self-learning topics: Digital/smart energy meter, Brushless DC Motors and their application

MODULE – 4	**10 hrs.**

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 Slip ring motors) Principle of operation and Constructional features, Slip and its significance, Single-phase induction motors, working principle, classification and applications.

Self-Learning topics: Applications of transformers and induction motors, types of electric motors used in Electric Vehicles.

Text Books :

1. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice-Hall of India Pvt. Ltd., ISBN: 81-203-2729-2, 2005.

Reference Books:

1. D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill, 2nd edition, 2019

2. E. Hughes, Electrical and Electronics Technology, Pearson 2010
3. D.P. Kothari, I.J. Nagrath, *Basic Electrical Engineering*, McGraw Hill Education, 4th Ed., 2019

3.Introduction to Electronics Engineering

Course Title	**Introduction to Electronics Engineering**		
Course Code	22ESC113/213	**(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 basic gate and its function.	1, 5, 9
4.	Apply the knowledge of Embedded system and basic communication system.	1,2

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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 multipliers.

Amplifiers – CE amplifier with and without feedback, multi-stage amplifier; BJT as a switch: Cut-off and saturation modes, BJT Biasing: Introduction, DC Load line and Bias point -Self bias, fixed bias. (Text 1)

MODULE –2	10 Hrs.

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Colpitt's and Hartley oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)

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)

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/subtractors-Half adder/Subtractor, Full adder/subtractor. (Text 2:4.1,4.2, 4.3).

MODULE – 4	10 hrs.

Embedded Systems–Definition, Embedded systems vs general computing systems, Classificationof Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC**.** (Text 1).

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,Concept of Radio wave propagation (Ground, space, sky).

Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK. (Text 3).

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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.

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 half subtractor circuit.
6. Realization of full subtractor circuit.
7. Realization of Integrator.
8. 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',4 thEdition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980.

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.Introduction to Mechanical Engineering

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Course Title	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code	**22ESC 144/244**	**(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.

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, Hydroelectric, 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:

1. 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.

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. Robotics, Appuu Kuttan K K. International Pvt. Ltd, volume 1
5. Introduction to Mechatronics, Appuu Kuttan K K, Oxford University Press, 2007.

5. Introduction to C Programming

INTRODUCTION TO C PROGRAMMING				
Course Code	: 22ECS145		**L-T-P-C**	: 2-0-2-3
SEE Hours	: 03		**Hours / Week**	: 04
CIE(Theory) Marks	: 30		**CIE (Practicals) Marks**	: 20
SEE	: 50 Marks		**Total hours**	: 40
Course Objective :	To provide fundamental programming concepts which are essential to develop program for a given problem.			
Course Outcomes (COs) :	Upon Completion of the course, students shall be able to:			

COs	**Statement**	**POs**
1.	Describe the concepts of C programming	PO1
2.	Apply C programming constructs to solve a given problem	PO1, PO2
3.	Analyze the given program to determine the output and its correctness	PO1, PO2
4.	Develop programs to find a solution for the given real world problems	PO1, PO2, PO9, PO10

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**

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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, Passing arrays to functions, Passing strings to functions. **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, 8th 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

Practice Programs	
1.	a. Write a C program to read length of the sides of a triangle and find its area. b. Write a C program to read radius of a circle and find its area and circumference
2.	An employee gets DA 90% of basic salary; HRA 15% of basic salary, CA 5% of basic salary. And also employee has to pay income tax of 10% of gross salary (Grass salary= Basic Salary+ DA+HRA+CA). Write a C program to read the basic salary of an employee and find the take home salary of the employee. (Take home salary =gross salary – income tax)
3.	Heights of three students in a class are h1, h2 and h3. Write a C program to find the tallest among three students using nested if else statement.
4.	Read first name, middle name and last name of a person. Write a C program to concatenate first name with middle name without using built in function. And concatenate the resultant string with last name using built in function.
Guided Laboratory Experiments	
1.	Quadratic equation is given by $ax^2+bx+c=0$, where a, b and c are the c~~oefficient~~s provided where $a\neq0$.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: 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 Write a C program to read the customer number, power consumed and display the amount to be paid by the customer.
4.	Sine series is given by $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$ 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, acitvity1 and activity2.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Emerging Technology Courses (ETC)

(ETC) Emerging Technology Courses				
Code	**Title**	**L**	**T**	**P**
22ETC15A	Smart Materials and Systems	3	0	0
22ETC15B	Green Buildings	3	0	0
22ETC15C	Introduction to Nano Technology	3	0	0
22ETC15D	Introduction to Sustainable Engineering	3	0	0
22ETC15E	Renewable Energy Sources	3	0	0
22ETC15F	Waste Management	3	0	0
22ETC15G	Emerging Applications of Biosensors	3	0	0
22ETC15H	Introduction to Internet of Things (IOT)	3	0	0
22ETC15I	Introduction to Cyber Security	3	0	0
22ETC15J	Introduction to Electric Vehicle Technology	3	0	0
22ETC15K	Introduction to Embedded System	3	0	0

1. Smart Materials and Systems

Exam hours: 03	**Hours/week: 03**
SEE: 50 Marks	**Total hours: 40**

Course Objective:

To know the fundamentals of various smart materials, the process of their synthesis and their applications.

Upon successful completion of this course, the student shall be able to:

COs	Statement	POs
1.	learn the fundamentals of emerging materials	1, 7, 12
2.	define the properties of prefabricated materials and optic fibers	1, 2
3.	demonstrate the use of smart materials in engineering applications	1,3
4.	analyze BIM fundamentals and develop a 3-D model	1, 6, 7

Module – 1 (10 Hours)
Emerging Materials: Honey comb structure (Carbon composites), Nano-materials, engineering polymers, emerging sustainable by products (Fly ash and GGBS), Composite materials, types, synthesis methods, properties and applications.
Module – 2 (10 Hours)

Engineering Components: Definition, types of prefabricated/ manufactured components for engineering applications, desirable properties and manufacturing techniques, fundamentals of Shape Memory Alloys, Characteristics and Applications, Fiber Optics, Twisted and Braided Fibre Optics, Applications of Fiber Optics
Module – 3 (10 Hours) **Smart Materials and MEMS:**Definition, Principles of Piezo-electricity, Materials (Polymers and Ceramics), Sensors (Piezo-electric sensor, strain gauge, shear sensor, in-plane and out of plane sensor, accelerometer), **MEMS:** History of MEMS, Intrinsic Characteristics, Devices: Sensors and Actuators, Microfabrication: Photolithography, Thermal oxidation, Thin film deposition, etching types, Doping, Dicing, Bonding.
Module – 4 (10 Hours) **BIM and 3D Printing:** BIM, Definition, Characteristics, Necessity, Advantages, **3D Printing**, Importance, Historic development, advantages, common terminologies, classification, process chain, 3D printing procedure, Applications, Case Studies on application of 3D printing.

Textbooks:

1. Donald R. Askeland and Pradeep P. Fulay, Essentials of Materials Science and Engineering, 2009, Cengage Laerning
2. Ian Gibson, David Rosen, Brent Stucker, Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2015, Springer Nature, 2nd Edition, ISBN-10: 1493921126.
3. Stefan Mordue, Paul Swaddle, David Philp, Building Information Modeling**,** 2015, For Dummies, 1st Edition, ISBN-10: 9781119060055.

2. Green Buildings

3. Introduction to Nano Technology

Course Title	**Introduction to Nanotechnology**		
Course Code	22ETC15C	**(L-T-P)C**	(3-0-0)3
SEE duration	3 hour	**Class Hours / Week**	03
CIE (Theory) marks	30	**Activity marks**	20
SEE marks	50	**Total class hours**	40
Course Objective: Objective of the course is to make the students learn basic principles of nanoscience and application of as derived understanding in advanced nanotechnology. **Course Outcomes (COs):** Upon completion of the course, students shall be able to			

Sl. No.	Course outcomes	Mapping to POs
1.	Interpret the basic interdisciplinary nature of nanotechnology.	1
2.	Illustrate the synthesis and characterization methods of nanomaterial.	1
3.	Discuss the properties and applications of nanotechnology.	1

Course Contents:

MODULE –1	10 Hrs.

Introduction

Origin of nanotechnology, types of nanomaterials (including free stand and substrate supported), properties of nanomaterials, nanoparticles and quantum confinement – 0D, 1D & 2D. Influence of size on properties and their characterization of materials.

MODULE –2	8 Hrs.

Synthesis of Nanomaterials

Synthesis approaches; Bottom-up and top-down.

Physical methods: vacuum evaporation, sputtering techniques (DC, RF, thermal evaporation). **Chemical methods:** Electroplating, spray pyrolysis, chemical vapour deposition (CVD), sol-gel process: screen printing, solution based techniques, hydrothermal method.

MODULE –3	10 Hrs.

Characterizations

UV-Visible spectroscopy, Fourier Transform infrared spectroscopy (FTIR), X-Ray Diffraction (XRD). **Microscopy:** Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM).

MODULE – 4	10 hrs.

Applications of nanomaterials and nanotechnolgy

Advantage of nanotechnology, application of nanomaterials and nanotechnology in LED, Solar cell, Transistors, quantum computing, medical devices, MEMS, NEMS, etc.

Text Books :

1. **Nano: The Essentials: Understanding Nanoscience and Nanotecnology**, T. Pradeep, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

2. **Nanoscale Science and Technology**, Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan, John Wiley & Sons, Ltd., UK, 2005.

Reference Books:

1 **Introduction to Nanotechnology**, Charles P. Poole Jr and Frank J. Owens, Wiley Interscience, 2003.

2. **Principles of Nanotechnology,** Phanikumar (Scitech Publications, Chennai).

4.Introduction to Sustainable Engineering

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Course Title	INTRODUCTION TO SUSTAINABLE ENGINEERING		
Course Code	**22ETC15D**	**(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 students to the ideas of sustainability and provide knowledge of the guiding principles and framework for sustainable 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.	Elucidate the foundations of sustainable development and its application to engineering.	1,7
2.	Application of Sustainable Engineering Concepts and Principles in Engineering	1,7
3.	Apply the principles and procedures of the Life Cycle Assessment Tool to the design of engineering systems.	3,7
4.	Recognize ways to include sustainability into Engineering Design	3,7

Course Contents:

MODULE –1	10 Hrs.

Sustainable Development and Role of Engineers: Introduction, The SDGs, Paris Agreement, and Role of Engineering, Sustainable Development and the Engineering Profession.

Concepts for Sustainable Engineering: The Goals of sustainability, Systems Thinking, Life Cycle thinking, The Circular Economy, Industrial Ecology, Green Economy and Low-Carbon Economy, The Natural Step, Resources Efficiency and Decoupling, Eco-efficiency, Triple Bottom line.

Self-study:

Case Study on Adapting cooking technology powered by recycled materials

Activity:

Search the internet for an example of a major collapse of a culture in the past due to unsustainable behavior.

MODULE –2	**10 Hrs.**
Sustainable Engineering Principles and Frameworks: Guiding Principles for Sustainable Engineering, Sustainability framework for engineering, Sustainable Consumption and Production (SCP) framework, Lifecycle Engineering framework. **Tools for Sustainability Assessment and Introduction to Life Cycle Assessment (LCA):**Introduction, Environmental Management system, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental Assessment, Life Cycle Management, Design for Sustainability, LCA Goal and Scope definition, Life cycle Inventory, Strengths and Limitations of LCA.	
Self-study: Case study on Conserving Materials for the next mobility revolution, JG Afrika's operational Materials management plan for Hotel Verde, South Africa. **Activity:** Choose a common household appliance such as a refrigerator, TV set, an air conditioner, or a washing machine and describe its life stages, including who is primarily responsible for the environmental concerns at each stage.	
MODULE –3	**10 Hrs.**
Life Cycle Assessment Applications in Engineering: Environment Product Declaration and Product Category Rules, Carbon and Water Foot printing, Energy systems, Buildings and Build Environment, Drinking Water Supply and Wastewater Treatment, Solid Waste Management, Chemicals and Chemical Production, Automotive Industry, Food and Agriculture, Electronics and Information and Communication Technologies(ICT).	
Self-study: Case study for LCA for Planning of disposal of Pet Bottles in Mauritius and Sustainable product redesign at MAKSS Packaging Industries in Kampala, Uganda. **Activity:** Recognize the ways the establish a new paper mill closer to a river bank.	
MODULE – 4	**10 hrs.**
Integrating Sustainability in Engineering Design: Problems Solving in Engineering, Conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process in Building Design, Mechanical Engineering, Electronic Engineering and Electrical Engineering.	

Self-study:

Case study of Sustainable product redesign at MAKSS Packaging Industries in Kampala, Uganda.

Activity:

Provide examples of engineering designs or products from these designs that caused unintended damage to ecosystems.

TEXTBOOK:

Introduction to Sustainability for Engineers, ToolseeramRamjeawon, CRC Press, 1st Edition., 2020, ISBN – 13: 978-0-367-25445-2

REFERENCES:

. Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1stEdn, 2015
. System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1stEdn., 2010
. Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, First Edition, 2021
. Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., Second Edition, 2016

5. Renewable Energy Sources

Course Title	**Renewable Energy Sources**		
Course Code	22ETC15E	**(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 this course is to impart knowledge of various renewable energy resources and its applications.

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 resources	1, 2
2.	Describe the operation of solar thermal systems	1,6, 7
3.	Explain the concept of wind energy system.	1, 6, 7
4.	Explain hydrogen energy, biomass, tidal and ocean energy systems	1, 6, 7

Course Contents:

MODULE –1	10 Hrs.

Energy Sources: Energy sources–renewable and non-renewable. Energy Resources and Classification, Renewable Energy – Worldwide Renewable Energy Availability, Renewable Energy in India.

Energy from Sun: Measurement of solar radiation, schematic diagrams, and principle of working. Solar Radiation Geometry: latitude, declination angle, hour angle etc.

MODULE –2	10 Hrs.

Solar Thermal Energy Systems and Applications: Solar thermal energy storage and collection devices-Concentrating and non-concentrating collectors. Solar thermal applications - Solar Water Heating Systems, Solar Air Heating, Solar Pond.

Solar Cells: Components of Solar Cell System, Elements of Silicon Solar Cell, Solar Cell materials. Photovoltaic Conversion: Principle of working and characteristics, applications - Photovoltaic Panels, Applications of Solar Cell Systems

MODULE –3	10 Hrs.

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 Systems: Availability of wind energy in India, Wind flow-motion of wind, wind speed characteristics, basic components of a wind energy conversion system (Block diagram of

WECS), classification of WEC systems, Advantages, and disadvantages of WECS, site selection consideration.	
MODULE – 4	**10 hrs.**
Biomass Energy: Energy plantation and description of biogas plant (Batch type Floating & Fixed type), advantages and disadvantages. **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.	
Self Study: 1. Prepare a report on the world energy and energy scenario in India. 2. Prepare a report on methods to improve the harnessing of alternate energy resources.	
Text Books : 2. G.D. Rai, Non-conventional energy sources, Khana Publishers, 4th edition, 2009, ISBN: 8174090738, 9788174090737 3. S. P. Sukhatme, Solar Energy Principle of Thermal Collection and Storage, Tata McGraw Hill, 1990, ISBN 10: 0074624539	
Reference Books: 4. P.K. Nag, Solar power Engineering, TMH, 2003, ISBN: 0-07-043599-5. 5. Domkundwar, Power Plant Engineering, Dhanpath Rai& Sons, 3rd Edition, 2003, ISBN: 6700000000330 6. B.H. Khan, Nonconventional energy resources by, TMH, 3rd edition, 2015, ISBN: 13: 978-0070142763	

6. Waste Management

Course Title	**WASTE MANAGEMENT**		
Course Code	22ETC15F	**(L-T-P)C**	(3-0-0)3
CIE marks	50	**Hours / Week**	03
SEE marks	50	**Total contact hours**	40

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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.	Course outcomes	Mapping to POs
1.	Comprehend the sources, classification, characteristics and system of collection of solid waste	PO1, PO2, PO4,
2.	Learn different methods of transportation and treatment of solid waste	PO2, PO3, PO5
3.	Comprehend the various methods of air pollution control techniques and types of composting	PO3, PO4
4.	Learn different disposal methods of solid waste and hazardous waste	PO2, PO4, PO5

Course Contents:

MODULE –1	**10 Hrs.**

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	**10 Hrs.**

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 with incineration operation

MODULE –3	10 Hrs.
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. Vermicomposting	
MODULE – 4	**10 hrs.**
Sanitary Land Filling: Different types – Trench, area and Ramp Method. advantages and disadvantages, landfill gas emission, leachate formation **Hazardous waste**: classification, exposure pathways and effects **Biomedical waste**: classification, potential implication and steps in biomedical waste management	
Text Books : 1. Integrated Solid Waste Management : Tchobanoglous : Mc. Graw Hill, 1970, I Edition 2. Sasi Kumar.K, Sanoop Gopikrishna "Solid Waste Management" PHI Learning Pvt.ltd, 2009	
Reference Books: 1.Pavoni J.L "Hand book on Solid Waste Disposal" - 1973 2.Peavy and Tchobanoglous "Environmental Engineering" 1985	

7. Emerging Applications of Biosensors

8. Introduction to Internet of Things (IOT)

INTRODUCTION TO INTERNET OF THINGS

Course Code: 22ETC15H	**LTPC: 3-0-0-3**
Exam Hours : 3	Hours / Week : 3
SEE : **50 Marks**	Lecture hours : 40 hours

Course Objective:

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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:

Course Contents:

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

Module-1	**Teaching Hours**
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	**10 Hours**

Textbook 1 Chapter 12- 12.1-12.2; Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1	

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, Vechicular 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.

9. Introduction to Cyber Security

Course Title	**INTRODUCTION TO CYBER SECURITY**		
Course Code	22ETC15I	**(L-T-P)C**	(3-0-0)3
SEE duration	3 hour	**Hours / Week**	03
CIE (Theory) marks	30	**Activity marks**	20
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	1
2.	Describe Cyber offenses and Botnets	1,8

3.	Gain insight on Modern Tools and Methods used on Cybercrime	1,5
4.	Identify Phishing, Identity Theft and need of computer forensics	1,6

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. Sunit Belapure and Nina Godbole, "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=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu
2. https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4 _
3. https://www.youtube.com/watch?v=6wi5DI6du4&list=PL_uaeekrhGzJlB8XQBxU3z__hDwT95xlk
4. https://www.youtube.com/watch?v=KqSqyKwVuA8

10. Introduction to Electric Vehicle Technology

Course Title	**Introduction to Electric Vehicle Technology**		
Course Code	22ETC15J	**(L-T-P) C**	(3-0-0) 3
SEE Duration	3 Hrs.	**Hours/Week**	**3**
CIE (Theory) Marks	30	**Activity marks**	20
SEE Marks	50	**Total Hours**	40

Course objective: To enlighten students with various aspects of Electric Vehicles and Hybrid Electric Vehicles

Course outcomes: The student will be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSO's
1	Recognise and recall the history, necessity, and evolution of different type of electric vehicles	1,7	-
2	Explain EV and EHV configurations and the electric propulsion systems used in them.	1	-
3	Identify various type of sources that can be used in EV and EHV	1	-

4	Compare the electric power supply and infrastructure used with EV and EHV, distinguish different types of fuel cells used in this industry and verify their suitability.	1,7	-

MODULE-1	**10 Hrs**

Introduction to Electric Vehicles: History of Electric Vehicles (EV), Hybrid Electric Vehicles (EHV) and Fuel Cell Vehicles. Social and environmental importance of electric and hybrid electric vehicles – air pollution, global warming, impact of modern drive-trains on energy supplies.

Types of Electric Vehicles: Battery Electric Vehicles, IC Engine/Electric Hybrid Vehicle, Fuelled EVs, EVs using Supply Lines, EVs which use Flywheels or Supercapacitors, Solar-Powered Vehicles, Vehicles using Linear Motors, EVs for the Future

MODULE-2	**10 Hrs**

Configuration of EV's and EHV's: Configurations of EVs, Concept of Hybrid Electric Drive Trains, Architectures of Hybrid Electric Drive Trains - Series Hybrid Electric Drive Trains, Parallel Hybrid Electric Drive Trains and series-parallel Hybrid Electric Drive Trains

Electric Propulsion Systems: DC Motor Drives, Induction Motor Drives, Permanent Magnetic BLDC Motor Drives, PMSM Drives, SRM Drives

MODULE-3	**10 Hrs**

Sources: Batteries, Battery Parameters, Lead Acid Batteries, Nickel-Based Batteries, Sodium-Based Batteries, Lithium Batteries, Battery Charging, Battery Management System.

MODULE-4	**10 Hrs**

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

Reference Books:

1. James Larminie, John Lowry, *Electric Vehicle Technology Explained*, John Wiley & Sons Ltd, 2nd ed.,2012.
2. John G. Hayes, G. Abas Goodarzi, *Electric Powertrain: Energy Systems, 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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

11. Introduction to Embedded System

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Title	**Introduction to Embedded System**		
Course Code	22ETC15K	**(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 make students familiar with the basic concepts and terminology of the Embedded systems design flow, architecture, and applications.

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

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Discuss the requirements for designing embedded systems using microprocessor/microcontrollers, and the fundamentals of ARM processor and its architecture.	1
2.	Illustrate how the memory, peripheral components and buses interact in an embedded system	1
3.	Analyse the selection of microcontroller for different domain specific applications of embedded systems	1,2
4.	Apply the basic knowledge to demonstrate microcontroller based applications.	1,5,9

Course Contents:

MODULE –1	**10 Hrs.**

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems. **Characteristics and Quality Attributes of Embedded Systems**.

MODULE –2	**10 Hrs.**

The Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, Commercial Off-The-Shelf Components (COTS) Memory: ROM, RAM, Memory according to the type of Interface, Memory shadowing, Memory selection for Embedded Systems.

MODULE –3	**10 Hrs.**

Typical Embedded System: Sensors and Actuators, **Designing Embedded Systems with 8-bit Microcontrollers-8051**: Factors to be Considered in Selecting a Controller, Why 8051 Microcontroller, The 8051 Architecture.

MODULE – 4	**10 hrs.**

ARM Embedded Systems: Microcontrollers, Microprocessors v/s Microcontrollers, RISC v/s CISC, Harvard v/s Von-Neumann processor, Big-endian v/s Little-endian processors, Load store operation, TheARMDesignPhilosophy,EmbeddedSystemHardware,EmbeddedSystemSoftware.
ARMProcessorFundamentals: Registers,CurrentProgramStatusRegister.

List of experiments/Activities

1. To display numbers from 0 to 9 using Seven Segment Display
2. To rotate Stepper Motor clockwise and anticlokwise.
3. Blinking LEDs

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

2. ARMsystemdevelopersguide,AndrewNSloss,DominicSymesandChris Wright, Elsevier, Morgan Kaufman publishers, 2008.

Reference Books:

1. Embedded Systems - Raj Kamal, TMH.

2.Embedded System Design - Frank Vahid, Tony Givargis, John Wiley

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Programming Language Courses (PLC)

(PLC-I) Programming Language Courses-I				
Code	**Title**	**L**	**T**	**P**
22PLC15A	Introduction to Web Programming	2	0	2
22PLC15B	Introduction to Python Programming	2	0	2
22PLC15C	Basics of JAVA programming	2	0	2
22PLC15D	Introduction to C++ Programming	2	0	2

1. Introduction to Web Programming

Course Title	**Introduction to Web Programming**		
Course Code	22PLC15A	**(L-T-P)C**	(2-0-2)3
SEE duration	3 hour	**Hours / Week**	04
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	40

Course Objective: Create web pages with client-side scripting.

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

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Apply the knowledge of XHTML in designing webpages.	1,3
2.	Design webpages by applying CSS.	3
3.	Develop client-side script to design webpage.	1,3,5

Course Contents:

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

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, Syntactic Differences between HTML and XHTML.	
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; The and tags.	
MODULE –3	**10 Hrs.**
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 – 4	**10 hrs.**
JavaScript and HTML Documents: 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:** Element positioning; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements.	

Programming Assignments:

1. Create an XHTML page using tags to accomplish the following:

   (i) A paragraph containing text "Malnad College of Engineering". Bold face and italicize this text

   (ii) Create equation: $x = 1/3(y_1^{\ 2} + z_1^{\ 2})$

   (iii) Put a background image to a page

   (iv) Create unordered list of 5 fruits and ordered list of 3 flowers

2. Create following web page using XHTML and CSS.

CAR MANUFACTURERES

1. Maruti Suzuki
   A. Swift AMT
   B. Brezza- ZXI
2. TATA Motors
   A. Nexon EV

B. TATA Harrier

3. Hyundai India

A. Creta

B. Aura

3. Write an XHTML document to display 3 paragraphs and apply the style using CSS as below.

Pragraph-1:

- Set the border style to dotted, set left margin and right margin to 1 centimeter.

Pragraph-2:

- Set the background color to yellow, set margin to 25 pixels.

Pragraph-3:

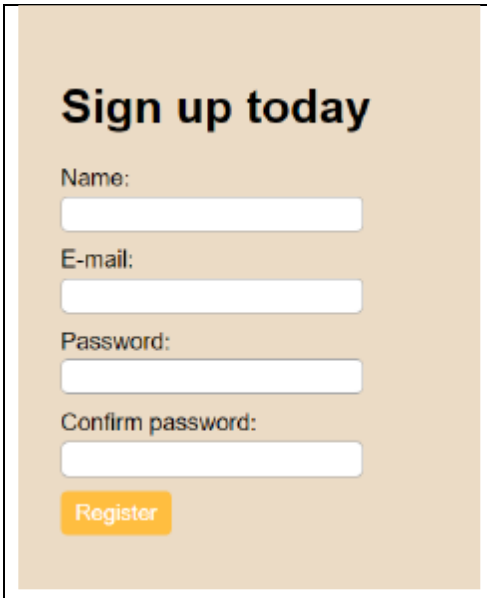
- Set color of the text to green, set padding to 10 pixels.

4. Create following web page using XHTML and CSS.

	TV sales in units		
	2021-20	2020-19	2019-18
Sony	3000	5000	6000
Samsung	2000	3000	4000
LG India	5000	8000	7000

5. Write an HTML document to create a form for online submission of RESUME. The following information must be provided. Name, Gender (use radio buttons), Address, Qualifications (use check boxes), University (use select element) and other information (use textarea element)

6. Create following web page using XHTML and CSS.



7. Write a JavaScript program to compute and print sum and average of given N numbers.

8. Write a JavaScript program to check whether a given number is prime number or not.

9. Develop a web page, using JavaScript and XHTML, that collects X-coordinate and Y-coordinate values, to move an image to position on click of a button.

10. Create a webpage containing 3 overlapping paragraphs using XHTML, CSS, and JS. Further when the mouse is over any paragraph, it should be on the top and fully displayed.

Text Books :

Robert W. Sebesta: Programming the World Wide Web, 8th Edition, Pearson Education, 2014.

Reference Books:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.

2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson, 2015.

2. Introduction to Python Programming

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Course Title	**Introduction to Python Programming**		
Course Code	22PLC15B	**(L-T-P)C**	(2-0-2) 3
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**
1.	Elucidate the basic constructs and OOPS concepts of python language	-
2.	Apply python language construct and OOPS concepts to write a program for the given problem	**1**
3.	Analyze the code snippet for its correctness	**2**
4.	Design a GUI/python program to solve a real-world problem	**3, 5**

Course Contents:

MODULE –1	**10 Hrs.**

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 Control Statements, Importing Modules, Ending a Program Early with sys.exit(). Loops for iteration.

MODULE –2	**10 Hrs.**

Manipulating Strings: Working with Strings, Useful String Methods.

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References

Tuples and Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things

Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print ( ), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number

MODULE –3	**10 Hrs.**

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, Interface and implementation

MODULE – 4	**10 hrs.**

Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.

GUI Programming: Tkinter Introduction, Tkinter and python programming,.Widgets: Label, Button, Entry, Scaling, Menu, Check Box, Radio button. Tkinter examples

Programming Exercises:

1. a. 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.
   b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
   b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. a. Write a program to search an element using linear search.
   b. Write a program to search an element using binary search.

5. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
6. Write a Python Event driven Program for file operations Press 1: to open file in read mode 2: open the file in write mode 3: current position of the file pointer #4: Reposition the pointer at the beginning 5: exit.
7. Write an Object oriented Python program to create two Time objects: currentTime, which contains the current time; and breadTime, which contains the amount of time it takes for a bread maker to make bread. Then we'll use addTimeto figure out when the bread will be done. Write the printTime function to display the time when the bread will be done by the bread maker.
8. Define a function which 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.
9. 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 getMarks() method to read marks into the list, and display() method to display the score card details.]
10. Design a simple calculator using GUI.

Text Books

1. Al Sweigart,"Automate the Boring Stuff with Python",1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automateheboringstuff.com/) for lambda functions use this link: https://www.learnbyexample.org/python-lambda-function/
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf (Download pdf/html files from the above link)
3. Core Python Application Programming, Wesley J Chun, 3rd Edition, Pearson Publication, 2016.

Reference Books:

1. R. Nageswara Rao , "Core Python Programming" 3 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, 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=edi
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

3.Basics of JAVA programming

Course Title	**Basics to Java Programming**		
Course Code	: 22PLC15C	**L-T-P-C**	(2-0-2)3
SEE Hours	: 03	**Hours / Week**	: 04
CIE(Theory) Marks	: 30	**CIE (Practicals) Marks**	: 20
SEE	: 50 Marks	**Total Hours**	: 40

Course Objective: Implement object-oriented concepts using Java.

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

#	Course Outcomes	Mapping to POs
1.	Explain the features and object-oriented concepts in Java programming	PO1
2.	Analyze/Debug the given program to get proper output	PO2
3.	Develop a java program(s) for simple real-world problem(s)	PO3

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Course Contents:

MODULE-1	10 Hrs.

Java programming fundamentals – The Java Language, The key attributes of Object Oriented programming, Java Development Kit (JDK), JVM, A first Simple program, handling syntax errors, The Java Keywords, Identifies in Java.

Introducing Data Types Java's Primitive Types, Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, operators, Shorthand Assignments, Type conversion in Assignments, Using Cast, Operator Precedence, Expressions.

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, Use break, Use continue, Nested Loops.

MODULE-2	10 Hrs

Introducing Classes, Objects and Methods: Class Fundamentals, How Objects are Created, Reference Variables and Assignment, Methods, Returning from a Method, Returning Value, Using Parameters, Constructors, Parameterized Constructors, The new operator Revisited, Garbage Collection. The this Keyword. More Data Types and Operators: Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The For- each Style for Loop, Strings, The Bitwise operators.

MODULE-3	10 Hrs

A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass Objects to Methods, How Arguments are passed, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Varargs: Variable- Length Arguments.

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,

MODULE-4	10 Hrs

Interfaces: Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces

Packages: Package Fundamentals, Packages and Member Access, Importing Packages, Static import.

Exception Handling: The Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exceptions.

Text Book:

1. Java Fundamentals, A comprehensive Introduction by Herbert Schildt, Dale Skrien.Tata McGraw Hill Edition 2013
2. Java –The complete Reference, by Herbert Schildt Eight Edition Tata Mcgraw Hill Education

MOOC:

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

Practical Programs :

1. Develop a JAVA program of provide all real solutions to the quadratic equation ax2+bx+c=0 Read in a,b, c and use the quadratic formula.
2. Develop a JAVA program for multiplication of two arrays.
3. Demonstrate the following operations and sign extension with Java programs(i)<< (ii) >> (iii) >>>
4. Develop a JAVA program to sort list of elements in ascending and descending order
5. Create a JAVA class called Student with the following details as variables within it.

   USN, NAME, BRANCH, PHONE and PERCENTAGE

   Develop a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentageof these objects with suitable headings.
6. Develop a JAVA program to demonstrating Method overloading and Constructor overloading.
7. Create a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Develop a JAVA program to read and display at least 3 staff objects of all three categories.
8. Demonstrate dynamic dispatch using abstract class in JAVA.
9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working ofaccess modifiers (private, public, protected, default) in all these classes using JAVA.
10. Develop a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundException.

4. Introduction to C++ Programming

Course Title	**Introduction to C++ Programming**		
Course Code	**22PLC152/22PLC252**	**L-T-P-C**	**2-0-2-3**
Exam Hrs.	**3 Hrs.**	**Hours / Week**	**3**
SEE	**50 Marks**	**Total hours**	**40**

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Course Objective :
Students will understand Object oriented concepts and will be able to solve real world problems.

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

#	Course outcomes	Mappingto POs
1.	Elucidate the object oriented programming concepts.	PO1
2.	Apply Object Oriented Programming concepts to solve a given problem.	PO1, PO2
3.	Design the solution to a real world problem using Object Oriented programming concepts.	PO1, PO2, PO3, PO9, PO10

Course Contents:

MODULE – 1	10 Hrs.

Introduction to Object Oriented Programming: Computer programming background- C++ overview. First C++ Program -Basic C++ syntax, Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.

Textbook 1: Chapter 1(1.1 to 1.8)

MODULE – 2	10 Hrs.

Functions in C++: Tokens – Keywords – Identifiers and constants – Operators in C++ – Scope resolution operator – Expressions and their types – Special assignment expressions – Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments – Function overloading, I/O Streams - cin, cout objects.

Textbook 2: Chapter 3(3.2,3.3,3.4,3.13,3.14,3.19, 3.20) , chapter 4(4.3,4.4,4.5,4.6,4.7,4.9) Chapter 12(12.5)

MODULE – 3	10 Hrs.

Inheritance & Polymorphism: Derived class Constructors, destructors-Types of Inheritance- Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.

Textbook 2: Chapter 6 (6.2,6.11) chapter 8 (8.1 to,8.8)

MODULE – 4	10 Hrs.

Exception Handling: Introduction to Exception - Benefits of Exception handling- Try and catch block Throw statement- Pre-defined exceptions in C++.

Textbook 2: Chapter 13 (13.2 to13.6)

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. programmes

Text Books:

1. Bhushan Trivedi, “Programming with ANSI C++”, Oxford Press, Second Edition, 2012.
2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt. Ltd, Fourth Edition 2010.

Reference Books:

1. **Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.**
2. **K.R. Venugopal, Raj kumar Buyya, T Ravishankar : Mastering C++, Tata McGraw Hill,1999.**

MOOCs:

1. **https://onlinecourses.nptel.ac.in/noc22_cs103/preview**
2. **https://archive.nptel.ac.in/courses/106/105/106105151/**
3. **https://archive.nptel.ac.in/courses/106/105/106105234/**

Programming Assignments:

1.	Write a C++ program to sort the elements in ascending and descending order.
2.	Write a C++ program to find the sum of all the natural numbers from 1 to n.
3.	Write a C++ program to swap 2 values by writing a function that uses call by reference technique.
4.	Write a C++ program to demonstrate function overloading for the following prototypes. add(int a, int b) add(double a, double b)
5.	Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes.

6.	Suppose we have three classes Vehicle, FourWheeler, and Car. The class Vehicle is the base class, the class FourWheeler is derived from it and the class Car is derived from the class FourWheeler. Class Vehicle has a method 'vehicle' that prints 'I am a vehicle', class FourWheeler has a method 'fourWheeler' that prints 'I have four wheels', and class Car has a method 'car' that prints 'I am a car'. So, as this is a multi-level inheritance; we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods. So, if we invoke the methods in this order, car(), fourWheeler(), and vehicle(), then the output will be I am a car I have four wheels I am a vehicle Write a C++ program to demonstrate multilevel inheritance using this.
7.	Write a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.
8.	Write a C++ program function which handles array of bounds exception using C++.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

STREAMS: Civil, Mech, and Electrical

Course Title	**Mathematics for Civil Engineering-1**		
Course Code	22MATC11	**(L-T-P)C**	(3-1-2)4
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals) marks**	20
SEE marks	50	**Total contact hours**	70

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**	**PO1**	**PO2**
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals.	3	-
CO2	Inspect for the maximum output of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
CO3	Apply the numerical methods to compute: The area of a region, root of an equation , missing input, or output of the given experimental data (interpolation/extrapolation).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

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.

Partial Differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor's series. Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin's series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, 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.

Self-learning topics: Quadrature formula, 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.

MODULE –3	**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 & cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in Civil engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Application of Optimization (extreme values of a single variable)- stiffness of a beam, strength of a beam.

Application of line integrals- finding projectile height from its acceleration initial velocity initial position.

Application of numerical integration- estimation of discharge in a stream – an application to hydrology, estimation of discharge in a stream – an application to surveying.

Application of multiple integrals- to find mass and moment for the thin plate covering the region in the xy plane.

Self study- 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. application of arc length-application to make sheets of corrugated iron roofing.

application of total derivative- controlling sag in an uniformly loaded beam , Application of line integrals- moment, mass and center of mass of a thin rod.

List of Programes:

1. computation of roots using - bisection method , Newton raphson method.
2. To compute the extreme values of function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

Text Books :

. 1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.

2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India P.v.t. Ltd. 8th Edition, (Wiley student edition) 2004.

3. Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Reference Books:

1. R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Mathematics for Mechanical Engineering -1**		
Course Code	22MATM11	**(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**	70

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**	**PO1**	**PO2**
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals.	3	-
CO2	Inspect for the maximum output of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
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).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor series.Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

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.

Self-learning topics: Quadrature formula, 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.

MODULE –3	**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 & cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in mechanical engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

application of Optimization (extremevalues of a single variable)- stiffness of a beam, strength of a beam, product design, metal fabrication.

Application of line integrals- finding projectile height from its accelaration, initial velocity & initial position. amount of work required to put a satellite in an orbit.

Application of numerical integration- to estimate the total quantity of oil that has escaped after leakage. To estimate the length of the tank in a design of an airoplane wich has a constantan cross sectional area in each wing.

Application to root finding-to locate the submarine.

Application of multiple integrals- to find mass and moment for the thin plate covering the region in the xy plane. computation of deflection of beams using double integral.

Self study:mass and moment for the object in space, moment of inertia of a circle about its diametrical axis- an application to eng. Mechanics, computation of deflection of beams using double integral..application of total deravitive- controlling sag in an uniformly loaded beam , Application of line integrals- moment, mass and center of mass of a thin rod. work and kinetic energy, work required in pumping the liquid from containers.

List of Programmes:

1. computation of roots using - bisection method , Newton raphson method.
2. To compute the extreme values of function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

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MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Mathematics for Electrical and Electronics Engineering stream-1**		
Course Code	22MATE11	**(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**	70

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**	**PO1**	**PO2**
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability.	3	-
CO2	Inspect for the maximum output of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
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).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two variables and illustrative examples on Taylor series.Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton-Raphson method,Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

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.

Self-learning topics: Quadrature formula,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.

MODULE –3	**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 & cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in EE engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Application of Optimization (extreme values of a single variable)- to find the peak current in an alternative circuits.

Application of line integrals- forcing electrons together, To estimate the total amount of pollutant produced due to production of electricity by burning oil.. finding projectile height from its acceleration, initial velocity & initial position.

Application of root finding- ion concentration.

Counting principle - sum rule, product rule, permutation and combination, , review of probability- applications of Baye's theorem.

Self study—To express the experimental data interms of cubic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting), applications of differential calculus. **A**pplication of multiple integrals- Brief note on the applications connected with field and wave theory.

List of Programmes:

1. computation of roots using - bisection method , Newton raphson method.
2. To compute the extreme values of function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
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1. R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Mathematics for Civil Engineering-2**		
Course Code	22MATC21	**L-T-P-C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

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**	**PO1**	**PO2**
CO1	Apply suitable methods to solve the simple problems of ordinary differential equations/partial differential equations and vector calculus, analytically/numerically.	3	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	3	2
CO3	Introspect the geometry of the region to compute the vector integration problems of gauss divergence theorem, stokes theorem, greens theorem.	3	2
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Equations of First order First Degree (DE): Solution of exact differential equations,

Higher Order Differential Equations , 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.

Self – study: Linear differential equations, Bernoulli's differential equations. Method of variation of parameters to solve linear differential equation with constant coefficients. Matrix method to solve homogeneous differential equations of order 2, degree 1. Orthogonal trajectories in Cartesian form, illustrative examples.

MODULE –2	**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: Solving PDE by variable separable method, To find all possible solutions of one-dimensional wave equation, solution of system of equations by Gauss -Seidel iteration method.

Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formulas.

Self-study: To find all possible solutions of one-dimensional heat equation, two-dimensional Laplace equation. Numerical solution of Simultaneous differential equations, numerical solution of second order differential equations by RK method.

MODULE –3	**10 Hrs.**

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

Line integrals, surface integrals and volume integrals, Statement of Green's theorem, Stoke's theorem and Illustrative examples from engineering field.

Self – study: Gauss divergence theorem, Illustrative examples from engineering field.

MODULE – 4	**10 hrs.**

Applications in civil engineering:

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 inflected diseases, carbon dating half-life period, mixing problem involving one tank, two tank.

Applications of second order, first degree Differential equations -Applications of second order, first degree Differential equations –Mechanical Vibrations-A Spring mass system $mu^{II}(t) + ku^{I}(t) + gu(t) = f(t)$-Undamped free vibrations, damped free vibrations, forced vibrations with damping, --forced vibrations without damping,

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**.**

Self-study- Application of first order differential equation- Autonomous equation and population dynamics-Application- Logistic model- Natural growth of halibut population in certain areas of Pacific Ocean, Harvesting a renewable resource. motion of a simple pendulum, Deflection of beams.

Modelling projectile motion(vector approach),

List of Programmes:

1. Solution of first order ordinary differential equation using Taylor series & RK method.
2. Solution of partial differential equation (Laplace & Poission equations)
3. Finding gradient , divergence and curl.
4. Computation of area, volume and center of gravity.
5. Verification of Green's theorem in vector integration.
6. Solution of system of equations by Guass elimination method.

7. Solution of 2nd order differential equations(by variation of parameter method).

8. Numerical solution of simultaneous differential equations by RK method.

9. Solution of system of linear equations using Guass-Seidal iteration method.

10. Product of a matrices & finding Inverse of a matrix.

Text Books :

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Reference Books:

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2. R K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age international pvt. Publishers, 6thedition, 2014.

3. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Mathematics for Mechanical Engineering -2**		
Course Code	22MATM21	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

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**	**PO1**	**PO2**
CO1	Apply suitable methods to solve the simple problems of ordinary differential equations/partial differential equations and vector calculus, analytically/numerically.	3	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	3	2
CO3	Introspect the geometry of the region to compute the vector integration problems of gauss divergence theorem, stokes theorem, greens theorem.	3	2
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Equations of First order First Degree (DE): Solution of exact differential equations.

Higher Order Differential Equations 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.

Self-study: Linear differential equations, Bernoulli's differential equations. Method of variation of parameters to solve linear differential equation with constant coefficients. Matrix method to solve homogeneous differential equations of order 2, degree 1. Orthogonal trajectories in Cartesian form, illustrative examples

MODULE –2	**10 Hrs.**

Numerical solution of first order, first degree ODE: Taylor series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods. **Partial Differential Equations**: Solving PDE by variable separable method, To find all possible solutions of one-dimensional wave equation, solution of system of equations by Gauss Seidel iteration method.

Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method--using standard five point formula, diagonal formula and iterative formulas.

Self – study: To find all possible solutions of one-dimensional heat equation, two-dimensional Laplace's equation. .Numerical solution of Simultaneous differential equations, numerical solution of second order differential equations by RK method.

MODULE –3	**10 Hrs.**

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

Line integrals, surface integrals and volume integrals, Statement of Green's theorem, Stokes theorem and Illustrative examples from engineering field.

Self -study: Gauss divergence theorem, Illustrative examples from engineering field.

MODULE – 4	**10 hrs.**

Applications in Mechanical Engineering:

Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, Modelling of inflected diseases, carbon dating-half-life period, mixing problem involving one tank, two tank. Newton's law of cooling, to compute the time required to drain the tank, resistance force opposing the motion, growth and decay- radioactivity.

Applications of second order, first degree Differential equations -Applications of second order, first degree Differential equations –Mechanical Vibrations-A Spring mass system $mu^{II}(t) + ku^{I}(t) + gu(t) = f(t)$-Undamped free vibrations, damped free vibrations, forced vibrations with damping, --forced vibrations without damping, 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.

Self-study- Application of first order differential equation- Autonomous equation and population dynamics-Application- Logistic model- Natural growth of halibut population in certain areas of pacific ocean, Harvesting a renewable resources. Application of eigen values of 2×2 matrices.

Modelling projectile motion(vector approach).

List of Programmes:

1. Solution of first order ordinary differential equation using Taylor series & RK method.
2. Solution of partial differential equation (Laplace & Poission equations)
3. Finding gradient , divergence and curl.
4. Computation of area, volume and center of gravity.
5. Verification of Green's theorem in vector integration.
6. Solution of system of equations by Guass elimination method.
7. Solution of 2nd order differential equations(by variation of parameter method).
8. Numerical solution of simultaneous differential equations by RK method.
9. Solution of system of linear equations using Guass-Seidal iteration method.

10. Product of a matrices & finding Inverse of a matrix.

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3.N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Mathematics for Electrical and Electronics Engineering stream-2**		
Course Code	22MATE21	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

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**	**PO1**	**PO2**
CO1	Apply suitable methods to solve the simple problems of ordinary differential equations/partial differential equations and vector calculus, analytically/numerically.	3	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	3	2
CO3	Introspect the geometry of the region to compute the vector integration problems of gauss divergence theorem, stokes theorem, greens theorem.	3	2
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Equations of First order First Degree (DE): Solution of exact differential equations.

Higher Order Differential Equations , 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.

Self-study: Linear differential equations, Bernoulli's differential equations. Method of variation of parameters to solve linear differential equation with constant coefficients. Matrix method to solve homogeneous differential equations of order 2, degree 1. Orthogonal trajectories in Cartesian form, illustrative examples.

MODULE –2	**10 Hrs.**

Numerical solution of first order, first degree ODE: Taylor series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods. **Partial Differential Equations**: Solving PDE by variable separable method, To find all possible solutions of one-dimensional wave equation, solution of system of equations by Gauss Seidel iteration method.

Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method--using standard five point formula, diagonal formula and iterative formulas.

Self – study: To find all possible solutions of one-dimensional heat equation, two-dimensional Laplace's equation.Numerical solution of Simultaneous differential equations, numerical solution of second order differential equations by RK method.

MODULE –3	**10 Hrs.**

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

Line integrals, surface integrals and volume integrals, Statement of Green's theorem, Stokes theorem and Illustrative examples from engineering field.

Self – study: Gauss divergence theorem, Illustrative examples from engineering field.

MODULE – 4	**10 hrs.**

Applications in Electrical Engineering:

Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating half-life period, mixing problem involving one tank, two tank. voltage in a discharging capacitor.

Modelling using difference equations- Growth of a Yeast Culture, spread of a Contagious Disease, Decay of Digoxin in the Blood stream, Solutions to Dynamical system .Linear dynamical system $a_{n+1} = ra_n$, $a_{n+1} = ra_n + b_n$, Sewage Treatment, Prescription for Digoxin.Applications of second-order differential equations $lQ^{II}(t) + RQ^{I}(t) + \frac{1}{C}Q(t) = E(t)$. -transient analysis of electrical net works**,** Modelling projectile motion(vector approach).

Self Study-Introduction to graph theory, types of graphs, subgraphs, trees, spanning subgraphs, shortest path algorithms.

List of Programmes:

1. Solution of first order ordinary differential equation using Taylor series & RK method.
2. Solution of partial differential equation (Laplace & Poission equations)
3. Finding gradient , divergence and curl.
4. Computation of area, volume and center of gravity.
5. Verification of Green's theorem in vector integration.
6. Solution of system of equations by Guass elimination method.
7. Solution of 2nd order differential equations(by variation of parameter method).
8. Numerical solution of simultaneous differential equations by RK method.
9. Solution of system of linear equations using Guass-Seidal iteration method.
10. Product of a matrices & finding Inverse of a matrix.

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MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**PHYSICS FOR CIVIL ENGINEERING**		
Course Code	22PHYC21/22	**(L-T-P)C**	(3-1-2)4
Exam. duration	3 hour	**Class Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals) marks**	20
SEE marks	50	**Total class hours**	70

Course Objective:

The objective of the course is to make students learn principles and 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**	**Mapping to POs**
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	**10 Hrs.**

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	**10 Hrs.**

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. Illustratio 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.**

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.

Reference Books:

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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**PHYSICS FOR MECHANICAL ENGINEERING**		
Course Code	22PHYM12/22	**(L-T-P)C**	**(**3-1-2)4
Exam. duration	3 hour	**Class Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals) marks**	20
SEE marks	50	**Total class hours**	70

Course Objective:

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

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

Sl. No.	**Course outcomes**	**Mapping to PO's**
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	10 Hrs

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	10 Hrs

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). 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.
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.
3. Brijlal N Subramanyam : Heat and Thermodynamics ISBN: 81-219-2813-3 S. Chand and Co. Ltd. New Delhi, Edition, 2007.

Reference Books:

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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**PHYSICS FOR ELECTRONICS AND ELECTRICAL ENGINEERING STREAM**		
Course Code	22PHYE12/22	**(L-T-P)C**	(3-1-2)4
Exam. duration	3 hour	**Class Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals) marks**	20
SEE marks	50	**Total class hours**	70

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**	**Mapping to PO's**
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	**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 – 2	**10 Hrs**

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.
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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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**ENGINEERING MECHANICS**		
Course Code	22CIV13/23	**(L-T-P)C**	(2-1-0)3
SEE duration	3 hour	**Hours / Week**	04
CIE (Theory) marks	30	**CIE (Practicals)/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 a force system and resolution of a force	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.	Analyse the frictional resistance offered by different planes and locate the centroid.	1,2
4.	Compute the moment of inertia of sections and analyse the bodies in motion	1,2

Course Contents:

MODULE –1	**12 Hrs.**

Resultant of coplanar force system:

Basic dimensions and units, Idealisations, 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.

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.

Text Books :

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 Books:

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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	ELEMENTS OF MECHANICAL ENGINEERING		
Course Code	**22EME13/23**	**(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 mechanical engineering course 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-spur gears, bevel gears, helical gears, 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, Appuu Kuttan K K, Oxford University Press, 2007.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Basic Electronics**		
Course Code	22EC103	**(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 making use of basic gate and its function.	1, 5, 9
4.	Apply the knowledge of various transducers for basic communication system.	1,2

Course Contents:

MODULE –1	**10 Hrs.**

Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, DiodeApproximations, DC Load Line analysis (Text 1: 2.1,2.2,2.3,2.4)
Diode Applications: Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Center tapped and bridge Rectifier Power Supply: Capacitor Filter Circuit, RC π Filter (includes numerical)
(Text 1: 3.1,3.2,3.4,3.5)

Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters,Equivalent Circuit, Zener Diode Voltage Regulator. (Text1:2.9, 3.7)

MODULE –2	**10 Hrs.**

Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, Common BaseCharacteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point -Self bias, fixed bias and voltage divider bias (Text 1: 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 (Text 1: 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	**10 hrs.**

Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa DecimalNumbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and
Properties of Boolean Algebra, Boolean Functions.
Digital Logic Gates (Text 3: 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 3:4.1, 4.2, 4.3)

Introduction to Transducers: Introduction, Resistive Transducers, Piezoelectric transducers (Text 4: Chapter 18: 18.1, 18.6)

Communications: Introduction to communication, Communication System, Modulation-AM and FM (Text book 5: 1.1,1.2, 1.3, 3.1, 5.1)

List of Activities

Activity Number	Activity Name	Description	Marks
1	**Analog Circuit design and implementati**	• Use Multisim Live Circuit Simulator (Online Simulation) • A group of 3 students should solve assigned	**10**

	on using open source Simulator	experiment • Demonstration of the circuit with results	
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.

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 SR and D flip flops. 6. Realization of JK and T flip flop. 7. Conversion of JK flip flop into D flips flop. 8. Realization of 4 x 2 encoder and 2 x 4 decoder.
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-amps 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 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

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Elements of Electrical Engineering**		
Course Code	22EEE13	**(L-T-P)C**	(2-1-0)3
SEE duration	3 Hours	**Hours / Week**	03
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total Contact Hours**	40

Course Objective: The student will acquire basic knowledge of electrical circuits, electromagnetism, protective devices and electric tariffs.

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

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Describe the basic laws used in the electromagnetism and DC circuits.	1, 2
2.	Apply the fundamentals of single phase and three phase AC circuits and perform related calculations.	1, 2
3.	Explain the concept of domestic wiring and Electrical safety measures	1, 2
4.	Analyse the power rating of household appliances and electricity billing	1, 2

Course Contents:

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

MODULE – 4	**10 hrs.**

Domestic Wiring: Requirements, Types of wiring, Two way and three way control. General types of wires and cables. Specifications of wires used for domestic wiring and their selection.

Electrical Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Electric Shock, General concept of Earthing, Types of earthing, Safety Precautions to avoid shock, Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB). General types of wires and cables and selection

Electricity bill: Power rating of household appliances like lights, fans, Air Conditioners, Personal Computers etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Text Books :

1. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice-Hall of India Pvt. Ltd., ISBN: 81-203-2729-2, 2005.

Reference Books:

1. D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill, 2nd edition, 2019
2. E. Hughes, Electrical and Electronics Technology, Pearson 2010
3. D.P. Kothari, I.J. Nagrath, *Basic Electrical Engineering*, McGraw Hill Education, 4th Ed., 2019

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Innovation and Design Thinking**		
Course Code	22IDT18/28	**(L-T-P)C**	(0-0-2)1
SEE duration		**Class Hours / Week**	02
CIE marks	10	**Activity marks**	40
SEE marks	50	**Total class hours**	30

Course Objective: The objective of this Course is to provide the new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products and services which useful for a student in preparing for an engineering career.

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

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Analyze emotional experience and expressions to better understand stakeholders while designing innovative products through group brainstorming sessions.	PO1,PO6 & PO9
2.	Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing any innovative products	PO1, PO9 & PO12

Course Contents:

Syllabus / Course Contents	**20 Hrs.**

Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, history of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test. **Prototyping & Testing in AICTE IDEA LAB:** What is Prototype? Why Prototype? Rapid Prototype Development process; 3D printing, Laser Cutter, CNC wood router, PCB Prototyping machine. **Testing;** Sample Example, advanced CNC facilities for prototyping. Integrating 17 Sustainable development goals (SDG) during design a product or service.

Course Contents

1. Empathize with a given situation and develop a customer journey map to identify real world problems.
2. Analyze the problem using Customer journey map.
3. Brainstorming to define the result of analysis of the problem using the above steps.
4. Ideate the result of a customer journey map.
5. Prototype the given idea in the AICTE IDEA LAB.
6. Test the developed prototype using the available methods in AICTE IDEA LAB.
7. Open ended activity/experiment.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Text Books :

Karmin Design Thinking by Dr. Bala Ramadurai, Mudranik Technology Private Ltd. ISBN 978-93-5419-0I0-0.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**CHEMISTRY FOR CIVIL ENGINEERING STREAM**		
Course Code	22CHEC22	**(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**	70

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 &P10

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.

MODUL E –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 (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. B**iodiesel**- 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 $K_2Cr_2O_7$ 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 H_2-O_2 fuel cell & Methanol-O_2 fuel cell.

MODULE – 4	**10 hrs.**

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Macromolecules for Engineering Applications

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

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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**CHEMISTRY FOR MECHANICAL ENGINEERING STREAM**		
Course Code	22CHEM22	**(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**	70

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 PO10

Course Contents:

MODULE –1	**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 (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 $K_2Cr_2O_7$ 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 H_2-O_2 fuel cell & Methanol-O_2 fuel cell.

MODULE –4	**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 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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

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

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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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM**		
Course Code	22CHEE22	**(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**	70

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 & PO10

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 (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.

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

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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

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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.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Engineering Drawing**		
Course Code	**22ED13/23**	**(L-T-P)C**	(2-0-4)3
SEE duration	3 hour	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	78

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;

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	visualize geometrical solids in 3D space through exercises in Orthographic Projections	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	**21Hrs.**

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	**27Hrs.**

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	**15Hrs..**
Isometric Projections: Isometric projections of geometric solids and simple machine components. Conversion of Isometric views into Orthographic views: Simple machine components. **Perspective Projection**: Introduction to Perspective projections, Projection of regular Planes by visual ray and two-point method.	
MODULE –4	**15Hrs.**
Multidisciplinary Applications & Practice Drawing Simple Mechanisms (Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions), 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.	

Question Paper Pattern for Semester End Examination (SEE)

22ED13 A

Q. No	Module	Questions on	Marks
(Answer any Five)			
1	1.	Projections of Points and Lines	20
2	2	Projections of Planes	20
3	2	Projections of Solids	20
4	2.	Projections of Solids	20
5	3.	Development of lateral surfaces of solids	20

6	3	Isometric projections of geometric solids	20
7	4.	Multidisciplinary Applications & Practice	20
Total Marks			**100**

22ED13 B

Q. No	Module	Questions on	Sketching	CADPrintouts	Total
Part A (Answer Any Two)					
1	1	Projection of Planes	08	17	25
2	2	Projections of Solids	08	17	25
3	3	Isometric projections of geometric solids	08	17	25
Part B (Answer Any Two)					
4	1	Projections of Points and Lines	07	18	25
5	2	Development of lateral surfaces	07	18	25
6	4	Multidisciplinary Applications & Practice	07	18	25
Total Marks			**30**	**70**	**100**

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Scientific Foundations of Health & Physical Education

Course Title:	**Scientific Foundations of Health** & Physical Education		
Course Code:	**22SFH18/28**	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 Practical
Total Hours of Pedagogy/physical activity	30 hours	Credits	01

Course objectives-

To improve the student's physical and mental health

Course outcomes

At the end of the course students will be able to.

1. Describe Health, wellness & its balance for positive mindset.(PO1)
2. Adopt healthy lifestyles for good health and better future.(PO1)
3. Demonstrate physical activity (PO1, PO9)

Module-1 **(3 hours of Pedagogy)**

Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health,

Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality,Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module-2 **(3 hours of Pedagogy)**

Building of healthy lifestyles 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 forhealth, Wellness and physical function, How to avoid exercise injuries.

Physical Education Practical classes **(24 hours of Practical)**

Sl. No	Name of the Game	Name of the Skills
1.	Shuttle badminton	Service
		Smash
		Receive

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Sl. No	Name of the Game	Name of the Skills
		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

Sl. No	Name of the Game	Name of the Skills
		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)

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

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	**18**
	Game Performance Examination	20	
	Viva -Voce	10	
	Total Marks	**100**	**40**

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	**Innovation and Design Thinking**		
Course Code		**(L-T-P)C**	(0-0-2)3
SEE duration	3 hour	**Class Hours / Week**	02
CIE (Theory) marks	20	**Activity marks**	30
SEE marks	50	**Total class hours**	20

Course Objective: The objective of this Course is to provide the new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products and services which useful for a student in preparing for an engineering career.

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

Sl. No.	**Course outcomes**	**Mapping to POs**
1.	Analyze emotional experience and expressions to better understand stakeholders while designing innovative products through group brainstorming sessions.	PO6 & PO9
2.	Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing any innovative products	PO9 & PO12

Course Contents:

Syllabus / Course Contents	**20 Hrs.**

Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, history of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test. **Prototyping & Testing in AICTE IDEA LAB:** What is Prototype? Why Prototype? Rapid Prototype Development process; 3D printing, Laser Cutter, CNC wood router, PCB Prototyping machine. **Testing;** Sample Example, advanced CNC facilities for prototyping. Integrating 17 Sustainable development goals (SDG) during design a product or service.

Course Contents

8. Empathize with a given situation and develop a customer journey map to identify real world problems.
9. Analyze the problem using Customer journey map.
10. Brainstorming to define the result of analysis of the problem using the above steps.
11. Ideate the result of a customer journey map.
12. Prototype the given idea in the AICTE IDEA LAB.
13. Test the developed prototype using the available methods in AICTE IDEA LAB.

14. Open ended activity/experiment.
Text Books : Karmin Design Thinking by Dr. Bala Ramadurai, Mudranik Technology Private Ltd. ISBN 978-93-5419-0I0-0.

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

STREAM: Computer Science and Engineering

Course Title	**Mathematics for Computer Science Engineering stream -1**		
Course Code	22MATS11	**(L-T-P)C**	(3-1-2-4)
SEE duration	3 hours	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	70

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**	**PO1**	**PO2**
CO1	Compute Taylor series, partial derivatives and solve simple problems connected with multiple integrals, Counting principle, bayes theorem on probability	3	-
CO2	Inspect for the maximum output of a function (experimental data), analyze the region of integration connected with multiple integrals so as to determine the area, volume.	3	2
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).	3	-
CO4	Model the real-life problems/engineering application problems and solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Calculus: Definition of average growth rate and its illustrative examples. Definition of differentiability. Statement of Taylor's theorem, Taylor series for a function of one variable - Illustrative examples.

Partial Differentiation: Definition of Partial derivative, Physical and geometrical interpretation of partial differentiation, and Illustrative examples, Statement of Taylor theorem for a function of two

variables and illustrative examples on Taylor series.Extreme values of functions of two variables.

Self-learning topics: Evaluation of Jacobians, Expansion of a function as a Maclaurin series for function of one variable and two variables-illustrative examples. Brief introduction to curvature, radius of curvature, polar curves.

MODULE –2	**10 Hrs.**

Numerical Methods: Numerical Solution of algebraic & transcendental equations by Bisection method, Newton Raphson method, Interpolation-Definition of forward, backward differences, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.

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.

Self-learning topics: Quadrature formula,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.

MODULE –3	**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 & cylindrical and Spherical co-ordinate system.

MODULE – 4	**10 hrs.**

Applications of Mathematics in Computer science engineering:

To express the experimental data interms of quadratic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting).

Extreme values of a single variable- cost and revenue.

Application of numerical integration- general applications connected with business cost and revenue.

Counting principle - sum rule, product rule, permutation and combination, review of probability-applications of Baye's theorem.

Self study—To express the experimental data in terms of cubic equation (function of one variable) and hence to find the maximum value of the experimental data (curve fitting), applications of differential calculus and integral calculus.

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

List of Programmes:

1. computation of roots using - bisection method , Newton raphson method.
2. To compute the extreme values of function of two variables.
3. Interpolation by- Newtons forward & Lagrange's interpolation formula.
4. Numerical integration- line integral (Trapezoidal rule , Weddle's rule)
5. Numerical integration- line integral (Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule)
6. Solution of first order differential equation and plotting the graph.
7. Finding angle between polar curves & computing the curvature of a given curve.
8. Finding partial derivatives, Jacobians.
9. Computing area by line integral & double integral.
10. Expressing the function of one variable & two variables using Taylor's & Maclaurin's series.

Text Books :

. 1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 44th edition, 2016.

2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India P.v.t. Ltd. 8th Edition, (Wiley student edition) 2004.

3. Thomas Finney, Calculus, 9th edition, Pearson education, 2002

Discrete mathematics by J.K. sharma.

Reference Books:

1. R. K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age International p.v.t. Publishers, 6th edition, 2014.

2. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

Course Title	**Mathematics for Computer Science Engineering stream -2**		
Course Code	22MATS21	**(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**	70

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**	**PO1**	**PO2**
CO1	Apply suitable methods to solve the simple problems of ordinary differential equations/partial differential equations and vector calculus, number theory, analytically/numerically.	3	-
CO2	Examine the higher order problems (more difficult problems) that are connected with differential equations/partial differential equations and solve.	3	2
CO3	Introspect the geometry of the region to compute the vector integration problems of gauss divergence theorem, stokes theorem, greens theorem.	3	2
CO4	Model the real-life problems/ Engineering application problems and hence solve the same.	3	2

Course Contents:

MODULE –1	**10 Hrs.**

Differential Equations of First order First Degree (DE): Solution of exact differential equations.

Higher Order Differential Equations 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.

Self – study: Linear differential equations, Bernoulli's differential equations. Method of variation of parameters to solve linear differential equation with constant coefficients. Matrix method to solve homogeneous differential equations of order 2, degree 1. Orthogonal trajectories in Cartesian form, illustrative examples.

MODULE –2	**10 Hrs.**

Numerical solution of first order, first degree ODE: Taylor series method, Runge-Kutta (RK) method of fourth order, Milne's predictor corrector methods. **Partial Differential Equations**: Solving PDE by variable separable method, To find all possible solutions of one-dimensional wave equation, solution of system of equations by Gauss Seidel iteration method.

Numerical solution of a Laplace equation, Poisson equation by finite difference approximation method using standard five point formula, diagonal formula and iterative formulas.

Self–study: To find all possible solutions of one-dimensional heat equation, two-dimensional Laplace's equation. Numerical solution of Simultaneous differential equations, numerical solution of second order differential equations by RK method.

MODULE –3	**10 Hrs.**

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

Line integrals, surface integrals and volume integrals, Statement of Green's theorem, Stokes theorem and Illustrative examples from engineering field.

Self – study: Gauss divergence theorem, Illustrative examples from engineering field.

MODULE – 4	**10 hrs.**

Applications in computer science engineering:

Mathematical modelling through differential equations of first order first degree and solution-modelling of population growth, carbon dating-half-life period, mixing problem involving one tank, two tank.

To mesuare the change over all concentration of glucose in blood when glucose is fed. continuous compounding.

Number theory -Properties of integers- division algorithem, GCD and LCM , Congruence relations, residue classes, congruence equations, applications of congruences on cryptography.

Self study- Application of line integral- finding projectile height from its acceleration, initial velocity, initial position. Applications connected with Differential equations and vector calculus.

List of Programmes:

1. Solution of first order ordinary differential equation using Taylor series & RK method.
2. Solution of partial differential equation (Laplace & Poission equations)
3. Finding gradient , divergence and curl.

4. Computation of area, volume and center of gravity.
5. Verification of Green's theorem in vector integration.
6. Solution of system of equations by Guass elimination method.
7. Solution of 2nd order differential equations(by variation of parameter method).
8. Numerical solution of simultaneous differential equations by RK method.
9. Solution of system of linear equations using Guass-Seidal iteration method.
10. Product of a matrices & finding Inverse of a matrix.

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.

Reference Books:

1.Calculus by Thomas Finney, 9th edition, Pearson education, 2002.

2.R K. Jain and S. R. K. Jain & S. R. K. Iyengar, Numerical methods, New age international pvt. Publishers, 6thedition, 2014.

3.N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010

Course Title	**CHEMISTRY FOR COMPUTER SCIENCE AND ENGINEERING STREAM**		
Course Code	22CHES12	**Course Code**	22CHES12
SEE duration	3 hour	**SEE duration**	3 hour
CIE (Theory) marks	30	**CIE (Theory) marks**	30
SEE marks	50	**SEE marks**	50

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 & PO10

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.

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 –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 lectrode 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 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
1. 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.

Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.

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.

Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H. Jeffery, 4th Ed.

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

Course Title	Engineering Drawing		
Course Code	**22ED13/23**	**(L-T-P)C**	2-0-4)3
SEE duration	3 hour	**Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals)/Activity marks**	20
SEE marks	50	**Total contact hours**	78

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;

Sl. No.	Course outcomes	Mapping to POs
1.	visualize geometrical solids in 3D space through exercises in Orthographic Projections	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	21Hrs.

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	27Hrs.

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	15Hrs..

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

Perspective Projection: Introduction to Perspective projections, Projection of regular Planes by visual ray and two-point method.

MODULE –4	**15Hrs.**

Multidisciplinary Applications & Practice
Drawing Simple Mechanisms (Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions), 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.

Question Paper Pattern for Semester End Examination (SEE)

22ED13 A

Q. No	Module	Questions on	Marks
(Answer any Five)			
1	1.	Projections of Points and Lines	20
2	2	Projections of Planes	20
3	2	Projections of Solids	20
4	2.	Projections of Solids	20
5	3.	Development of lateral surfaces of solids	20
6	3	Isometric projections of geometric solids	20
7	4.	Multidisciplinary Applications & Practice	20
Total Marks			**100**

22ED13 B

Q. No	Module	Questions on	Sketching	CADPrintouts	Total
Part A (Answer Any Two)					
1	1	Projection of Planes	08	17	25
2	2	Projections of Solids	08	17	25
3	3	Isometric projections of geometric solids	08	17	25
Part B (Answer Any Two)					
4	1	Projections of Points and Lines	07	18	25
5	2	Development of lateral surfaces	07	18	25
6	4	Multidisciplinary Applications & Practice	07	18	25
Total Marks			**30**	**70**	**100**

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

Scientific Foundations of Health & Physical Education

Course Title:	**Scientific Foundations of Health** & Physical Education		
Course Code:	**22SFH18/28**	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 Practical
Total Hours of Pedagogy/physical activity	30 hours	Credits	01

Course objectives-

To improve the student's physical and mental health

Course out come

At the end of the course students will be able to.

1. Describe Health, wellness & its balance for positive mindset.(PO1)
2. Adopt healthy lifestyles for good health and better future.(PO1)
3. Demonstrate physical activity (PO1, PO9)

Module-1

(3 hours of Pedagogy)

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

Module-2

(3 hours of Pedagogy)

Building of healthy lifestyles 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 forhealth, Wellness and physical function, How to avoid exercise injuries.

Physical Education Practical classes (24 hours 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

Sl. No	Name of the Game	Name of the Skills
		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	Multiply Choice Questions	20	**8**
	Performance and Attendance Criteria	30	**12**
SEE	Skill Examination	20	**18**
	Game Performance Examination	20	
	Viva -Voce	10	
	Total Marks	**100**	**40**

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

Course Title	**PHYSICS FOR COMPUTER ENGINEERING STREAM**		
Course Code	22PHYS12/22	**(L-T-P)C**	(3-1-2)4
Exam. duration	3 hour	**Class Hours / Week**	06
CIE (Theory) marks	30	**CIE (Practicals) marks**	20
SEE marks	50	**Total class hours**	70

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	Mapping to PO's
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.	1,10

Course Contents:

MODULE 1	10 hrs

Free Electron Theory and Superconductivity for computation

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). 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 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 on Logic gates operation on Qubits

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 Gupt**a ; *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. **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.

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

PROGRAMMING USING C				
Course Code	: 22CS105/205		**L-T-P-C**	: 2-0-2-3
Exam. Hours	: 03		**Hours / Week**	: 04
SEE	: 50 Marks		**Total hours**	: 40

Course Objective : To provide fundamental programming concepts which are essential to develop program for a given problem.

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

COs	Statement	POs
1.	Describe the concepts of C programming	PO1
2.	Apply C programming constructs to solve a given problem	PO1, PO2
3.	Analyze the given program to determine the output and its correctness	PO1, PO2
4.	Develop programs to find a solution for the given real world problems	PO1, PO2, PO9, PO10

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.
User-defined Functions: Elements of User defined function, Category of functions.

MODULE – 4	10 Hrs

Parameters passing in functions: call by value and call by reference, Passing arrays to functions, Passing strings to functions.
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, Pointer expressions, Pointers increments and scale factor, Pointers and arrays, Pointers as function Arguments.
Files: Introduction to files, Using files in C, Reading and Writing data files.

Text Book:

Balagurusamy E, Programming in ANSI C, 8th 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

MALNAD COLLEGE OF ENGINEERING, HASSAN
Contents of Syllabi for First Year B E Programmes

Practice Programs	
1.	a. Write a C program to read length of the sides of a triangle and find its area. b. Write a C program to read radius of a circle and find its area and circumference
2.	An employee gets DA 90% of basic salary; HRA 15% of basic salary, CA 5% of basic salary. And also employee has to pay income tax of 10% of gross salary (Grass salary= Basic Salary+ DA+HRA+CA). Write a C program to read the basic salary of an employee and find the take home salary of the employee. (Take home salary =gross salary – income tax)
3.	Heights of three students in a class are h1, h2 and h3. Write a C program to find the tallest among three students using nested if else statement.
4.	Read first name, middle name and last name of a person. Write a C program to concatenate first name with middle name without using built in function. And concatenate the resultant string with last name using built in function.
Guided Laboratory Experiments	
1.	Quadratic equation is given by $ax^2+bx+c=0$, where a, b and c are the coefficients provided where $a\neq0$.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: 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 Write a C program to read the customer number, power consumed and display the amount to be paid by the customer.
4.	Sine series is given by $x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+$----------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, acitvity1 and activity2.
Open ended problems	
1.	Solve a puzzle/game like tic-tac-toe
2.	Read two strings and check whether they are anagram or not
3.	Generate bill in a grocery store
4.	Generate magic square.
5.	Design a car/hut/rainbow using graphics in C.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Course Title	Innovation and Design Thinking		
Course Code		(L-T-P)C	(0-0-2)3
SEE duration	3 hour	Class Hours / Week	02
CIE (Theory) marks	20	Activity marks	30
SEE marks	50	Total class hours	20

Course Objective: The objective of this Course is to provide the new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products and services which useful for a student in preparing for an engineering career.

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

Sl. No.	Course outcomes	Mapping to POs
1.	Analyze emotional experience and expressions to better understand stakeholders while designing innovative products through group brainstorming sessions.	PO6 & PO9
2.	Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing any innovative products	PO9 & PO12

Course Contents:

Syllabus / Course Contents	20 Hrs.

Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, history of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test. **Prototyping & Testing in AICTE IDEA LAB:** What is Prototype? Why Prototype? Rapid Prototype Development process; 3D printing, Laser Cutter, CNC wood router, PCB Prototyping machine. **Testing;** Sample Example, advanced CNC facilities for prototyping. Integrating 17 Sustainable development goals (SDG) during design a product or service.

Course Contents

1. Empathize with a given situation and develop a customer journey map to identify real world problems.
2. Analyze the problem using Customer journey map.
3. Brainstorming to define the result of analysis of the problem using the above steps.
4. Ideate the result of a customer journey map.
5. Prototype the given idea in the AICTE IDEA LAB.
6. Test the developed prototype using the available methods in AICTE IDEA LAB.
7. Open ended activity/experiment.

MALNAD COLLEGE OF ENGINEERING, HASSAN

Contents of Syllabi for First Year B. E. Programmes

Text Books :

Karmin Design Thinking by Dr. Bala Ramadurai, Mudranik Technology Private Ltd. ISBN 978-93-5419-0I0-0.