

MALNADCOLLEGEENGINEERING,HASSAN

(An Autonomous Institution Affiliated to VTU, Belgaum)



Autonomous Programmes

Bachelor of Engineering



DEPARTMENT OF

INFORMATION SCIENCE AND ENGINEERING

SYLLABUS

V & VI Semester (2022 Admitted Batch)

(3rd Year)

Academic Year 2024-25

VISION

The department will be a premier centre focusing on knowledge dissemination and generation to address the emerging needs of information technology in diverse fields.

MISSION

1. To make students competent to contribute towards the development of IT field
2. Promote learning and practice of latest tools and technologies among students and prepare them for diverse career options
3. Collaborate with industry and institutes of higher learning for Research and Development, innovations and continuing education
4. Developing capacity of teachers in terms of their teaching and research abilities
5. Develop software applications to solve engineering and societal problems

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will:

PEO1: be successful professionals in IT industry with good design, coding and testing skills, capable of assimilating new information and solve new problems

PEO2: communicate proficiently and collaborate successfully with peers, colleagues and organizations

PEO3: be ethical and responsible members of the computing profession and society

PEO4: acquire necessary skills for research, higher studies, entrepreneurship and continued learning to adopt and create new applications

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

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

1. Design and Develop efficient information systems for organizational needs.
2. Ability to adopt software engineering principles and work with various standards of Computing Systems.

Scheme of Evaluation (Theory Courses)

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

Scheme of Evaluation (Laboratory Courses)

Assessment	Marks
Continuous Evaluation in every lab session by the Course coordinator	10
Record Writing	20
Laboratory CIE conducted by the Course coordinator	20
SEE	50
Total	100

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
Scheme & Syllabus for III Year
B.E. Information Science and Engineering
Academic Year 2024-25

V SEMESTER

Sl. No	Course category & Course Code		Course Title	Teaching Hours/Week				Examination				
				Theory Lecture	Tutorial	Practical/ Drawing	Self-study	Credits	Duration in hours	CIEMarks	SEEMarks	Total Marks
				L	T	P	S	C				
1	IPCC	22IS501	Computer Networks	3	0	2		4	5	50	50	100
2	PCC	22IS502	Theoretical Foundations of Computation	2	2	0		3	4	50	50	100
3	IPCC	22IS503	Full Stack Development	3	0	2		4	5	50	50	100
4	PCCL	22IS504	Data Visualization Lab	0	0	2		1	2	50	50	100
5	HSMC	22IS505	Entrepreneurship and Management	3	0	0		3	3	50	50	100
6	PEC	22IS5XX	Professional Elective Course – I	3	0	0		3	3	50	50	100
7	AEC	22RIP	Research Methodology and IPR	2	2	0		3	4	50	50	100
8	HSMC	22EVS	Environmental Studies	0	2	0		1	2	50	50	100
9	PI	22IS506	Mini Project	0	0	2		1	2	50	50	100
			Total					23	30	450	450	900

Course Category:

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, SDA: Skill Development Activity, ESC: Engineering Science Course, ETC: Emerging Technology Course
Note: AEC, SEC, ETC courses are to be chosen suitably by the BOS of the programme

Professional Elective Course - I

22IS551	Software Testing	22IS553	Object Oriented Modelling and Design
22IS552	Robotic Process Automation	22IS554	Service Oriented Architecture

MALNAD COLLEGE OF ENGINEERING, HASSAN

Scheme & Syllabus for III Year

B.E. Information Science and Engineering

Academic Year 2024-25

VI SEMESTER

Sl.No	Course category & Course Code		Course Title	Teaching Hours/Week					Examination			
				Theory Lecture	Tutorial	Practical/ Drawing	Self-study	Credits	Duration in hours	CIEMarks	SEEMarks	Total Marks
				L	T	P	S	C				
1	PCC	22IS601	Cryptography, Network Security and Cyber Law	3	0	0		3	3	50	50	100
2	IPCC	22IS602	Artificial Intelligence and Machine Learning	3	0	2		4	5	50	50	100
3	IPCC	22IS603	Cloud Computing	3	0	2		4	5	50	50	100
4	PI	22IS604	Main Project Work Phase 1	0	0	4		2	4	50	50	100
5	PEC	22IS6XX	Professional Elective Course - 2	3	0	0		3	3	50	50	100
6	OEC	22OEIS6X	Open Elective- 1 (Institution Level)	3	0	0		3	3	50	50	100
7	OEC	22SW01	Swayam NPTEL - 1	0	1(A)	0		A	-	-	-	-
8	AEC/SDC	22ASK	AEC/SDCV	0	0	2		1	2	50	50	100
	Total							20	25	350	350	700
	Course Category: PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, SDA: Skill Development Activity, ESC: Engineering Science Course, ETC: Emerging Technology Course Note: AEC, SEC, ETC courses are to be chosen suitably by the BOS of the programme											

Professional Elective Course - II

22IS661	Data Mining and Warehousing	22IS663	Mobile Computing Applications
22IS662	Big Data Technologies	22IS664	Blockchain Technology

Open Elective Course - I

22OEIS61	Web Technologies	22OEIS63	Internet of Things
22OEIS62	Java Programming	22OEIS64	Data Science

CourseTitle	ComputerNetworks		
CourseCode	22IS501	L-T-P	(3-0-2)4
Exam	3Hrs.	Hours/Week	5
SEE	50Marks	TotalHours	50(36L+14P)
CourseObjective: Students will gain the basic knowledge of data communication and computer networks. Courseoutcomes: At the end of course, student will be able to:			
#	CourseOutcomes	Mapping to PO's	Mapping to PSO's
1.	Explain the Ethernet Standard and Networking devices, Connecting devices and different protocols at the network, transport and application layers.	1	
2.	Apply suitable subnetting and IP addressing for a given requirement	1	
3.	Analyze different protocols at MAC sub-layer, Network and Transport Layers	2	
4.	Design networks applying Internet networking concepts and appropriate IP addressing for a given problem	3, 5	
MODULE-1			9Hrs.
Introduction: Data Communications, Network Types, Network Models, TCP/IP Protocol Suite, The OSI Model. Introduction to Physical Layer: Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance. Digital Transmission: Digital-to-Digital Conversion-Line Coding, Line Coding Schemes. Transmission Media: Introduction, Guided Media, Unguided Media: Wireless. Transmission Media			
MODULE-2			9 Hrs.
Switching: Introduction, Circuit-Switched Networks, Packet Switching, Structure of a Switch. Introduction to Data-Link Layer: Introduction, Link-Layer Addressing (up to ARP). Error Detection and Correction: Introduction, Block Coding, Cyclic Codes (up to Cyclic code encoder using Polynomials) Data Link Control: DLC Services, Data-Link Layer Protocols			
MODULE-3			9 Hrs.
Introduction to Network Layer: Network Layer Services, Packetizing, Routing and Forwarding, Packet Switching, Network Layer Performance, IPV4 Addresses – Address Space, Classful Addressing, Classless Addressing, DHCP message format Introduction. Routing Algorithms, Distance vector routing, link state routing, Path vector routing. Multicast Routing: Introduction, Multicasting Basics. Next Generation IP: IPV6 Addressing, The IPV6 protocol, Transition from IPV4 to IPV6			

MODULE-4	9 Hrs
Transport-Layer: Introduction,Transport-Layer Services, Transport Layer Protocols - Simple Protocol, TL Protocols: Introduction, User Datagram Protocol, Transmission Control Protocol – up to A TCP Connection (Excluding: State Transition Diagram). IntroductiontoApplicationLayer: Introduction,Client-ServerProgramming,StandardClientServer Protocols:WorldWideWeband HTTP	

PrescribedText Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Data Communications andNetworking	BehrouzA. Forouzan	6th	Tata McGraw-Hill	2022

ReferenceBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	“CommunicationNetworks-Fundamental Concepts and Key Architectures”	AlbertoLeon-Garcia and Indra Widjaja,	2nd	Tata McGraw-Hill	2004
2	Dataand Computer Communication	William Stallings	9th	Pearson Education	2014

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Data Communications andNetworking	BehrouzA. Forouzan	6th	TataMcGraw-Hill	2022

MOOCCourse:

Sl.No	Course Name	Course offered by	Year	URL
1	Computer Networking	Swayam	2020	https://www.my-mooc.com/en/mooc/computer-networking--ud436
2	Advanced Computer Networking	IITIndore,IIT Gandhi nagar	2023	https://onlinecourses.nptel.ac.in/noc23_cs35/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Lab Conduction	20
Total		50

Laboratory Plan:

Sl No	Program Details
1	Write and execute a program for distance vector algorithm to find the suitable path for transmission between sender and receiver.
2	Write and execute a program to find 16-bit and 32-bit checksum Fletcher and Adler checksum methods
3	Using TCP/IP sockets, write a client – server program to make the client send the filename and to make the server send back the contents of the requested file if present.
4	Suppose Alice wants her friend to encrypt email messages before sending them to her. Write a program to help her friend to encrypt and decrypt the data. (RSA algorithm).
5	Implement three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
6	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant application over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP/UDP.
7	Simulate the transmission of ping messages over a network topology consisting of 6 nodes
8	Simulate an Ethernet LAN using n nodes, change error rate and data rate and compare throughput.
9	Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source/destination.
10	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

CourseTitle	TheoreticalFoundationsof Computation																						
CourseCode	22IS502	L-T-P	(2-2-0)3																				
Exam	3Hrs.	Hours/Week	4																				
SEE	50Marks	TotalHours	(40) 26L + 14T																				
CourseObjective: Thecourseprovidesabasicunderstandingoftheoryofcomputationandstudents will be able to design various kinds of automata, formal languages and grammars as a first step towards learning advanced topics such as compiler design. Courseoutcomes: Attheendofcourse,studentwillbeableto: <table> <tr> <th>#</th><th>CourseOutcomes</th><th>Mapping toPO's</th><th>Mapping toPSO's</th></tr> <tr> <td>1.</td><td>Understandthefundamentalconceptsofformallanguagesand automatatheory</td><td>1</td><td>-</td></tr> <tr> <td>2.</td><td>DesignDFAs,NFAs,andperformconversionsamong them</td><td>3</td><td>-</td></tr> <tr> <td>3.</td><td>Designregularexpressions,contextfreegrammars,PushDown AutomataandTuringmachinesfordifferentlevelsofformal languages</td><td>3</td><td>-</td></tr> <tr> <td>4.</td><td>Constructandsimulatedifferentkindsofautomatausing simulationtool</td><td>5</td><td>-</td></tr> </table>				#	CourseOutcomes	Mapping toPO's	Mapping toPSO's	1.	Understandthefundamentalconceptsofformallanguagesand automatatheory	1	-	2.	DesignDFAs,NFAs,andperformconversionsamong them	3	-	3.	Designregularexpressions,contextfreegrammars,PushDown AutomataandTuringmachinesfordifferentlevelsofformal languages	3	-	4.	Constructandsimulatedifferentkindsofautomatausing simulationtool	5	-
#	CourseOutcomes	Mapping toPO's	Mapping toPSO's																				
1.	Understandthefundamentalconceptsofformallanguagesand automatatheory	1	-																				
2.	DesignDFAs,NFAs,andperformconversionsamong them	3	-																				
3.	Designregularexpressions,contextfreegrammars,PushDown AutomataandTuringmachinesfordifferentlevelsofformal languages	3	-																				
4.	Constructandsimulatedifferentkindsofautomatausing simulationtool	5	-																				
MODULE-1			10Hrs.																				
IntroductiontoFiniteAutomata:TheCentralConceptsofAutomataTheory,DeterministicFiniteAutomata (DFA), Nondeterministic Finite Automata (NFA), Epsilon-Transitions, Equivalence of NFA and DFA. RegularExpressionsandLanguages:RegularExpressions,FiniteAutomataandRegularExpressions																							
MODULE-2			10Hrs.																				
RegularExpressionsandLanguages(Contd.):Pumpinglemmaforregularlanguages,Applicationsof Regular Expressions, Equivalence and Minimization of Automata. Context-FreeGrammarsandLanguages:Context-FreeGrammars, Parse Trees, Applications of Context Free Grammars, Ambiguity in Grammars.																							

MODULE-3	10Hrs.
Pushdown Automata: Introduction and construction of Pushdown Automata, Acceptance by final state and empty stack , Equivalence of PDA's and CFG's Turing Machines: Introduction to Turing Machine, Construction of Turing Machine.	
MODULE-4	10Hrs
Turing Machines (contd.): Programming Techniques for Turing Machines, Restricted Turing machines, Turing Machines and Computers, The Universal Turing Machine, Introduction to undecidable problems, Post's Correspondence Problem.	

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman: education	3rd	Pearson Education	2007

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Introduction to Languages and Theory of Computation	John Martin	4th	Tata McGraw - Hill	2007
2	An Introduction to Formal Languages and Automata	Peter Linz	5th	Narosa publishing house	2012

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Automata Theory	Stanford University	2024	https://online.stanford.edu/courses/s-oe-yicsautomata-automata-theory
2	Introduction to Automata, Languages and Computation	IIT B	2024	https://onlinecourses.nptel.ac.in/noc21_cs19/preview

Course Title	FULLSTACKDEVELOPMENT		
CourseCode	22IS503	L-T-P	(3-0-2)4
Exam	3 Hrs.	Hours/Week	5
SEE	50 Marks	Total Hours	50 (36L+14P)
CourseObjective: The primary objective of this course is to equip students with comprehensive skills in full stack web development using the Django framework. Students will learn the Model-View- Template (MVT) architecture, design models and forms, and utilize Django's template system and generic views. The course also aims to teach students to generate various content types and manage user authentication, enabling them to create dynamic and scalable web applications.			
Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Understand the working of MVT based full stack web development with Django and Visual Studio Code.	1,5	-
2.	Designing of Models and Forms for rapid development of webpages.	3	1
3.	Analyze the role of Template Inheritance and Generic views for developing full stack web applications.	1, 4	2
4.	Apply the Django framework libraries to render non HTML contents like CSV and PDF.	1, 3	1
MODULE-1			9 Hrs.
Fundamentals of Web: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators XHTML: Origins and Evolution of HTML and XHTML, Basic Syntax, Standard XHTML Document Structure, Basic Text Markup.			
MODULE-2			9 Hrs.
MVC based Web Designing: Web framework, MVC Design Pattern, Django Evolution, Views, Mapping URL to Views, Working of Django URL Confs and Loose Coupling, Errors in Django, Wild Card patterns in URLs.			
MODULE-3			9 Hrs.
Django Templates and Models: Template System Basics, Using Django Template System, Basic Template Tags and Filters, MVT Development Pattern, Template Loading, Template Inheritance, MVT Development Pattern. Configuring Databases, Defining and Implementing Models, Basic Data Access, Adding Model String Representations, Inserting/Updating data, Selecting and deleting objects, Schema Evolution.			
MODULE-4			9 Hrs
Django Admin Interfaces and Model Forms: Activating Admin Interfaces, Using Admin Interfaces, Customizing Admin Interfaces, Reasons to use Admin Interfaces. Form Processing, Creating Feedback forms, Form submissions, custom validation, creating Model Forms, URL Conf Ticks, Including Other URL Confs. Generic Views and Django State Persistence: Using Generic Views, Generic Views of Objects, Extending Generic Views of objects, Extending Generic Views.			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Programming the World Wide Web	Robert W. Sebesta	8th	Pearson Education.	2014
2	The Definitive Guide to Django: Web Development Done Right	Adrian Holovaty, Jacob Kaplan Moss	2nd	Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers	2009

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Django Java Script Integration: AJAX and jQuery	Jonathan Hayward	1 st	Pack Publishing	2011
2	Django 3 Web Development Cookbook	Aidas Bendroraitis, Jake Kronika	4 th	Packt Publishing	2020

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Full Stack	IBM	2024	https://www.mooc-list.com/tags/full-stack#google_vignette
2	Modern Application Development	NPTEL	2020	https://nptel.ac.in/courses/106106222

EBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	The Definitive Guide to Django: Web Development Done Right	Adrian Holovaty, Jacob Kaplan Moss	2 nd	Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers	2009

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Laboratory conduction	20
Total		50

Laboratory Plan:

SINo	ProgramDetails
1	InstallationofPython,DjangoandVisualStudiocodeeditorscanbedemonstrated.
2	Creationofvirtualenvironment, Django project and App should be demonstrated
3	Develop a Django app that displays current date and time in server
4	Develop a Django app that displays date and time four hours ahead and four hours before as an offset of current date and time in server
5	Develop a simple Django app that displays an unordered list of fruits and ordered list of selected students for an event
6	Develop a layout.html with a suitable header (containing navigation menu) and footer with copyright and developer information. Inherit this layout.html and create 3 additional pages: contact us, About Us and Home page of any website.
7	Develop a Django app that performs student registration to a course. It should also display list of students registered for any selected course. Create students and courses as models with enrolment as ManyToMany field.
8	For student and course models created in Lab experiment for Module 2, register admin interfaces, perform migrations and illustrate data entry through admin forms.
9	Develop a Model form for student that contains his topic chosen for project, languages used and duration with a model called project.
10	For students enrolment developed in Module 2, create a generic class view which displays list of students and detail view that displays student details for any selected student in the list.
11	Develop example Django app that performs CSV and PDF generation for any models created in previous laboratory component.

CourseArticulationMatrix

[illegible]

Course Title	Data Visualization with Python		
Course Code	22IS504	L-T-P	(0-0-2)1
Exam	2 Hrs.	Hours/Week	2
SEE	50 Marks	Total Hours	14
Course Objective: The course aims to equip students with fundamental skills in data visualization using Python, utilizing libraries such as Matplotlib, Seaborn, Bokeh, and Plotly. Students will develop the ability to create various visualizations, analyze and interpret data, and apply these skills to support decision-making processes. Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Map to PSO's
1.	Demonstrate the use of IDLE or PyCharm IDE to create Python Applications	5	-
2.	Utilize Python libraries (Matplotlib, Seaborn, Bokeh, and Plotly) to create a variety of visualizations, analyze and interpret data to derive meaningful insights, and support decision-making.	2,3,5	1
3.	Use Python programming constructs to develop programs for solving real-world problems.	3	-
Experiments			
1.	a. Write a Python program to find the best of two test average marks out of three test's marks accepted from the user. b. Develop a Python program to check whether a given number is a palindrome or not and count the number of occurrences of each digit in the input number.		
2.	a. Define a function $F_n = F_{n-1} + F_{n-2}$. Write a Python program which accepts a value for N (where $N > 0$) as input and pass this value to the function. Display suitable error message if the condition for input value is not followed. b. Develop a Python program to convert binary to decimal, octal to hexadecimal using functions.		
3.	a. Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters. b. Write a Python program to find the string similarity between two given strings		
4.	a. Write a Python program to demonstrate how to draw a Bar Plot using Matplotlib. b. Write a Python program to demonstrate how to draw a Scatter Plot using Matplotlib.		
5.	a. Write a Python program to demonstrate how to draw a Histogram Plot using Matplotlib. b. Write a Python program to demonstrate how to draw a Pie Chart using Matplotlib.		
6.	a. Write a Python program to illustrate Linear Plotting using Matplotlib. b. Write a Python program to illustrate line plotting with line formatting using Matplotlib.		
7.	Write a Python program which explains uses of customizing seaborn plots with Aesthetic functions.		

Course Title	Entrepreneurship and Management		
CourseCode	22IS505	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: StudentswillAnalyzevariousconceptsofdifferentstylesofmotivation,company leadership, power and patent aspects. CourseOutcome: At the endofcourse,studentwill beable to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Describethethefunctionsof managementactivitiesuchasplanning, Organizationandstaffing,directingand controlling.	1,2,11	-
2	Identifyandappreciatetheethicalissuesinmanagement decision areas.	2.11	-
3	Explaintheimportanceofentrepreneurshipand entrepreneurial Process.	2, 11	-
4	Prepareaprojectreport foragivenbusinessrequirement.	6	-
MODULE-1			10 Hrs.
Management: Introduction-Meaning-NatureandFunctionsofManagement,Importance&Definition of Management, Management Functions, Roles of a Manager, Levels of Management, Managerial Skills, Management & Administration, Management as a Science, Actor Profession–Development of Management Thought-Early Management Approaches, ModernManagementApproaches Planning:Nature,Importance and Forms of Planning, Types of Plans, Steps in Planning ,Limitations of Planning, MakingPlanningEffective–DecisionMaking–Meaning,TypesofDecisions,Steps in Decision Making, CommonDifficultiesinDecision –Making.			
MODULE-2			10 Hrs.
Organization and Staffing: Meaning and Process of Organizing - Principles of Organizing - Types of Organization - Departmentalization - Committees. Centralization Vs Decentralization of Authorityand Responsibility, Nature and Importance of Staffing - Process of Selection & Recruitment (in brief). DirectingControlling:RequirementsofEffectiveDirection,MotivationTheories,Communication –Importance, Purpose- Leadership Styles, Meaning and Steps in Controlling, Need for Control, Essentials of Effective Control System.			
MODULE-3			10 Hrs.
Motivation: concept,types of motivation, theories of motivation,Leadership definition,principles,leadershipstyles,Communication:meaning,nature,communicationprocess,typesof communication,barriers to communication			
MODULE-4			10 Hrs.

Entrepreneur: Meaning of Entrepreneur: Importance of an Entrepreneur, Functions of an Entrepreneur, Types of Entrepreneurs, Concept of Entrepreneur, Concept of Entrepreneurship – Evolution of Entrepreneurship Development of Entrepreneurship, Stages in Entrepreneurial Process, Role of Entrepreneurs in Economic Development, Entrepreneurship in India, Entrepreneurship-Its Barriers
Institutional support: Introduction, Institutional Finance, Different Schemes – SSIDC, DIC.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Principles of Management	P.C. Tripathi, P.N. Reddy	7th	Tata McGrawH	2021
2	Dynamics of Entrepreneurial Development & Management	Vasant Desai	6th	Himalaya Publishing House	2011

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Entrepreneurship development and management	Dr R K Singal	2nd	S S Kataria	2013
2	Principles and practice of management	RSN Pillai	3rd	s chand	2012

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Principles of Management	P. C. Tripathi, P.N. Reddy	7 th	Tata McGraw Hill	2021

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Management: Entrepreneur Development	By Dr. Nilam Panchal B.K. School of Business Management, Gujarat University	2023	https://onlinecourses.swayam2.ac.in/cec23_mg11/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT (Visiting Startup industry)	1) Group of 3/4 visit the industry/Startup industry - 10M 2) Preparation of the report - 5M 3) Presentation - 5M	20
Total		50

CourseArticulationMatrix

Course Outcomes	ProgramOutcomes[POs]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3									3			
CO2		2									2			
CO3		2									2			
CO4						2								

Course Title	SoftwareTesting		
CourseCode	22IS551	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: Students will be able to apply effective testing techniques for developing quality software. Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the concepts of Software Testing & its documentation process	1	2
2	Apply various testing techniques in the process of software development	3	2
3	Apply different approaches of verifying and validating a software product.	3,5	-
4	Apply various project management activities	3	2
MODULE-1			10 Hrs.
A Perspective on Testing, Examples: Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, code based testing, fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The NextDate function, The commission problem, The SATM (Simple Automatic Teller Machine) problem, The currency converter, Saturn windshield wiper, Garage Door Opener. Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing: Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Equivalence classes, traditional Equivalence Class Testing Improved Equivalence Class Testing Equivalence test cases for the triangle problem, Next Date function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, cause effect graphing, Guidelines and observations.			
MODULE-2			10 Hrs.
Path Testing, Data Flow Testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Definition-Use testing, Slice-based testing, program Slicing Tools Guidelines and observations. Life cycle based testing, model based testing: Traditional waterfall testing, testing in iterative life-cycle, agile testing, agile model-driven development, Testing Based on Models Appropriate Models, Commercial Tool Support for Model-Based Testing			

MODULE-3	10 Hrs.
Integration Testing: Decomposition-based integration, call graph-based, Path-based integrations. System Testing: Threads, Basic concepts for requirements specification, Model-Based Threads, Use Case-Based Threads Long versus Short Use Cases, How Many Use Cases?, Coverage Metrics for SystemTesting,SupplementalApproachestoSystemTesting,NonfunctionalSystemTesting AtomicSystemFunctionTestingExample.	
MODULE-4	10 Hrs
Process Framework: Validation and verification, Degrees of freedom, Varieties of software. Basic principles: Sensitivity, redundancy, restriction, , partition, visibility, Feedback. The quality process, Planning and monitoring, Quality goals, Dependability properties, Analysis, Testing, Improving the process, Organizationalfactors. Planning and Monitoring the Process, Documenting Analysis and Test: Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, The quality team, Organizing documents, Test strategy document, Analysisandtestplan,Testdesignspecificationsdocuments,Testandanalysisreports.	

PrescribedText Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	SoftwareTesting,ACraftsman’sApproach	PaulC. Jorgensen	4th	Auerbach Publications	2014
2	SoftwareTestingandAnalysis– Process,Principles and Techniques	MauroPezze	-	Wiley India	2008

ReferenceBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	FoundationsofSoftware Testing	WaseemRoshen	-	PearsonEducation	2008

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	SoftwareTesting,ACraftsman’s Approach	PaulC.Jorgensen	4th	Auerbach Publications	2014

MOOCCourse:

Sl.	CourseName	Courseoffered by	Year	URL
1	Software Testing	IIIT Bangalore	2024	https://onlinecourses.nptel.ac.in/no_c20_cs77/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Threetestsconducted for 20 markseachand reducedto 10 marks	30
AAT	Anautomation project bystudents inagroupof 2-4 students.	20
Total		50

Coursearticulation Matrix:

[illegible]

Course Title	RoboticProcessAutomation		
CourseCode	22IS552	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40

CourseObjective: Students will be able to Deploy and control Bots with UiPath Orchestrator.

Courseoutcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand RPA and Learn UiPath programming techniques to deploy robot configurations and explore data extraction techniques	1	-
2	Describe the different types of variables, Control Flow and data manipulation techniques	2	-
3	Use about integrations with various popular applications such as SAP and MS Office	3,4	
4	Debug a programmed robot including logging and exception handling, Maintain code version and source control	3,5,9	2

MODULE-1

10 Hrs.

What is Robotic Process Automation?: What is Robotic Process Automation? Scope and techniques of automation Robotic process automation, About UiPath, The future of automation.
Record and Play: Record and Play, UiPath stack, Downloading and installing UiPath Studio, Learning UiPath Studio.

MODULE-2

10 Hrs.

Sequence, Flowchart, and Control Flow: Sequence, Flowchart, and Control Flow, Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, Step-by-step example using Sequence and Flowchart, Step-by-step example, using Sequence and Control flow.
Data Manipulation: Data Manipulation, Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example.

MODULE-3

10 Hrs.

Taking Control of the Controls: Taking Control of the Controls, Finding and attaching windows, Finding the control, Techniques for waiting for a control, Action on controls – mouse and keyboard activities, Working with UiExplorer, Handling events, Revisit recorder, Screen Scraping,
Tame that Application with Plugins and Extensions: Tame that Application with Plugins and Extensions, Terminal plugin, SAP automation, Java plugin.

MODULE-4

10 Hrs

Handling User Events and Assistant Bots: Handling User Events and Assistant Bots, What are assistant bots? Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event.
Exception Handling, Debugging, and Logging: Exception Handling, Debugging, and Logging, Exception handling
Managing and Maintaining the Code: Managing and Maintaining the Code, Project organization

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool – Ui Path	Alok Mani Tripathi,	-	Packtpub	March 2018.

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Learning ServiceNow	Tim Woodruff	-	Packtpub	2017

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool – Ui Path	Alok Mani Tripathi,	-	Packtpub,	March 2018.

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	AI Powered Automation	uipath	2024	https://www.uipath.com/rpa/academy

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	An automation project by students in a group of 2-4 students.	20
Total		50

Course articulation Matrix:

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

CourseTitle	ObjectOrientedModellingandDesign		
CourseCode	22IS553	L-T-P	(3-0-0)3
Exam	3Hrs.	Hours/Week	4
SEE	50Marks	TotalHours	40
CourseObjective: StudentwilllearnObject-Orientedmodellingdevelopmentdesignconceptsfor software system development Courseoutcomes: Attheendofcourse,studentwillbeableto:			
#	CourseOutcomes	Mapping toPO's	Map toPSo
1.	Understandthe conceptsof object-orientedmodelingand basicclassmodelingproblems.	1	-
2.	Drawclassdiagrams,sequencediagramsandinteractiondiagram stosolvealllife applications	2	1
3.	Applyabefittingdesignpatternforthegivenproblem.	1	-
4.	Work effectivelyinteamstopresentUMLnotations forapplications.	9,10	-
MODULE-1			10Hrs.
Introduction:WhatisObjectOrientation?WhatisOODevelopment?OOThemes.Modelingas Design Technique: Modeling, Abstraction, Three Models. Class Modeling: Object and Class Concepts, Link and Associations Concepts, Generalization and Inheritance, A Sample Class Model, Navigationof ClassModels. Advanced object and class concepts;Associationends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages. State Modeling: Events, States, Transitions and Conditions, State Diagrams, State diagram behavior.			
MODULE-2			10Hrs.
Advanced State Modeling: Advanced State Modeling, Nested State Diagrams, Nested States, SignalGeneralization,Concurrency,ASampleStateModel,RelationofClassandStateModels. Interaction Modeling: Use Case Models, Sequence Models, Activity Models. Advanced InteractionModeling:UseCaseRelationships,ProceduralSequenceModels,SpecialConstructs for Activity Models. Process Overview: Development stages, Development life cycle.			
MODULE-3			10Hrs.
System Conception: Process Overview: Development stages; Development life Cycle; System Conception:Devisingasystemconcept;elaboratingaconcept;preparingaproblemstatement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis.			

Application Analysis: Application Interaction model, Application Class Model, Application State Model, Adding Operations. **System Design:** Overview of System Design, Estimating Performance, Making a Reuse Plan, Breaking a System into Sub-systems, Identifying Concurrency, Allocation of Sub-systems, Management of Data Storage, Handling Global Resources. Choosing a Software Control Strategy, Handling Boundary Conditions, Setting the Trade-off Priorities, Common Architectural Styles.

MODULE-4

10Hrs

Implementation Modeling: Overview of implementation, Fine-tuning Classes, Fine Tuning Generalizations, Realizing Associations, Testing.

Legacy Systems: Reverse Engineering, reverse Engineering Tips, Wrapping, Maintenance.

Patterns: What is a Pattern and What Makes a Pattern? Pattern Categories, Relationships between Patterns, Pattern Description.

Design Patterns: Communication Patterns, Forwarder-Receiver, Client-Dispatcher-Server, Publisher-Subscriber

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Modelling and Design with UML	Michael Blaha, James Rumbaugh	2nd Edition	Pearson Education,	2007
2.	Pattern-Oriented Software Architecture - A System of Patterns	Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal	Volume-1	John Wiley and Sons	2008

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Object-Oriented Analysis and Design with Applications	Grady Booch et al	3 rd	Pearson Education	2007
2	Object-Oriented Analysis and Design with Applications	Booch, Jacobson, Rumbaugh	3 rd	pearson, Reprint	2013

EBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year	URL
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1	Object Oriented Modelling and Design with UML	Michael Blaha, James Rumbaugh	2 nd	Pearson Education	2012	https://www.google.co.in/books/edition/Object_oriented_Modeling_and_Design_with/MtdaFEfY0XMC?hl=en&gbpv=1&pg=PR3&printsec=frontcover
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MOOC Course:

Sl.No	CourseName	Course offered by	Year	URL
1	Object –Oriented Analysis and Design	IIT Kharagpur	2022	https://nptel.ac.in/courses/106105153

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Demonstration on a case study using OO modeling tools	20
Total		50

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3											3	
CO3	3													
CO4									3	3				

CourseTitle	ServiceOrientedArchitecture		
CourseCode	22IS554	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: Students will be able to understand and implement remote services Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the different IT architectures	1	-
2	Explain SOA based applications	2	-
3	Illustrate web service and realization of SOA	3,4	
4	Discuss RESTful services	3,5,9	2
MODULE-1			10 Hrs.
SOA BASICS: Software Architecture; Need for Software Architecture, Objectives of Software Architecture, Types of IT Architecture, Architecture Patterns and Styles, Service oriented Architecture: Service Orientation in Daily Life, Evolution of SOA, Drivers for SOA, Dimension of SOA, Key components, perspective of SOA, Enterprise-wide SOA; Considerations for Enterprise-Wide SOA: Strawman Architecture For Enterprise-Wide-SOA-Enterprise, SOA Layers, Application Development Process, SOA Methodology For Enterprise			
MODULE-2			10 Hrs.
Enterprise Applications; Architecture Considerations, Solution Architecture for enterprise application, Software platforms for enterprise Applications; Package Application Platforms, Enterprise Application Platforms, Service-oriented-Enterprise Applications; Considerations for Service-Oriented Enterprise Applications, Patterns for SOA, Pattern-Based Architecture for Service-Oriented Enterprise Application (java reference model only). Composite Applications, SOA programming models..			
MODULE-3			10 Hrs.
SOA ANALYSIS AND DESIGN; Need For Models, Principles of Service Design, Design of Activity Services, Design of Data services, Design of Client services and Design of business process services, Technologies of SOA; Technologies For Service Enablement, Technologies For Service Integration, Technologies for Service orchestration.			
MODULE-4			10 Hrs
Business case for SOA; Stakeholder OBJECTIVES, Benefits of SOA, Cost Savings, Return on Investment, SOA Governance, Security and implementation; SOA Governance, SOA Security, approach for enterprise wide SOA implementation, Trends in SOA; Technologies in Relation to SOA, Advances in SOA.			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Service–OrientedArchitectureforEnterprise Applications	Shankar Kambhampaly	2 nd	Wiley	2014

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	SOA-BasedEnterprise Integration	WaseemRoshen	-	TataMcGraw-HILL	2009

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Service–OrientedArchitecturefor Enterprise Applications	Shankar Kambhampaly	2 nd	Wiley	2014

MOOC Course:

Sl.	CourseName	Courseoffered by	Year	URL
1	Service- Oriented Architecture	UniversityofAlberta	2024	https://www.coursera.org/learn/service-oriented-architecture

Proposed Assessment Plan(for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Threetests conductedfor20 markseach andreduced to 10 marks	30
AAT	Anautomation project bystudents inagroupof 2-4 students.	20
Total		50

Course articulation Matrix:

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

Course Title	RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS		
Course Code	22RIP	L-T-P	(3-0-0) 3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
Course Objective: To give an overview of technical research activities and patenting methodology. Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Carry out Literature Review and write technical paper	2,3,4,12	-
2.	Describe the fundamentals of patent laws and the patent drafting Procedure.	4, 12	-
3.	Elucidate the copyright laws and subject matters of copyright	4, 12	-
MODULE-1			10 Hrs.
Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research. Ethics in Engineering Research: Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship. Literature Review and Technical Reading: New and Existing Knowledge, Analysis and Synthesis of Prior Art, Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward, Introduction to Technical Reading, Conceptualizing Research, Critical and Creative Reading.			
MODULE-2			10 Hrs.
Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keyword on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions. Technical Writing and Publishing: Free Writing and Mining for Ideas, Attributes and Reasons of Technical Writing, Patent or Technical Paper? — The Choice, Writing, Journal Paper: Structure and Approach: Title, Abstract, and Introduction, Methods, Results, and Discussions, Table, Figures, Acknowledgments, and Closures			
MODULE-3			10 Hrs.
Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP, Major Amendments in IP Laws and Acts in India. Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Process of Patenting: Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Do I Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications.			
MODULE-4			10 Hrs

Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Copyrights and Internet. Non-Copyright Work.

Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyright to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC).

Trademarks: Eligibility

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

Selfstudy: Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, IPO Organizations in India.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Engineering Research Methodology	Dipankar Deb, Rajeeb Dey, Valentina E, Balas	-	Springer	2019
2	Intellectual Property	Prof. Rupinder Tewari Ms. Mamta Bhardwa	8th	Professor Gurpal Singh Sandhu Honorary Director	2021

Reference Books:

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

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Engineering Research Methodology	Dipankar Deb, Rajeeb Dey, Valentina E, Balas	-	Springer	2019

MOOC Course:

Sl.	Course Name	Course offered by	Year	URL
1	Research Methodology and IPR	National Institute of Technical Teachers Training and Research, Chennai.	2024	https://onlinecourses.swayam2.ac.in/ntr24_ed08/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Threetestsconducted for 20 markseach andreduced to10 marks	30
AAT	.	20
Total		50

Course Articulation Matrix

[illegible]

Course Title	EnvironmentalStudies		
CourseCode	22EVS	L-T-P	(0-2-0)1
Exam	3 Hrs	Hours/Week	2
SEE	50 Marks	Total Hours	28
CourseObjective: The studentswillbeabletodevelopa sense ofresponsibilityabouttheenvironment, natural resources,theirconservationandUnderstandtheconcept,structureandfunctionofdifferenteecosystemsandthei ll effects of environmental pollution and other environmental issues like population growth, Acid rain, global warming etc.,.			
Course Outcomes	Attheend ofcourse, studentwillbeable to:		Mappingto PO's
#			
1.	Acquireanawarenessofandsensitivitytothetotalenvironmentanditsallied problems		7, 10
2.	Developstrongfeelingsofconcern,senseofethicalresponsibilityforthe environmentandthemotivationtoactinprotectingandimproving it.		6,8
3.	Analyzeandevaluateenvironmentalmeasuresinrealworldsituationsintermsof ecological,political,economical,societalandaestheticfactors.		6, 8, 9
MODULE-1			4Hrs.
Environment: Definition, about the Earth, Earth's Structure I.e. Atmosphere and its parts, Hydrosphere, Lithosphere andBiosphere,Ecosystem,Balancedecosystem,EffectsofhumanactivitiesonenvironmentAgricultureHousing IndustryMiningand Transportation.			
MODULE-2			8Hrs.
NaturalResources:Waterresources,AvailabilityandQuality,Waterbornediseases,Waterinduceddiseases,Fluoride problem in drinking water. Mineral Resources - Forest Resources - Material Cycles - Carbon, Nitrogen and Sulphur Cycles.			
MODULE-3			7Hrs.
Pollution:Effectsofpollution-Waterpollution-AirpollutionLandpollution-Noisepollution.			
MODULE-4			7Hrs.
CurrentEnvironmentalissuesofimportance:AcidRain,Ozonelayerdepletion - PopulationGrowth,Climatechange and Global warming. Environmental Impact Assessment and Sustainable Development Environmental Protection - Legal aspects. Water Act and Air Act.			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Environmental Studies	Dr.D.L Manjunath	-	Pearson Education	2006
2.	Environmental Studies	Dr.S.M. Prakash	-	Elite Publishers	2006

ReferenceBooks:

SL.No	Book Title	Authors	Publisher	Year
1	EnvironmentalStudies	BennyJoseph	TataMcGrawill	2005
2	PrinciplesofEnvironmental Science and Engineering	P.VenugopalaRao	PrenticeHallof India.	
3	EnvironmentalScienceand Engineering	Meenakshi	PrenticeHall India	

E Books:

Sl.No	Book Title	Authors	Edition	Publishe r	Year	URL
1	Environmental Studies	Dr.D.L Manjunath	-	Dorling Kindersley	2007	https://archive.org/details/environmentalstu0000manj/page/4/mode/2up

ProposedAssessmentPlan(for50marksof CIE):

Tool	Remarks	Marks
Internals	Twotestsconductedfor 20marks each	40
Activity1	MCQ	10
Total		50

CourseArticulationMatrix

Course Outcomes	ProgramOutcomes[POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3			3				
CO2						3		3						
CO3						3		3	3					

CourseTitle	Mini Project		
CourseCode	22IS506	L-T-P	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2
SEE	50Marks	TotalHours	28
Course Objective: Students should form batches of 3-4 members and develop applications using any technology or domain.			
#	CourseOutcomes	Mapping to PO	Mapping to PSOs
1.	Identify a real-life or engineering problem, and conduct challenge to investigate and solve.	1,2	1
2.	Utilize software engineering principles to plan and design a solution for the selected problem.	1,2,3	2
3.	Develop and test the designed solution using appropriate methods, resources, and modern tools.	3,5	1
4.	Collaborate effectively with team members and mentors, deliver presentations, and prepare comprehensive technical documentation.	9,10,11,12	1
5.	Adhere to ethical standards in all project-related activities.	8	1
Performance Indicators	Low	Medium	High
Literature Survey and Problem Definition (5Marks)	Literature Survey not pertaining to the title of the project (2M)	Incomplete literature survey and improper problem definition (3-4M)	Extensive literature survey with clear state of the art problem definition (5M)
Effective Formulation of Design strategies (10 Marks)	Has no coherent strategies for problem solving (2-4M)	Has some strategies for problem-solving, but does not apply them consistently (5-7M)	Formulates strategies for solving problems (8-10 M)
Implementation Techniques (10Marks)	No proper technique for implementation (2-4M)	Has some techniques but does not apply them consistently (5-7M)	Uses well defined implementation techniques (8-10 M)

Verification of the results (5 Marks)	No attempt at checking the incorrect solution. (2M)	The solution is correct, but not visualized efficiently (3-4M)	The solution is correct and visualized in an efficient way (5M)
Presentation/ communication (10 Marks)	Disorganized and ineffective presentation (2-4M)	Organized, but ineffective presentation (5-7M)	Effective and organized presentation (8-10 M)
Report Preparation (10 Marks)	Disorganized and contents not sufficient (2 - 4 M)	Organized but not good content wise (5-7 M)	Effectively organized and well framed contents (8-10 M)

The Open ended Project work is to be carried out in three phases:

- **Project Phase I** - Students in consultation with the guides shall carry out literature survey to finalize the topic of the project. Evaluation of the project and its feasibility is done at the end of two weeks.
- **Project Phase II** - Students are expected to present the system analysis, Requirements Specification, design carried out/ algorithms developed and intermediate results at the end of six weeks.
- **Project Phase III** - Final internal evaluation shall be taken up during this phase. This includes presentation, project demonstration and report
- **The continuous evaluation of the project phases – I, II, and III shall be carried out by the Committee consisting of Head of the department, Guide and other faculty.**

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											3	
CO2	3	3	3											3
CO3			3	3									3	
CO4									3	3	3	3	3	
CO5								3					3	

Course Title	Cryptography, Network Security and Cyber Law																						
Course Code	21IS601	L-T-P	(3-0-0) 3																				
Exam	3 Hrs.	Hours/Week	3																				
SEE	50 Marks	Total Hours	40																				
Course Objective: To impart the fundamentals of Cryptographic techniques and various algorithms that enables providing network security services. Course outcomes: At the end of course, student will be able to: <table> <tr> <th>#</th><th>Course Outcomes</th><th>Mapping to PO's</th><th>Mapping to PSO's</th></tr> <tr> <td>1.</td><td>Describe the basics of cryptographic techniques, principles & practices, Cyber security and cyber law</td><td>1</td><td>-</td></tr> <tr> <td>2.</td><td>Apply cryptographic techniques to secure the data in transit</td><td>2</td><td>-</td></tr> <tr> <td>3.</td><td>Analyze different cryptographic techniques to handle security threats</td><td>2</td><td>-</td></tr> <tr> <td>4.</td><td>Understand and adopt Cyber security and Cyber law</td><td>8</td><td>-</td></tr> </table>				#	Course Outcomes	Mapping to PO's	Mapping to PSO's	1.	Describe the basics of cryptographic techniques, principles & practices, Cyber security and cyber law	1	-	2.	Apply cryptographic techniques to secure the data in transit	2	-	3.	Analyze different cryptographic techniques to handle security threats	2	-	4.	Understand and adopt Cyber security and Cyber law	8	-
#	Course Outcomes	Mapping to PO's	Mapping to PSO's																				
1.	Describe the basics of cryptographic techniques, principles & practices, Cyber security and cyber law	1	-																				
2.	Apply cryptographic techniques to secure the data in transit	2	-																				
3.	Analyze different cryptographic techniques to handle security threats	2	-																				
4.	Understand and adopt Cyber security and Cyber law	8	-																				
MODULE-1			10 Hrs.																				
Overview: Computer Security Concepts. The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms. A Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques. Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure, The Data Encryption Standard, A DES Example, The Strength of DES, Block Cipher Design Principles.																							
MODULE-2			10 Hrs.																				
Asymmetric Ciphers: Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems, the RSA Algorithm, Diffie Hellman Key Exchange. Digital Signatures: Digital Signatures, NIST Digital Signature Algorithm. Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates.																							
MODULE-3			10 Hrs.																				
User Authentication: Kerberos, Federated Identity Management, Personal Identity Verification. Network and Internet Security: Network Access Control and Cloud Security: Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control																							
MODULE-4			10 Hrs																				
Transport-Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security, HTTPS, Secure Shell (SSH). Cyber Law: IT act aim and objectives, Scope of the act, Major Concepts, Important Provisions, Attribution, acknowledgement, and dispatch of electronic records. Regulation of certifying authorities, Penalties and adjudication, the cyber regulations appellate tribunal.																							

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Cryptography and Network Security	William Stallings	7th	Pearson Education	2018
2	Cryptography, Network Security and Cyber Laws	Bernard Menezes	-----	Cengage Learning	2010

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Network Security: Private Communication in a Public World	Charlie Kaufman, Radia Perlman, Mike Speciner	2nd	Pearson Education	2016
2	Cryptography and Network Security	Atul Kahate	3rd	Tata McGraw-Hill	2011

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Cryptography and Network Security	IITB	2024	https://nptel.ac.in/courses/106/105/106105031/ .

E-Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year	URL
1	Cryptography and Network Security. Principles and Practice	William Stallings	3 rd	Pearson Education	2007	http://williamstallings.com/Crypto3e

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	1) Implementation of cryptographic algorithm – 10 marks 2) Problem Solving test – 10 marks	20
Total		50

AAT - Implementation of cryptographic algorithm

Students are supposed to develop a Cryptographic algorithm/Digital Signature without using libraries or built-in functions. Code demonstration along with a report has to be submitted. Example: Implementation of classical encryption techniques, RSA Digital Signature algorithm, Elgamal Digital Signature, Diffie Hellman Signature, and Modified RSA algorithm for practical purpose, Public key encryption schemes and Hybrid encryption schemes.

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COs														
CO1	3													
CO2		3												
CO3		3												
CO4								3						

Course Title	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING																						
Course Code	22IS602	L-T-P	(3-0-2)4																				
Exam	3 Hrs.	Hours/Week	5																				
SEE	50 Marks	Total Hours	(50) 36L+14P																				
Course Objective: Students will be able to apply the concepts of Artificial Intelligence to construct knowledge based systems. Course outcomes: At the end of course, student will be able to: <table> <tr> <th>#</th><th>Course Outcomes</th><th>Mapping to PO's</th><th>Mapping to PSO's</th></tr> <tr> <td>1.</td><td>Elucidate different types of intelligent agents, search strategies, logic and examples of learning</td><td>1</td><td>1</td></tr> <tr> <td>2.</td><td>Analyze and formulate the problems using Artificial Intelligence and Machine Learning approaches that involve problem solving, knowledge representation, automated reasoning and learning.</td><td>2</td><td>1</td></tr> <tr> <td>3.</td><td>Develop a solution for the given problem using different intelligent agents.</td><td>3,5,9,10,12</td><td>1</td></tr> <tr> <td>4.</td><td>Apply preprocessing, modeling, evaluation, and both supervised and unsupervised machine learning algorithms to solve given problems.</td><td>2, 3</td><td>1</td></tr> </table>				#	Course Outcomes	Mapping to PO's	Mapping to PSO's	1.	Elucidate different types of intelligent agents, search strategies, logic and examples of learning	1	1	2.	Analyze and formulate the problems using Artificial Intelligence and Machine Learning approaches that involve problem solving, knowledge representation, automated reasoning and learning.	2	1	3.	Develop a solution for the given problem using different intelligent agents.	3,5,9,10,12	1	4.	Apply preprocessing, modeling, evaluation, and both supervised and unsupervised machine learning algorithms to solve given problems.	2, 3	1
#	Course Outcomes	Mapping to PO's	Mapping to PSO's																				
1.	Elucidate different types of intelligent agents, search strategies, logic and examples of learning	1	1																				
2.	Analyze and formulate the problems using Artificial Intelligence and Machine Learning approaches that involve problem solving, knowledge representation, automated reasoning and learning.	2	1																				
3.	Develop a solution for the given problem using different intelligent agents.	3,5,9,10,12	1																				
4.	Apply preprocessing, modeling, evaluation, and both supervised and unsupervised machine learning algorithms to solve given problems.	2, 3	1																				
MODULE-1			9Hrs.																				
Introduction, Intelligent agents, Searching: Definition of AI, Intelligent Agents: Agents and environment; Rationality; the nature of environments; the structure of agents. Problem-solving: Problem-solving agents; Searching for solution; Uninformed search strategies; Informed search strategies, Heuristic Functions. Local Search Algorithms and Optimization Problems: Hill-climbing search, Simulated annealing																							
MODULE-2			9 Hrs.																				
Adversarial Search, Constraint Satisfaction Problems, Logical agents, First-order logic: Games, Optimal decisioning games, Alpha-Beta Pruning, Defining Constraint satisfaction problems; Backtracking search for CSPs; Knowledge-based agents; The Wumpus world as an example world; Logic; propositional logic; Propositional theorem proving; Syntax and semantics of first-order logic; Using first-order logic;																							
MODULE-3			9 Hrs.																				
Introduction to Machine learning: Human learning and its types, Machine learning and its types, Applications, tools and issues in machine learning, Activities in machine learning, Types of data, Exploring structure of data, Data quality and Pre-processing. Modeling and Evaluation: Introduction, Selecting a model, training a model, model representation and Interpretability, Evaluating performance of a model. Learning Problems and Concept Learning: Well Posed learning problems, Designing a Learning systems, Concept Learning Tasks, Search, Find-S, Version Spaces and Candidate Elimination Algorithm, Inductive bias.																							

MODULE-4	9 Hrs
Supervised Learning: Introduction, example, classification model, classification learning steps, Common algorithms – KNN, decision tree, Random forest model. Unsupervised Learning: Supervised Vs Unsupervised, Application, clustering, Finding pattern using Association rule. Basics of Neural Networks: Exploring the artificial neuron, Types of activation function, Early implementation of ANN, Architectures of NN, Learning process in ANN, Backpropagation algorithm.	

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence-A Modern Approach	Stuart Russell and Peter Norvig	3rd	Pearson Education	2014
2	Machine Learning	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das	(INDIAN EDITION)	Pearson	2019

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence	Elaine Rich, Kevin Knight and Shivashankar B Nair	3rd	Tata McGraw-Hill	2015
2	Introduction to Artificial Intelligence and Expert Systems	Dan W Patterson	----	Pearson	2015
3	Hands-on machine learning with scikit-learn and tensorflow, Concepts, Tools, and Techniques to Build Intelligent Systems.	O'Reilly Media, Aurélien Géron,	2nd Ed	Tata McGraw-Hill	2019

MOOC Course:

SN	Course Name	Course offered by	URL
1	Introduction to artificial intelligence	Udacity	https://www.udacity.com/course/intro-to-artificial-intelligence--cs271
2	Artificial Intelligence	Columbia University	https://www.edx.org/course/artificial-intelligence-uc-berkeleyx-cs188-1x
3	Introduction to Machine Learning	IIT Madras	https://nptel.ac.in/courses/106106139/

E-Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Hands-On Machine Learning	Scikit-Learn, Keras, and TensorFlow	2nd	O'Reilly Media	2019

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Threetestsconductedfor20markseach andreducedto10marks	30
AAT	LabConduction	20
Total		50

LabExperiments

1.	Demonstrate data analysis using the “ numpy ” module.
2.	Demonstrate Exploratory Data Analysis using the “ pandas ” module.
3.	Demonstrate Data Visualization using the “ matplotlib ” module.
4.	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples.
5.	Implement and demonstrate the Candidate Elimination algorithm for finding the most specific hypothesis based on a given set of training data samples.
6.	Consider the given dataset, which demonstrates the salary distribution table of a company based on years of experience. Using the given data implement the ML algorithm (Linear Regression) to predict the salary of a new employee with 5 years of experience. Create a visualization to represent training data and regression line.
7.	Consider the Iris dataset from the sklearn.datasets module and implement the ML algorithm (k-nearest neighbors) to classify the Iris flowers among three species (Setosa, Virginica and Versicolor) from measurements of sepal and petal.
8.	Apply K-Means clustering to segment a customer dataset based on various attributes such as age, amount spent, satisfaction, and brand loyalty.
9.	Consider the given Iris dataset and implement the ML algorithm to classify the Iris flowers among three species (Setosa, Virginica and Versicolor) from measurements of sepal, petal length and width. (using Decision Tree Algorithm)
10.	Implement an Artificial Neural Network (ANN) using TensorFlow to predict customer churn based on bank customer data.

Course Articulation Matrix

[illegible]

CourseTitle	CLOUDCOMPUTING		
CourseCode	22IS603	L-T-P	(3-0-2)4
Exam	3Hrs.	Hours/Week	5
SEE	50Marks	TotalHours	(40) 26L+14P
CourseOutcomes: Attheendofthecourse,studentwillbeableto:			
#	CourseOutcomes	Mappingto PO's	Mapping toPSO's
1	ElucidatetheconceptsofCloudComputingarchitectureanditsdesign challenges	2	-
2	DescribethetheprinciplesofParallelandDistributedComputing.	2	-
3	Identifyresourcemanagementfundamentals,i.e.resource abstraction, sharing and sandboxing.	3,5	2
4	Applyprinciplesofbestpracticeincloudapplicationdesignand management.	3,5	2
Module -1			
			09Hrs.
Cloudcomputingbasics: cloudcomputingoverview,deploymentmodels applications,intranetsandthe cloudfirstmoversinthecloud.Yourorganizationandcloudcomputing:whenyoucanusecloud Computing, benefits limitations, security concerns, regulatory issues.			
Module -2			09Hrs.
Cloudcomputingwiththetitans: Google,Microsoft,Amazon,salesforce.comthebusinesscaseorGoingto the cloud: cloud computing services, howthose applicationshelp your business, deleting your datacenter, thomsons routers. Cloud computing technology: hardware and infrastructure clients, security,network,services.			
Module -3			09Hrs.
Cloud storage: overview, cloud storage providers, standards: application, client, infrastructure, service Cloudcomputingatwork:softwareasaservice:overview,drivingforces,companyofferings,industries Software plus services: overview, mobile device integration, providers, Microsoft online.			
Module -4			09Hrs.
Software plus services Developing applications: Google, Microsoft, troubleshooting, Application management.Localcloudsandthinclients:virtualizationinyourorganization,serversolutions,thinclients, case study. Migrating to the cloud: cloud services for individuals, cloud services aimed at mid Market,enterprisecloudofferings,migration.			

PrescribedTextBooks:

I.No	Book Title	Authors	Edition	Publisher	Year
1	CloudComputing- A practical approach	Anthony T. Velte, Toby J. Velte, RobertElsenpeter	3rd	McGrawHill publication	2010

ReferenceBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	CloudComputing: Theory and Practice	Dan CMarinescue	1st	MK publishers	2017
2	MasteringCloud Computing	RajkumarBuyya, ChristianVecchiola, S.ThamaraiSelvi	5th	McGraw Hill publication	2021

EBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	CloudComputing- A practical approach	Anthony T. Velte, TobyJ.Velte,Robert Elsenpeter	3rd	McGrawHill publication	2010
2.	CloudComputing: Theoryand Practice	Dan CMarinescue	1st	MK publishers	2017

MOOCCourse:

Sl.No	CourseName	Course offered by	Year	URL
1	Cloudcomputing	BITS,Pilani	2023	https://bits-pilani-wilp.ac.in/bitspilani-campaign/campaign-SEM1/cloud-computing
2	Cloudcomputing	ByProf.Soumya Kanti Ghosh, IITKharagpur	2023	https://onlinecourses.nptel.ac.in/noc24_cs17/preview

ProposedAssessmentPlan(for50marksofCIE):

Tool	Remarks	Marks
Internals	Threetestsconductedfor20markseachand reduced to 10 marks	30
AAT	LaboratoryConduction	20
Total		50

Course Title	Main Project Phase - 1		
Course Code	22IS604	L-T-P	(0-0-2)2
CIE	100 Marks	Hours/Week	2

Course Outcomes:

At the end of the course, student will be able to:

#	Course Outcomes	Mapping To PO	Mapping To PSOs
1.	Identify a problem, through Extensive literature Survey leading to Publication of a survey paper.	1,2	-
2.	Plan & design the solution to the chosen problem	3	2
3.	Make oral presentation and documentation of the work carried out	9,10	-

During VII semester, Candidates in consultation with the guides shall carry out literature survey to finalize the topic of the project. Students are expected to present the project synopsis, system analysis, Requirements Specification and **should publish a technical paper on Literature Survey.**

Project Phase1–Team Formation, Topic Selection & Guide allotment

Project Phase2–Extensive Literature Survey, Problem Definition

Project Phase3–System Design, Report Preparation and Publication

The evaluation of the project phases shall be carried out by the evaluation committee comprising of project guide & other faculty members. The committee will be constituted by the project coordinator in consultation with the Head of the department.

The topic chosen during Mini Project3 will be continued & implemented during eighth semester

Performance Indicators	Low	Medium	High
Literature Survey And Problem Definition (30 Marks)	Literature Survey not Pertaining to the title of the project	Incomplete literature Survey and improper problem definition	Extensive literature survey with clear state of the art problem definition
Design (10Marks)	Has no coherent strategies for problem Solving	Has some strategies for problem – solving, But does not apply The m consistently	Formulates strategies for solving problems
Presentation/ communication (20 Marks)	Disorganized and ineffective presentation	Organized, but ineffective presentation	Effective organized presentation
Report Preparation (20 Marks)	Disorganized and contents not sufficient	Organized but not good content wise	Effectively organized and well framed contents
Paper Publication (10Marks)	Paper submitted & awaiting results	National conference International Conference	Journal

Punctuality(Project Dairy Maintenance) (10marks)	Not meeting the Guide regularly	Meeting regularly but doesn't document details of every session	Up to date dairy maintenance
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Course Articulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	3
CO3	-	-	-	-	-	-	-	-	3	3	-	-	-	-

Course Title	Data Mining and Warehousing		
Course Code	22IS661	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
Course Objective: Students will be able to select right data mining technique to extract useful patterns. Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Acquire the knowledge of data quality and data pre-processing	1	-
2.	Explain the process of Data Mining, Classification and Association Analysis	2,3	-
3.	Acquire the knowledge of Data Warehouse design, Modelling and usage	3	-
4.	Do the cluster analysis and explain the application of data mining	2	2
MODULE-1			10 Hrs.
Introduction, Data: Why Data Mining? What is Data Mining? What kinds of data can be mined?, What kinds of pattern can be mined?, Which technologies are used? Major issues in data mining. Getting to know your data: Data objects and attribute types, Basic statistical description of data : measuring the central tendency, Measuring the dispersion of data, measuring data similarity and dissimilarity			
MODULE-2			10 Hrs.
Data Pre-processing: Data Pre-processing: An overview, Data cleaning, Data integration, Data Reduction: overview of data reduction strategies, wavelet transforms, Principal component analysis, attributes subset selection, Data Transformation: min-max normalization and Z-score normalization. Data Warehouse and online Analytical processing: Data Warehouse: Basic Concepts, Data Warehouse modelling: Data cube and OLAP, Data warehouse design and usage: A business analysis framework for data warehouse design, Data warehouse design process, Data warehouse usage for information processing			
MODULE-3			10 Hrs.
Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Rule-based classification, K- Nearest-neighbour Classifier. Mining frequent patterns Association and correlations: basic concepts and methods: Basic Concepts, Frequent item set mining methods: Apriori Algorithm, generating association rules from frequent item sets, Improving the efficiency of Apriori, A Pattern growth Approach for Mining Frequent item sets.			

MODULE-4	10 Hrs
Cluster Analysis: Basic Concepts and Methods, Cluster Analysis, Partitioning Methods, Agglomerativeversusdivisivehierarchicalclustering,DBSCAN.DataMiningTrendsand researchfrontiers:DataminingApplications,Dataminingandsociety,Dataminingtrends	

PrescribedText Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	DataMining– Concepts and Techniques	JiaweiHanand Micheline Kamber	4 th	Morgan Kaufmann	2012
2	Introductionto DataMining,,	Pang-Ning Tan, Michael Steinbach,VipinKumar,	2 nd	Pearson Education	2014

ReferenceBooks:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	1.Insightinto Data Mining– Theory and Practice, ,	K.P.Soman, ShyamDiwakar, V. Ajay,	4th	PHI	2006

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	DataMining– Concepts and Techniques	JiaweiHanand Micheline Kamber	4 th	Morgan Kaufmann	2012

MOOCCourse:

Sl.No	CourseName	Courseoffered by	Year	URL
1	Datawarehousing and mining	IIT	2022	https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ar10/

ProposedAssessmentPlan(for50marksof CIE):

Tool	Remarks	Marks
Internals	Threetestsconductedfor20markseach and reduced to 10 marks	30
AAT	1)Quiz-10 3)Assignment–10	20
Total		50

CourseArticulationMatrix

[illegible]

Course Title	BigData Technologies		
CourseCode	22IS662	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: Acquiretheknowledge,skillsandtoolstomanagebig data CourseOutcomes: At theendofcourse,studentwill beable to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describebigdataconcepts,databasemodelsandbigdata techniques	1	-
2.	DescribearchitecturalelementsofHDFS,MapReduce, YARN,SparkandStorm	1	-
3.	Apply big data concepts and techniques to address issues in a given scenario	1	1
4.	DesignMapreducesolutionorHbasequeryforagiven problem	3	1
Module-1			10 Hrs
IntroducingHadoopandSeeingWhatIt’sGoodfor –BigDataandtheNeedforHadoop,The OriginandDesignofHadoop,ExaminingtheVariousHadoopOfferings. UseCasesforBigData in Hadoop – The Keys to Successfully Adopting Hadoop, Log Data Analysis, Data Warehouse Modernization,Frauddetection,Riskmodeling,SocialSentimentAnalysis,ImageClassification, GraphAnalysis,ToInfinityandBeyond.			
StoringDatainHadoop:TheHadoopDistributedSystem –DataStorageinHDFS,Sketching Out the HDFS Architecture, HDFS Federation, HDFS High Availability.			
Module-2			10 Hrs
MapReduceProgramming –ThinkinginParallel,SeeingtheImportanceofMapReduce,Doing Things in Parallel: Breaking Big Problems into Many Bite-Size Pieces, Writing MapReduce Applications, Getting Your Feet Wet: Writing a Simple MapReduce Application.			
FrameworksforProcessingDatainHadoop:YARNandMapReduce –RunningApplication Before Hadoop 2, Seeing a World Beyond MapReduce, Real-time and Streaming Applications. Statistical Analysis in Hadoop – PumpingUpYourStatisticalAnalysis,Machine LearningwithMahout,Ron Hadoop.			
Module-3			10 Hrs
HadoopandtheDataWarehouse: FriendsorFoes? –ComparingandContrastingHadoop withRelationalDatabases,ModernizingtheWarehousewith Hadoop.			

Extremely Big Tables: Storing Data in HBase – SayHello to HBase, Understanding the HBase Data Model, Understanding the HBase Architecture, Taking HBase for a Test Run, Getting Things Done with HBase, HBase and the RDBMS world.

Module-4	10 Hrs
Introducing Spark: Spark's Background and History, Common Use Cases for Spark, Understanding How Spark Processes Information, How Spark Benefits the Entire Organization, Core Spark Technology Components, Comparing Hadoop/MapReduce and Spark, Spark's Open-Source Challenges. How Spark, Hadoop and MapReduce Work Together: Choosing the Optimal Big Data Solution, Big Data in Action. Storm – What is storm? Storm architecture, Why Storm? Industry Use cases of storm (refer online material for storm)	

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Hadoop for Dummies	Dirk de Roos, Paul C. Zikopoulos, Bruce Brown, Rafael Coss, Roman B. Melnyk	2nd	John Wiley & Sons, Inc	2017
2.	Robert D. Schneider and Jeff Karmiol	Spark for Dummies	2nd IBM Limited	John Wiley & Sons, Inc	2019

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Big data and Analytics	Seema Acharya, Subhashini Chellappan		Wiley publications	2014
2	Hadoop Operations other text for spark and storm tex	Eric Sammer		O'Reilly,	2012

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Hadoop for Dummies	Dirk de Roos, Paul C. Zikopoulos, Bruce Brown, Rafael Coss, Roman B. Melnyk	2nd	John Wiley & Sons, Inc	2017

MOOCCourse:

Sl.No	CourseName	Course offeredby	Year	URL
1	Big Data Computing	Dr. Rajiv Misra,IIT Patna	2024	https://nptel.ac.in/courses/106104189

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Threetestsconductedfor20markseachand reducedto10 marks	30
AAT	MiniProject	20
Total		50

CourseArticulationMatrix

[illegible]

CourseTitle	MOBILECOMPUTINGANDAPPLICATIONS		
CourseCode	22IS663	L-T-P	(3-0-0)3
Exam	3Hrs.	Hours/Week	3
SEE	50Marks	TotalHours	40
CourseObjective: Studentswillbeabletoapplysolutionstomobilecomputingapplications.			
CourseOutcomes: Attheendofcourse,studentwillbeableto:			
#	CourseOutcomes(CO)	Mappingto POs	Mappingto PSOs
1.	ElucidatethevariousmethodologiesusedinWirelessCommunication Networks.	2	-
2.	Analyzevariousprotocolsofalllayersformobileandad hoc wireless Communicationnetworks.	2	-
3.	Demonstrateandapplytheknowledgeforcellularnetworksdesign	2,5	-
4.	Developskillsoffindingsolutionsandbuildingsoftwareformobile computing applications using wireless languages and J2ME	2,5	2
MODULE-1			10Hrs.
Introduction: Mobile computing, Types of Networks, Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing, Global system for mobile communication(GSM), Short Service Message (SMS), GSM Architecture, Entities, Call services, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, Mobility Management, GSM Frequency Allocation, Mobile Computing Over SMS, Short Message Service(SMS), Value Added Services through SMS			
MODULE-2			10Hrs.
GPRS:GPRSandPacketDataNetwork,GPRSNetworkArchitecture,GPRSNetworkOperations,Data Servicesin GPRS, ApplicationsforGPRS,Billingand CharginginGPRS.CDMA 3G andWiMAX: Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data.			
MODULE-3			10Hrs.
MobileClient:Movingbeyonddesktop,Mobilehandsetoverview,Mobilephonesandtheirfeatures, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6, Mobile OS .			
MODULE-4			10Hrs.
MobileInternetApplications:ThinclientArchitecture,theclient,Middleware,messagingServers, ProcessingaWirelessrequest,WirelessApplicationsProtocol(WAP)Overview,WirelessLanguages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Mobile Computing, Technology, Applications and Service Creation	Dr. Ashok Talukder, Ms Roopa Yavagal, Mr . Hasan Ahmed	2nd	McGraw Hill publication	2017
2.	Mobile and Wireless Design Essentials	Martyn Mallik	3rd	Wiley	2003

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Mobile Computing	Raj kamal	3rd	Oxford University Press	2019
2	Wireless Communications and Networks, 3G and Beyond	Iti Saha Misra	2nd	McGraw Hill publication	2013

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Mobile Computing, Technology, Applications and Service Creation	Dr. Ashok Talukder, Ms Roopa Yavagal, Mr . Hasan Ahmed	2nd	McGraw Hill publication	2017

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Mobile computing	coursera	2023	https://www.mooc-list.com/tags/mobile-computing

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	1) Develop the mobile computing application – 10M 2) Presentation – 5M 3) Preparation of the project report – 5M	20
Total		50

Course Title	Blockchain Technology		
Course Code	22IS664	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
Course Objective: The course provides the fundamentals, models and technologies of Block chain Course outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Understand the types, benefits and limitations of blockchain and bitcoin.	1	-
2.	Explore the blockchain decentralization, cryptography concepts and smart contracts	2	-
3.	Comprehend the blockchain applications outside of currencies	1	-
4.	Demonstrate topics and participate in quizzes to assess knowledge.	9,10,12	-
MODULE-1			10 Hrs.
Blockchain 101: Distributed systems, History of blockchain: Introduction to Blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.			
MODULE-2			10 Hrs.
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Introducing Bitcoin: Bitcoin definition, Transactions, Blockchain, Bitcoin Payments			
MODULE-3			10 Hrs.
Alternative Coins: Bitcoin limitations, Namecoin, Litecoin Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Ethereum Network, Components of the Ethereum blockchain(bird's eye view)			
MODULE-4			10 Hrs
Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media.			

Prescribed Text Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Mastering Blockchain - Distributed ledgers, Decentralization and smart contracts explained	Imran Bashir	3rd	Packt Publishing Ltd	2017
2	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Arvind Narayanan, Joseph Bonneau, Edward W. Felten, Andrew Miller, Steven Goldfeder and Jeremy Clark.,	2nd	Princeton University Press	2016

Reference Books:

Sl.No	BookTitle	Authors	Edition	Publisher	Year
1	Blockchain Basics: A Non-Technical Introduction in 25 Steps,	Daniel Drescher	First Edition	Apress	2017
2	Mastering Bitcoin: Unlocking Digital Cryptocurrencies	Andreas M. Antonopoulos	First Edition	O'Reilly Media	2014

E Books:

SL.No	BookTitle	Authors	Edition	Publisher	Year
1	Mastering Blockchain - Distributed ledgers, Decentralization and smart contracts explained	ImranBashir	3rd	ISBN 978-1-78712-544-5	2017
2	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Arvind Narayanan, Joseph Bonneau, Edward W. Felten, Andrew Miller, Steven Goldfeder and Jeremy Clark.,	2nd	Princeton University Press	2016

MOOC Course:

SL.No	Course Name	Course offered by	Year	URL
1	Blockchain and its Applications	By Prof. Sandip Chakraborty, Prof. ShamikSural, IIT Kharagpur	2022	https://onlinecourses.nptel.ac.in/noc22_cs44/preview
5	Blockchain	Dr.Mayank Aggarwal , Gurukul Kangri Vishwavidyalaya, Haridwar		https://onlinecourses.swayam2.ac.in/aic21_ge01/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20marks each and reduced to 10 marks	30
AAT	Presentation on course related topic-10Marks Quiz- 10 Marks	20
Total		50

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3												
CO3	3													
CO4									3	3		3		

Course Title	Webprogramming		
Course Code	21OEIS61	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: Students will be able to develop web applications. Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the fundamentals of world wide web and web programming languages such as HTML, XHTML, Javascript .	1	-
2	Apply the different scripting languages for dynamic web page development.	2	-
3	Knowledge in server-side programming languages and database management systems with their web applications	1	
4	Design and develop web solutions for real time applications.	5,9,10	2
MODULE-1			10 Hrs.
Fundamentals of Web: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, HTTP, Security. XHTML: Origins and Evolution of HTML and XHTML, Basic Syntax, Standard XHTML Document Structure, Basic Text Markup, Images, Hypertext Tables, Forms, The Audio Element, The Video Element, Syntactic Difference between HTML and XHTML.			
MODULE-2			10 Hrs.
Cascading Style Sheets: Sheets, Style Specification Formats, Selector Forms, Property Value Forms, Font Properties, List Properties, Colour, Alignment of Text, The Box Model, Background Images, The and <div> Tags, Conflict Resolution. The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation, and Modification, Arrays, Functions, Constructors, Pattern Matching Using Regular Expressions, Errors in Scripts.			
MODULE-3			10 Hrs.
JavaScript and XHTML Documents: The JavaScript Execution Environment, The Document Object Model, Element Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from The Text Box and Password Elements Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colours and Fonts. Introduction to XML: Introduction, uses of XML, The Syntax of XML, Displaying Raw XML Documents, Displaying XML Documents with CSS.			
MODULE-4			10 Hrs
Introduction to PHP: Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching.			

Database Access Through the Web: Relational Databases, An introduction to Structured Query Language (Review), Architectures for Database Access, The MySQL Database System, Database Access with PHP and MySQL.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Programming the World Wide Web	Robert W. Sebesta	8 th	Pearson Education.	2014

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Web Programming Building Internet Applications	Chris Bates	3rd	Wiley India	2014
2	Open Source Web Development with LAMP	James Lee, Brent Ware		Pearson Education	2013

E Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Programming the World Wide Web	Robert W. Sebesta	8 th	Pearson Education.	2014

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Modern Application Development	IIT Madras	2022	https://www.shiksha.com/online-courses/modern-application-development-course-nptel812

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Web Page Design and Development	20
Total		50

CourseArticulationMatrix

Course Outcome s	ProgramOutcomes[POs]													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3													
CO2		3												
CO3	3													
CO4					3				3	3				3

Course Title	Java Programming		
CourseCode	21OEIS62	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
CourseObjective: Apply the principles of data science for solving real time problems. Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Comprehend the fundamental concepts Object Oriented Programming	1,2	1
2.	Apply Object Oriented constructs for program development	2	1
3.	Analyze a Java program for identifying bugs	2,3	1
4.	Analyze demonstration showing the effective handling of exceptions, as well as understand the implementation of inheritance in Java packages.	5	1
MODULE-1			10 Hrs.
Object Oriented Concepts and Java: Concepts of Object-Oriented programming language: Object, Class, Message passing, inheritance, encapsulation, and polymorphism Difference between OOP and other conventional programming – advantages and disadvantages of OOP. Introduction to Java: Java and Java Applications, Java Development Kit (JDK), The Byte Code, The Java Buzzwords, Simple Java Programs using Control Statements and Blocks of code, Lexical Issues. Data Types, Variables, and Arrays The primitive Types, Integers, Floating-Point Types, Characters, Booleans, Variables, Type conversion and Casting, Arrays, Strings.			
MODULE-2			10 Hrs.
Operators: Arithmetic, Bitwise, Relational, Boolean Logical, Assignment Operator, The ‘?’ Operator, Operator Precedence. Program Control Statements: Input characters from the Keyboard, if statement, Nested if, 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-3			10 Hrs.
Introducing Classes, Objects and Methods: Class Fundamentals, Declaring Objects, Object Reference Variables, Methods, Constructors, the “This” keyword, Garbage collection, Overloading Methods, and constructors, Argument Passing, Returning Objects, Access Control, Nested and Inner Classes.			

MODULE-4	10 Hrs
Inheritance, Packages, and Interfaces: Inheritance Basics, Using Super, Multilevel Hierarchy, When Constructors are called, Method Overriding, Abstract Classes. Packages, Access Protection, Importing Packages, Interfaces Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and Catch, Multiple catch Clauses, throw, Java's Built-in Exceptions, Customized exceptions.	

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	JavatheComplete Reference	Herbert Schildt	9 th	TataMcGraw Hill	2021
2	Programmingwith JAVA	Bala Guruswamy	7 th	Pearson	

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	IntroductiontoJAVA Programming	Y.DanielLiang	9 th	Pearson Education,2019	2019

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Programming In Java	Swayam	2021	https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals:	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT:	The student must present a demonstration of one program from the following list.	20
Total		50

Course Title	Internet of things		
Course Code	21OEIS63	L-T-P	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
SEE	50 Marks	Total Hours	40
Course Objective: Students will be able to develop IoT applications. Course Outcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Understand the fundamentals and applications of IoT, its Architecture, Design Principles and Standards	1	-
2	Apply programming skills to design IoT applications	3	-
3	Appraise the role of IoT protocols for efficient network communication.	2	2
4	Design and Implement applications of IoT and make presentation in team	5, 10	2
MODULE-1			7 Hrs
Introduction to Internet of Things: Definition and characteristics of IoT, Physical design of IoT, Things in IoT, IoT Protocols, Logical Design, IoT functional blocks, IoT communication Models, IoT communication API's, IoT enabling Technologies Wireless sensor networks, Cloud Computing, Big Data Analytics, Communication protocols, embedded systems. IoT levels and deployment template Domain specific IoTs, - IoT levels, Introduction, Home Automation; Cities; Environment; Energy; Retail; Logistics; Agriculture; Industry; Health & Lifestyle.			
MODULE-2			7 Hrs
IoT and M2M IoT System management with NETCONF-YANG Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking, network function virtualization Need for IoT Systems management; SNMP; Network Operator Requirements; NETCONF; IoT platform Design Methodology - IoT Design Methodology; Introduction; Case Study on IoT System for Weather Monitoring,			
MODULE-3			7 Hrs
IoT Physical Devices and End points - What is an IoT device; Exemplary Device- Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces, Other IoT devices. IoT Physical Servers & Cloud Offerings: Amazon Web Services for IoT, Amazon S3, Amazon RDS.			
MODULE-4			7 Hrs
Case studies illustrating IoT Design: Introduction to IoT Design, Home Automation, Smart Lighting, Home Intrusion Detection, Cities, Smart Parking. Data Analytics for IOT- Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis.			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Internet of Things-A Hands on Approach	Arshdeep Bahga and Vijay Madiseti		Universities Press	2015

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	The Internet of Things: Key Applications and Protocols	Olivier Hersent, David Boswarthick, Omar Elloumi,	2nd		2012
2	Internet of Things: A Hands-On Approach Vijay Madiseti	Vijay Madiseti, Arshdeep Bahga	1st		2014

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Design for Internet of things	IISC Bangalore	2017	https://nptel.ac.in/courses/108/108/108108098/

E-Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Internet of Things - A Hands on Approach	Arshdeep Bahga and Vijay Madiseti		Universities Press	2015

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Project on Realtime IOT Applications	20
Total		50

CourseArticulationMatrix

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

CourseTitle	DataScience		
CourseCode	21OEIS64	L-T-P	(3-0-0)3
Exam	3Hrs.	Hours/Week	3
SEE	50Marks	Total Hours	40
CourseObjective: Apply the principles of data science for solving real time problems. Courseoutcomes: At the end of course, student will be able to:			
#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Understanding of techniques for data acquisition, cleaning, transformation, and storage.	1	1
2.	Describe various Data Science process like statistical modelling, Exploratory data analysis, Data visualization.	1	1
3.	Apply various feature selection algorithms for effective decision making.	3	1
4.	Develop effective visualization for the given data using R	5	1
MODULE-1			10Hrs.
Introduction: What is Data Science? Big Data and Data Science hype-and getting past the hype, Why now? – Datafication, Current landscape of perspectives, Skill sets needed. Statistical Inference- Populations and samples, Statistical modelling, probability distributions, fitting a model.			
MODULE-2			10 Hrs.
Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. The Data Science Process, Case Study: RealDirect (online real estate firm). Three Basic Machine Learning Algorithms - Linear Regression			
MODULE-3			10 Hrs.
k-Nearest, Neighbors (k-NN), k-means. One More Machine Learning Algorithm and Usage in Applications - Motivating application: Filtering Spam. Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web.			
MODULE-4			10 Hrs
Feature Generation and Feature Selection Motivating Application: user (customer) retention, Feature Generation Feature Selection algorithms, Filters; Wrappers; Decision Trees, Random Forests. Data Visualization - Data Visualization History, What Is Data Science, Redux?, A Sample of Data Visualization Projects			

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Doing Data Science, Straight Talk from The Frontline.	Cathy O'Neil and Rachel Schutt		O'Reilly	2019

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Mining of Massive Datasets	Jure Leskovec, Anand Rajaraman and Jeffery Ullman	3th	Tata McGraw-Hill	2004
2	Machine Learning: A Probabilistic Perspective	Kevin P. Murphy.	5th	Narosa publishing house	2013

MOOC Course:

Sl.No	Course Name	Course offered by	Year	URL
1	Data Science for Engineers	Swayam	2021	https://onlinecourses.nptel.ac.in/noc21_cs69/preview
2	Generative AI for Data Scientists Specialization	coursera	2022	https://www.coursera.org/specializations/generative-ai-for-data-scientists

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals:	Three tests conducted for 20 marks each and reduced to 10 marks	30
AAT	Students must provide demonstrations on Linear Exploratory Data Analysis, Linear Regression, k-Nearest Neighbors (k-NN), k-means clustering, and Naive Bayes using the R language.	20
Total		50

Course Title	Swayam NPTEL		
CourseCode	22SW01	L-T-P	(0-1 (A)-0)A
As part of the curriculum, students are required to register and complete one “Swayam NPTEL” course from the department-approved list. This entails: 1. Course Registration: Choose and register for any one course from the designated Swayam NPTEL courses. 2. Assignments: Complete assigned coursework and assignments as stipulated by the chosen Swayam course. 3. Examination: Take and pass the final examination for the course. 4. Certificate Submission: Submit the completion certificate to the department as proof of successful course completion.			