MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belagavi)

Autonomous Programme

Bachelor of Engineering

Department Of
Information Science and Engineering

SCHEME and SYLLABUS

(2024 Admitted Batch)

Academic Year 2025-26

MALNAD COLLEGE OF ENGINEERING, HASSAN
(An Autonomous Institution Affiliated to VTU, Belagavi)
DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

VISION OF THE INSTITUTE

To be an institute of excellence in engineering education and research, producing socially responsible professionals.

MISSION OF THE INSTITUTE

1. Create conducive environment for learning and research
2. Establish industry and academia collaborations
3. Ensure professional and ethical values in all institutional endeavors

VISION OF THE DEPARTMENT

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

MISSION OF THE DEPARTMENT

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.

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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)

1. **Engineering knowledge**: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
3. **Design/Development of solutions**: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
4. **Conduct investigations of complex problems**: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).
5. **Engineering tool usage**: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
6. **The engineer and the world**: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PROGRAM OUTCOMES (POs)

7. **Ethics**: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

8. **Individual and collaborative team work**: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary settings.

9. **Communication**: Communicate effectively and inclusively within the community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

10. **Project management and finance**: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

11. **Life-long learning**: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAM SPECIFIC OUTCOMES

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
CIE 1	**10**
CIE 2	**10**
CIE 3	**10**
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

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COURSE TYPES

Basic Science Course	BSC
Engineering Science Course	ESC
Emerging Technology Course	ETC
Programming Language Course	PLC
Professional Core Course	PCC
Integrated Professional Core Course	IPCC
Professional Core Course Laboratory	PCCL
Professional Elective Course	PEC
Open Elective Course	OEC
Project/Mini Project/Internship	PI
Humanities and Social Sciences, Management Course	HSMC
Ability Enhancement Course	AEC
Skill Enhancement Course	SEC
Universal Human Value Course	UHV
Non-credit Mandatory Course	MC

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Semester-wise Credit Distribution

Curricular Component ↓ / Semester →	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total Credits**
Basic Science Course (BSC)	8	8	4	5	-	-	-	-	**25**
Engineering Science Course (ESC)/ Emerging Technology Course (ETC)/Programming Language Course	9	9	3	3	-	-	-	-	**24**
Professional Core Course (PCC)	-	-	12	12	12	11	8	-	**55**
Professional Elective Course (PEC)	-	-	-	-	3	3	3	3	**12**
Open Elective Course (OEC)	-	-	-	-	-	3	3	3	**9**
Project/Mini Project/Internship (PI)	-	-	-	-	1	2	4	10	**17**
Humanities and Social Sciences, Management Course (HSMC)	1	2	-	-	4	-	-	-	**7**
Ability Enhancement Course (AEC)/ Skill Enhancement Course (SEC)	2	1	1	1	3	1	-	-	**9**
Universal Human Value Course (UHV)	-	-	1	1	-	-	-	-	**2**
Total Credits	**20**	**20**	**21**	**22**	**23**	**20**	**18**	**16**	**160**

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	THIRD SEMESTER										
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	BSC	24MAIS301	Mathematics for Information Science Engineering	42	28	0	20	90	50	50	100	3
2	IPCC	24IS302	Digital Design & Computer Organization	42	0	28	50	120	50	50	100	4
3	IPCC	24IS303	Operating Systems	42	0	28	50	120	50	50	100	4
4	PCC	24IS304	Data Structures and Applications	42	0	0	48	90	50	50	100	3
5	PCCL	24IS305	Unix Lab	0	0	28	2	30	50	50	100	1
6	ESC	24IS306X	ESC/ETC/PLC	28	0	28	34	90	50	50	100	3
7	UHV	24SCR	Social Connect and Responsibility	0	0	2	0	24	100	-	100	1
8	AEC/SEC	24IS307X	Ability Enhancement Course/Skill Enhancement Course - III	If the course is a Theory					50	50	100	1
				14	0	0	16	30				
				If the course is a laboratory								
				0	0	28	2	30				
9	PCCL	24IS308	Data Structures and Applications laboratory	0	0	28	2	30	50	50	100	1
10	MC	24NYP1	NSS,YOGA,PE	0	0	24	0	24	100	-	100	A
11	BSC	24BCM301	Bridge Mathematics-I (Mandate Audit Course for Diploma entry students)	3	0	0		*3	100	-	100	A
Total								648	600	400	1000	22
Note: AEC, SEC, ETC courses are to be chosen suitably by the BOS of the programme												

Engineering Science Course (ESC/ETC/PLC)			
24IS306A	OOP with Java	24IS306C	Discrete Mathematical Structures
24IS306B	OOP with C++	24IS306D	Graph Theory and Combinatorics
Ability Enhancement Course – III			
24IS307A	R Programming	24IS307C	Competitive Coding
24IS307B	Data Analytics with Excel	24IS307D	Version Controller with GiT

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	FOURTH SEMESTER										
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	IPCC	24IS401	Software Engineering	42	0	28	50	120	50	50	100	4
2	IPCC	24IS402	Microprocessor and Microcontroller	42	0	28	50	120	50	50	100	4
3	IPCC	24IS403	Database management Systems	42	0	28	50	120	50	50	100	4
4	PCC	24IS404	Design and Analysis of Algorithms	42	0	0	48	90	50	50	100	3
5	ESC	24IS405X	ESC/ETC/PLC	28	0	28	28	90	50	50	100	3
6	UHV	24UHV	Universal Human Values	0	0	28	2	30	50	50	100	1
7	AEC/SEC	24IS406X	Ability Enhancement Course/Skill Enhancement Course - IV	If the course is a Theory					50	50	100	1
				14	0	0	16	30				
				If the course is a laboratory								
				0	0	28	2	30				
8	MC	24NYP2	NSS,YOGA,PE	0	0	24	0	24	100	-	100	A
9	BSC	24BEIS407	Biology for Engineers	0	0	28	2	30	50	50	100	1
10	PCCL	24IS408	Design and Analysis of Algorithms laboratory	0	0	28	2	30	50	50	100	1
			Total					684	550	450	1000	22
	Note: AEC, SEC, ETC courses are to be chosen suitably by the BOS of the programme											

Engineering Science Course (ESC/ETC/PLC)			
24IS405A	C# and .Net Technologies	24IS405C	Optimization Techniques
24IS405B	Internet of Things	24IS405D	Probability, Statistics and queuing
Ability Enhancement Course – III			
24IS406A	Green IT and Sustainability	24IS406C	Introduction to web technology
24IS406B	UI/UX laboratory	24IS406D	Technical writing using LATEX

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	FIFTH SEMESTER											
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	IPCC	24IS501	Computer Networks	42	0	28	50	120	50	50	100	4
2	PCC	24IS502	Theoretical Foundations of Computation	42	28	0	20	90	50	50	100	3
3	IPCC	24IS503	Full Stack Development	42	0	28	50	120	50	50	100	4
4	PCCL	24IS504	Data Visualization Lab	0	0	28	2	30	50	50	100	1
5	HSMC	24IS505	Entrepreneurship and Management	42	0	0	48	90	50	50	100	3
6	HSMC	24EVS	Environmental Studies	14	0	0	16	30	50	50	100	1
7	PEC	24IS5XX	Professional Elective Course - I	42	0	0	48	90	50	50	100	3
8	MC	24NYP3	NSS,YOGA,PE	0	0	24	0	24	100	-	100	A
9	PI	24IS506	Mini Project	0	0	28	2	30	50	50	100	1
10	AEC	24RIP	Research Methodology and IPR	42	0	0	48	90	50	50	100	3
Total								714	550	450	1000	23

Professional Elective Course -I			
24IS551	Automated Software Testing	24IS553	Object Oriented Modeling and design
24IS552	Robotic Process Automation	24IS554	Storage Area Networks

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	SIXTH SEMESTER										
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	PCC	24IS601	Cryptography, Network Security and Cyber Law	42	0	0	48	90	50	50	100	3
2	IPCC	24IS602	Artificial Intelligence and Machine Learning	42	0	28	50	120	50	50	100	4
3	IPCC	24IS603	Cloud Computing	42	0	28	50	120	50	50	100	4
4	PI	24IS604	Main Project Phase - I	0	0	60	0	60	50	50	100	2
5	PEC	24IS6XX	Professional Elective Course - II	28	0	28	34	90	50	50	100	3
6	OEC	24OEIS6X	Open Elective Course - I	28	0	28	34	90	50	50	100	3
7	MC	24NYP4	NSS,YOGA,PE	0	0	2	0	24	100	-	100	A
8	AEC	24ASK	Analytical Ability and Soft Skills	0	0	2	0	24	50	50	100	1
Total								**618**	450	350	800	**20**

Professional Elective Course - II			
24IS661	Big data Technologies	24IS663	Computer Vision and Image Processing
24IS662	Supply Chain Technology	24IS664	Block Chain Technology

Open Elective Course - I			
24OEIS61	Responsible AI	24OEIS63	Information and Network Security
24OEIS62	Introduction to Machine Learning	24OEIS64	Data Mining and Warehousing

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	SEVENTH SEMESTER										
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	IPCC	24IS701	Deep Learning	42	0	28	50	120	50	50	100	4
2	IPCC	24IS702	Data Science using R	42	0	28	50	120	50	50	100	4
3	PI	24IS703	Main Project Phase - II	0	0	70	50	120	50	50	100	4
4	PEC	24IS7XX	Professional Elective Course - III	28	0	28	34	90	50	50	100	3
5	OEC	24OEISX	Open Elective Course – II	28	0	28	34	90	50	50	100	3
Total								**540**	250	250	500	**18**

Professional Elective Course - III			
24IS771	Virtual Reality and Augmented Reality	24IS773	Computer Vision Using OpenCV
24IS772	Parallel Computing	24IS774	Generative Artificial Intelligence

Open Elective Course - II			
24OEIS71	Fundamentals of Database Management System	24OEIS73	Fundamentals of Block Chain
24OEIS72	Introduction to Big Data	24OEIS74	Introduction to Data Science

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	EIGHTH SEMESTER										
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW+SL	Total	CIE	SEE	Total	
1	PEC	24SW01	Professional Elective (Online Course)	42	0	0	48	90	50	50	100	3
2	OEC	24SW02	Open Elective (Online course)	28	0	28	34	90	50	50	100	3
3	PI	24INT	Internship (Research/Industry) (15-20 weeks)	0	0				100	100	200	10
Total								**180**	150	150	400	**16**

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Program Outcomes (PO) and Program Specific Outcomes (PSO) Mapping

#	Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	24MAIS 301	√	√			√								
2	24IS302	√		√		√								
3	24IS303	√	√	√		√								
4	24IS304	√	√			√						√	√	√
5	24IS305	√	√			√				√	√			√
6	24IS306A	√	√	√		√						√	√	
7	24IS307B	√	√	√		√		√	√	√	√			
8	24IS308		√	√									√	
9	24SCR			√		√	√	√				√		
10	24IS401	√	√	√	√	√		√	√	√	√			√
11	24IS402	√	√	√		√								
12	24IS403	√	√	√	√	√						√	√	√
13	24IS404		√	√									√	
14	24IS405B	√	√	√		√								√
15	24IS406B			√		√								
16	24BEIS407	√	√	√										
17	24IS408		√	√		√							√	
18	24UHV						√	√	√	√				

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Course Title	**MATHEMATICS FOR INFORMATION SCIENCE ENGINEERING**		
Course Code	**24MAIS301**	**(L-T-P) C**	**(2-2-0)3**
Exam	**3hrs**	**Hours/Week**	**4**
SEE	**50**	**Total Hours**	**42L+48ABL=90**

Course Objective: Students will be able to use appropriate data structures for solving problems.
Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Utilise the concept of consistency of system of equations to solve the engineering application problems and compute the number of linearly independent vectors.	1	-
2	Examine for the existence of diagonalization of matrix, find the suitable matrix of transformations so as to get the required image and analyse the system of equations to compute the number of linearly independent Eigen vectors.	1,2	-
3	Compute Fourier series of a given function, the orthogonal basis, QR factors of Matrices, and solve homogeneous differential equations using matrices	1	-
4	Write the python programme for the mathematical procedures connected with linear algebra, Fourier series and Model the real life problems/engineering application problems	1,2,5	-

MODULE-1 **10hrs**

Linear Algebra: Importance of Matrices in engineering. Rank of a matrix. Consistency of non homogeneous and homogeneous system of equations, Solution of the system of linear equations by Gauss elimination method and Gauss – Seidel iterative method. Linearly dependent and independent vectors.

Applications of solution of system of equations to balance the chemical equations.

Self-Study--Traffic flow problem, to find the suitable combination of food stuff so as to get the desired nutrients as prescribed by a dietician

MODULE-2 **10hrs**

Linear algebra: Orthogonal matrices, Gram Schmidt process, QR-factorization, symmetric matrices and quadratic forms, Matrix method to solve homogeneous differential equations of order 2, degree 1. Special matrices-matrix of rotation, reflection, translation. To find the matrix of transformation when the image of some points is given.
Self-study: Linear models in business and engineering. Partition matrices, Matrix factorization, Application to computer graphics.

MODULE-3 **10hrs**

Linear Algebra: Eigen values and Eigenvectors, properties, Illustrative examples.

Applications-Stretching of an elastic membrane, to determine the growth of a population model. Role of eigen values, eigenvectors in determining natural frequency, Rayleigh power method to find the highest eigen value.

Diagonalization and powers of 3X3 matrices when Eigen values are already given.

Self-Study-- Stability analysis of differential equations which governs the dynamical systems using the concept of eigen value, eigenvectors. Applications of system of equations, linear transformation in computer science. Application of eigen value eigenvectors in data compression, Signature testing, Face recognition. Google page ranking.

MODULE-4	**12hrs**

Fourier Series: Periodic functions and their graphical representation, to find the function for standard graphs, to find Fourier series by change of interval method, To represent the experimental data as a Fourier series using the method - Practical harmonic analysis. application of Fourier series in engineering-To represent the signal (wave form) in terms of Fourier series, Fourier series representation for the excitation described by the wave form, graphs of Fourier series approximating the given function.

Self-Study-- Half range series method. Applications of Fast Fourier transforms, Discrete Fourier transforms in information science engineering.

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics Dr. B. S. Grewal	Dr. B. S. Grewal	44th edition	Khanna Public ations	2016
02	Advanced Engineering Mathematics	Erwin Kreyszig	8th	Wiley India Pvt. Ltd	2004
03	Calculus	Thomas Finney	9th	Thomas Finney	2002

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Advanced engineering mathematics	R K Jain and S R K Iyengar	2nd	Narosa publishers	2005

EBooks and Online course material:

1.https://archive.org/details/higher-engineering-mathematics-bs-grewal

Online course and video lecture:

1. NPTEl IIT Madars 2021 http://nptel.ac.in/courses.phd?discipl ineID=111

Teaching -Learning– Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-

3	Activity Based Learning (ABL1&ABL2)	-	-	41
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**90**

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
ACT	Demonstration activity- Assignment ,Quiz and Group activity	20
Total		**50**

Activity Based Learning (41Hours)

ABL1 (10Hours): Data analysis ,Report writing and presentation	**27Hours**
ABL2 (31 Hours): Assignment and Quiz	**14 Hours**
Total Learning Hours/Semester	**41**

Evaluation o f Learning Process (7Hours)

Type of Evaluation	Hours
Test(1,2and3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO 1**	**PSO2**
CO1	3												
CO2	3	2											
CO3	3												
CO4	3	2			1								

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Course Title	DIGITAL DESIGN AND COMPUTER ORGANIZATION		
Course Code	24IS302	(L-T-P)C	(3-0-2) 4
Exam	3 Hrs.	Hours/Week	5
SEE	50 Marks	Total Hours	42L+28P+50ABL=120

Course Objective: Students will be able to design synchronous and asynchronous circuits. Also will understandthe basic organization of a computer.

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 behavior of basic digital components and apply simplification techniques to design combinational logic circuits.	1	-
2	Comprehend the architecture of computer systems, memory organization and cache mapping techniques, I/O operations and instruction execution mechanisms.	1	-
3	Analyze the functionality/working of data processing circuits, sequential logic circuits, and design combinational logic circuits using gates, multiplexers, and comparators.	1,2	-
4	Carry out the implementation of combinational and sequential logic circuits from the functional description of digital systems.	5	-

MODULE-1 — 11 Hrs.

Digital Logic: Overview of Basic Gates and Universal Logic Gates, AND-OR-Invert Gates, Positive and Negative Logic. Combinational Logic Circuits: Boolean Laws and Theorems, Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs, Quads, and Octets, Karnaugh Simplifications, Don't Care Conditions, Product-of-Sums method, Sum-of-Products method Simplification by Quine-McCluskey Method

Data-Processing Circuits: Multiplexers, Demultiplexers, EX-OR gates, Parity Generators and Checkers

MODULE-2 — 10 Hrs.

Data-Processing Circuits (contd..): Magnitude Comparator.

Arithmetic Circuits: Arithmetic Building Blocks, **Flip-Flops**: RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS, D, JK Flip-Flops, JK Master-Slave Flip-Flops, Various Representations of Flip-Flops, **Registers**: Registers: Types of Registers, Serial In-Serial Out, Serial In-Parallel Out, Parallel In-Serial Out, Parallel In-Parallel Out.

Counters: Asynchronous Counters.

MODULE-3 — 10 Hrs.

Basic Structure of Computers: Basic Operational Concepts**,** Numbers, Arithmetic Operations and Characters,Memory Location and Addresses**.**

Input/Output Organization: Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling MultipleDevices. Direct Memory Access, Standard I/O Interfaces – PCI Bus, USB.

MODULE-4 — 11 Hrs

Memory System: Basic Concepts, Semiconductor RAM Memories(till Asynchronous DRAMS), Read OnlyMemories, Cache Memories – Mapping Functions.

Arithmetic: Multiplication of positive numbers, Signed Operand Multiplication, Fast multiplication-Bit pairrecoding of multipliers**,** Integer Division.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Digital Principles andApplications	Donald P Leach, Albert PaulMalvino and Goutam Saha	8th	McGrawHill	2017
2	Computer Organizationand Embedded Systems	Carl Hamacher, Zvonko Vranesic , Safwat Zaky, Naraig Manjikian	6th	Tata McGraw Hill	2012

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Computer Organization &Architecture	William Stallings	7th	PHI	2006
2	Computer Organization andDesign	David A Patterson, John L Hennessy-he Hardware/ software Interface ARM Edition	4th	Elsevier	2009

EBooks and Online course material:

1. https://www.v2vclass.com/images/coursepdf/bsc-cssem1/bsc-cssem1/co/fy-cs.pdf

Online course and video lecture:

1.https://onlinecourses.nptel.ac.in/noc21_cs61/preview

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	10
4	Activity Based Learning(ABL1)	-	-	40
Total Learning Hours/Semester				**120**

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Three tests conducted for 20 marks each andreduced to 10 marks	30
Activity Details	Lab Conduction ABL1	15 05
Total		**50**

Integrated Lab Component (28Hours)

#	Programs List	Hours
1.	Realize the behavior of following gates: i) AND ii) OR 3) NOT 4) NOR 5) NAND	4
2.	Design and implement BCD to Excess-3 code converter	2
3.	Simplify and realize given Boolean expressions using logic gates (y = C'+A'D'+B'D').	4
4.	Design and implement a Full Adder using 4:1 multiplexer.	2
5.	Given any 4-variable logic expression (y = C'+A'D'+B'D'), simplify using a Karnaugh Map and realize the simplified logic expression using 8:1 Multiplexer IC	2
6.	Design and implement a Johnson Counter using 4-bit Shift Register IC.	2
7.	Design and implement a 3 stage Asynchronous Counter using J-K flip flops to count down from 7 to n .	4
8.	Design and implement: i) 4:1 Multiplexer ii) 2:4 Decoder using NAND gates	4
9.	Demonstrate all logic gates, Multiplexers, Demultiplexers, Half Adders, Full adders, Shift registers, Counters, and Flip-flops using a simulator (e.g., Logisim).	4
	Total	28

Activity Based Learning (40Hours)

ABL1 (40Hours): Students engage in a hands-on exploration of circuits using an interactive simulator.		**Hours**
1.	Evaluate understanding of designing circuits and truth tables.	15
2.	Students present their designed circuits, explaining the logic and functionality.	15
3.	Discuss challenges faced during simulation and how they were overcome.	10
Total		**40**

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Evaluation of Learning Process (10Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution & Demonstration of an Activity	4
Semester End Exam	3
Total	**10**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**OPERATING SYSTEMS**		
Course Code	**24IS303**	**(L-T-P)C**	**(3-0-2) 4**
Exam	**3 Hours**	**Hours/Week**	**5**
SEE	**50 Marks**	**Total Hours**	**42L+28P+50ABL=120**

Course Objective: Students will be able to implement different components of operating systems.
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mappingto PO's	Mapping to PSO's
1	Describe various concepts and functionalities of operating systems	1,2	-
2	Apply different Process scheduling, CPU scheduling algorithms and synchronization problems.	3	-
3	Analyze different mechanisms for handling deadlocks andmemory management Algorithms	3	-
4	Implement various disk scheduling, page replacement algorithm	2,3,5,8	-

MODULE-1	**11Hrs.**

Introduction to Operating Systems, System Structures: What Operating Systems Do? Computer System Architecture; Operating System Structure; Operating System Operations; Operating System Services;System Calls; Types of System Calls; System Programs, Process Management: Process Concept; Operations on Processes; Inter-Process Communication. Multi-Threaded Programming: Overview; Multithreading Models.

MODULE-2	**10 Hrs.**

Process Management (contd..): Process Scheduling: Basic Concepts; Scheduling Criteria; Scheduling Algorithms; Process Synchronization: The Critical Section Problem; Peterson's Solution; Synchronization Hardware; Semaphores; Classic problems of Synchronization, Monitors- Usage, Dining-Philosophers solution using monitors.

MODULE-3	**10 Hrs.**

Deadlocks: System Model; Deadlock Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from Deadlock. Memory Management: Memory Management Strategies: Background; Swapping; Contiguous Memory Allocation; Paging; Structure of Page Table; Segmentation.

MODULE-4	**11Hrs**

Virtual Memory Management: Background; Demand Paging; Page Replacement. Storage Management:Secondary Storage Structures, Protection: Mass Storage Structures; Disk Structure; Disk Scheduling; Swap Space Management. Protection: Goals of Protection, Principles of Protection, Domain of Protection-Domain Structure, Access Matrix, Implementation of Access Matrix.
Real time OS: Docker, FreeRTOS, Azure RTOS, RTEMS.

Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Operating System Concepts	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	9th Edition	John Wiley & Sons	2018

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Modern Operating Systems - A Concept Based Approach	Andrew.S.Tanenbaum	4th Edition	Addison Wesley	2015
2	Introduction to Operating Systems: Concepts and Practice	P.C.P. Bhatt	2nd Edition	PHI	2008
3	Operating Systems Internals and Design Principles	William Stallings	8th Edition	Tata McGraw-Hill Education	2007

EBooks and Online course material:

1.https://archive.org/details/operating-system-concepts-9th-edition?utm_source=chatgpt.com

2) https://os-book.com/OS9/index.html?utm_source=chatgpt.com

Online course and video lecture:

1. https://nptel.ac.in/courses/106/105/106105214/
2. **https://www.youtube.com/watch?v=9hOSkx9jWPQ**

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	09
4	Activity Based Learning(ABL1&ABL2)	-	-	41
Total Learning Hours/Semester				**120**

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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
Activity Details	1) Lab Program Execution-10Marks 2) Mini projects-10Marks	20
Total		**50**

Integrated Lab Component (28Hours)

Sl. No	Program Details	Hours
1.	Write a C program for performing the following file handling operations a. Creation of the new file b. Opening an existing file c. Reading from the file d. Writing to the file e. Appending the file f. Copying the file g. Renaming the file	4
2.	Design and develop C program for implementing first come first serve and shortest jobfirst algorithm	4
3.	Design and develop C program for implementing round robin scheduling algorithms.	2
4.	Design and develop C program to implement first in first out and optimal page Replacement algorithm.	4
5.	Design and develop C program to implement the producer consumer program usingsemaphore.	4
6.	Design and develop C program to simulate banker's algorithm to avoid a deadlock.	2
7.	Design and develop C program to simulate the best fit and the worst fit contagious memory allocation techniques.	4
8.	Design and develop C program to simulate the following disk scheduling algorithms a. FCFS b. SCAN c. SSTF d. LOOK	4
Total		**28**

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Activity Based Learning (41 Hours)

ABL (41Hours): To enable students to understand, design, implement, and visualize Operating System algorithms by applying them in a real-time scenario using a programming language and simulation tools.		**Hours**
1.	Conduct a survey on various OS algorithms (e.g., CPU Scheduling, Deadlock Avoidance, Memory Management, Paging, File Systems)	8
2.	Meeting and discussing with the faculty and fixing the problem statement.	5
3.	Prepare a design document including flowcharts, architecture, and data structures.	5
4.	Code the application in a selected language (e.g., implement Round Robin Scheduling or Least Recently Used Paging).	8
5.	Use simulation tools to visually demonstrate algorithm behavior (e.g., Gantt charts for CPU scheduling, memory blocks for paging).	8
6.	Presentation and submitting the final report.	7
Total Learning Hours/Semester		**41**

Evaluation of Learning Process (9 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution and Mini Project	3
Semester End Exam	3
Total	**9**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**DATA STRUCTURES AND APPLICATIONS**		
Course Code	**24IS304**	**(L-T-P)C**	**(3-0-0) 3**
Exam	**3 Hrs.**	**Hours/Week**	**3**
SEE	**50 Marks**	**Total Hours**	**42L+48ABL=90**

Course Objective: Students will be able to use appropriate data structures for solving problems.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Describe various operations on data structures like Arrays, Lists, Stacks, Queues and Trees.	1	-
2	Apply linear and non-linear data structures for solving problems.	2	1
3	Design solutions for problems using appropriate data structures.	2	1
4	Develop programs to solve a problem using data structures like stack, queue, list and tree.	2,5	2

MODULE – 1 **11 Hrs.**

Introduction to Data Structures: Definition, Classification of Data Structures, Dynamic Memory Allocation – Introduction, Dynamic memory allocation, malloc, calloc, free and realloc. The Stack - Definition and examples: Primitive operations, Example. Representing stacks in C: Implementing the pop operation, testing for exceptional conditions, implementing the pushoperation. **Infix, postfix and prefix:** Basic definitions and examples, evaluating a postfix expression, Program to evaluate a postfix expression, converting an expression from infix to postfix, Program to convert an expression from infix to postfix.

MODULE – 2 **10 Hrs.**

Recursion: Recursive definition and processes: Factorial function, Multiplication of natural numbers, Fibonacci sequence, Binary search, Properties of recursive definition or algorithm. **Recursion in C:** Factorial of a number, generation of Fibonacci numbers, Binary searching, Concept of Recursive chains, Towers of Hanoi problem, **Queues and lists:** The queue and its sequential representation: C implementation of queues, Priority queue, Array implementation of a priority queue. **Linked lists:** Inserting and removing nodes from a list, Linked Implementation of stacks. Getnode and freenode operations.

MODULE -3 **11 Hrs.**

Lists in C: Array implementation of lists, Limitations of array implementation, allocating and freeing dynamic variables, linked lists using dynamic variable, Queues as lists in C, Examples oflist operations in C, Non integer and non-homogeneous lists. **Other list structures:** Circular lists, Stack as a circular list, Queue as a circular list.

MODULE -4 **10 Hrs.**

Trees - Binary trees: Operations on binary trees, Applications of binary trees. Binary tree representation: Node representation of binary tree, Internal and external node, Implicit array representation of binary trees, choosing a binary tree representation, Binary tree traversals in C, Threaded binary trees.

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Data structures using C and C++, PHI,	Yedidyah Langsam and Moshe J. Augenstein and Aaron M.Tenanbaum,	2nd	Pearson Education	2015

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Data Structures: A Pseudo-code approach with C	Gilberg and Forouzan	2nd	Cengage Learning	2014
2	Programming techniques through C - A beginner's companion,	M.G.Venkateshmurthy ,	2nd	Pearson Education	2002
3	An Introduction to Data Structures with Applications	Jean-Paul Tremblay & Paul G. Sorenson,.	2nd	McGraw Hill	2013

EBooks and Online course material:

1.https://www.cet.edu.in/noticefiles/280_DS%20Complete.pdf

Online course and video lecture:

1. https://nptel.ac.in/courses/106/102/106102064/

Teaching -Learning– Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Activity Based Learning (ABL1&ABL2)	-	-	41
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**90**

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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 activity- 1) Visualizing Data Structures through Real-Life Activities-15Marks 2) Applied Problem Solving through Competitive Programming Platforms - 5Marks	20
Total		**50**

Activity Based Learning (41 Hours)

ABL1 (10Hours): Students will understand and implement key data structure concepts such as Stack, Queue, Linked List, and Binary Tree by performing real-life simulation activities that reflect their practical applications	**Hours**
In this activity, students will demonstrate concepts of Stack, Tree constructions, Queues & Linked List , etc., using real Life activities.	10
Total	**10**
ABL2 (31 Hours): Applied Problem Solving through Competitive Programming Platforms	**Hours**
Various problem solve in any registered website	31
Total Learning Hours/Semester	**41**

Evaluation o f Learning Process (7Hours)

Type of Evaluation	Hours
Test(1,2and3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**UNIX LABORATORY**		
Course Code	**24IS305**	**(L-T-P) C**	**(0-0-2) 1**
Exam	**3Hrs.**	**Hours/Week**	**2Hrs**
SEE	**50Marks**	**Total Hours**	**28P + 2E= 30**

Course Objective: The course provides a comprehensive introduction to UNIX user commands and utilities and students will develop Shell Programming and Vi editing skills.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Demonstrate and interpret UNIX commands to perform file handling	1 ,2	2
2.	Design and develop shell scripts to automate system tasks and user operations	1 ,2,3	2
3.	Exhibit skills in identifying errors, verifying functionality, and creating AWK scripts.	1,2,	2

Teaching -Learning– Evaluation Scheme

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

Sl. No.	Experiments	Hours
1	**Executed Fundamental UNIX shell Script commands:** ls , cat, cd ,od , mkdir,echo ,date , mv , cal ,wc,pwd,rmdir,rm ,touch,sort ,read, clear,ps-u , ps whoami, alias , find ,test,expr,set,shift ,type ,grep ,sed,awk,tr,chmod,job,cut,paste,top,env,Bash	2
2	Write a shell script that takes a valid directory name as an argument and recursively descends all sub-directories, finds the maximum length of any file, and prints it.	2
3	Write a shell script that accepts a pathname and creates all the components in that pathname as directories (e.g., mpc a/b/c/d).	2
4	Write a shell script that accepts two filenames as arguments, checks if their permissions are identical, and outputs either the common permissions or each filename with its permissions.	2
5	Create a script file called file-properties that reads a filename entered by the user and outputs its properties.	1
6	Write a shell script that accepts one or more filenames as arguments and converts all of them to uppercase if they exist in the current directory.	1
7	Write a shell script that accepts a filename as an argument and displays its creation time if	2

	the file exists, otherwise shows an error message.	
8	Write a shell script that, when executed, displays "Good Morning", "Good Afternoon", or "Good Evening" depending on the current time.	2
9	Write a shell script that accepts a filename, starting, and ending line numbers as arguments, and displays all lines between the given line numbers.	2
10	Write an AWK script to compute gross salary based on: - If basic < 10000: HRA=15%, DA=45% - If basic ≥ 10000: HRA=20%, DA=50%	2
11	Write an AWK script to delete duplicate lines from a text file while maintaining original order.	2
12	Create a shell script that functions as a countdown timer.	2
13	Write a Bash script that prompts the user to enter a number and displays its multiplication table from 1 to 10.	2
14	Create a shell script that displays all the command-line arguments passed to it.	2
15	Create a shell script to show a real-time digital clock in the terminal.	2
Total		**28**

Prescribed Textbook:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	UNIX :Conceptsand Applications	Sumitabha Das	4th	Tata McGraw-Hill,	2021.

Proposed Assessment Plan (for 50 marks of CIE):

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

Course Articulation Matrix:

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2											2
CO2	3	1			2								3
CO3	3								3	3			2

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**OBJECT ORIENTED PROGRAMMING with JAVA**		
Course Code	**24IS306A**	**(L-T-P)C**	**(2-0-2) 3**
Exam	**3 Hours**	**Hours/Week**	**5**
SEE	**50 Marks**	**Total Hours**	**28L+28P+ 34ABL=90**

Course Objective: Students will be able to implement different components of operating systems.
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mappingto PO's	Mapping to PSO's
1.	Comprehend the fundamental concepts of Object Oriented Programming	1, 2	1
2.	Apply Object Oriented constructs for program development	2	1
3.	Develop computer programs to solve real world problems in Java	3,5	1
4.	Implement advanced object-oriented features such as inheritance, interfaces, exception handling, and multithreading to develop robust and efficient Java applications.	5	1

MODULE-1	**7 Hrs.**

An Overview of Java: Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles),Data Types, Type-Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Introducing Type Inference with Local Variables. Operators: The ? Operator. Control Statements: Java's Selection Statements (if, The Traditional switch), Iteration Statements (for, The For-Each Version of the for Loop, Local Variable Type Inference in a for Loop, Nested Loops), **New Features in Java SE 8:**Lambda Expressions , Functional Interfaces, Stream API, Default and Static Methods in Interfaces, Method References, Optional Class, New Date and Time API,Nashorn JavaScript Engine, Repeating Annotations, Type Annotations

MODULE-2	**7 Hrs.**

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection. Methods and Classes: Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes

MODULE-3	**7 Hrs.**

Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance. Packages, Access Protection, Importing Packages, Interfaces, The Object Class.

MODULE-4	**7 Hrs**

Interfaces: Interfaces, Default Interface Methods, Use of Static Methods in an Interface. Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, throw, Java's Built-in Exceptions, Customized Exceptions. Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join().

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Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Java the Complete Reference	Herbert Schildt	13th	Tata McGraw Hill	2024

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to JAVA Programming, Brief Version	Y. Daniel Liang	9th	Pearson Education	2019
2.	Programming with Java: A Primer	E. Balagurusamy	5th Edition	McGraw Hill Education	2014

EBooks and Online Course Material:

- https://archive.org/details/java-the-complete-reference-11th-edition-herbert-schildt
- https://www.bluej.org/objects-first/
- https://www.murach.com/books/java.htm

Online Course and Video Lecture:

- https://nptel.ac.in/courses/106/105/106105191/
- https://www.youtube.com/watch?v=GGkBhB1lTlc
- https://www.coursera.org/learn/java-programming

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	2	14	28
3	Activity Based Learning (ABL)	1	14	26
4	Evaluation of Learning Process	-	-	08
Total Learning Hours/Semester				**90**

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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
Activity Details	Lab Program Execution-15 Marks ABL-05Marks	20
Total		**50**

Integrated Lab Component (28 Hours)

Sl. No.	Program Description	Total Hours
1	Write a Java Program that grades multiple-choice tests. Suppose there are 'm' students and 'n' Questions, and the answers are stored in a two-dimensional array. Each row records a student's answers to the questions. The answer key is stored in a one-dimensional array. Theprogram grades the test and displays the result.	4
2	Write a Java program to count the number of occurrences of each letter in a string regardless of case.	2
3	Write a Java program that ignores non-alphanumeric characters in checking whether a string is a palindrome.	2
4	How can a functional interface be implemented using a lambda expression in Java to enable concise and functional-style programming	3
5	Create a Class Vehicle. Demonstrate method overriding by considering any two types of vehicles.	3
6	Create a super class called Figure that stores the dimensions of a two-dimensional object. Using Dynamic polymorphism in Java, compute the area of any three two-dimensional figures.	4
7	Write a Java program to demonstrate use of interfaces for computing the Net balance Amount after considering Gross income and expenditures in an Employee of an organization.	3
8	Write a program to demonstrate use of extending interfaces.	3
9	Write a java program to demonstrate handling of Array Index Out Of Bounds Exception and Arithmetic Exception.	4
Total		**28**

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Activity Based Learning (26 Hours)

ABL (26 Hours): Design and implement a real-time application demonstrating the working and effectiveness of an JAVA		**Hours**
1.	Study the basics of Object-Oriented Programming (OOP) and core Java concepts.	4
2.	Held a discussion with the faculty to finalize the application's problem statement (e.g., Library Management System, Student Information System).	3
3.	Planned and implemented the application utilizing key OOP principles such as Classes, Objects, Inheritance, Polymorphism, Encapsulation, and Abstraction.	12
4.	Performed testing and debugging to identify and fix issues, followed by refining the application to improve its overall functionality.	4
5.	Compiled a detailed project report and delivered a final presentation/demo to showcase the developed application.	3
Total		**26**

Evaluation of Learning Process (8 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

Course Articulation Matrix

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

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Course Title	**OBJECT ORIENTED PROGRAMMING WITH C++**		
Course Code	**24IS306B**	**(L-T-P)C**	**(2-0-2)3**
Exam	**3Hrs**	**Hours/Week**	**4**
SEE	**50 Marks**	**Total Hours**	**28L+28P+ 34ABL=90**

Course Objective : Students will be able to apply object oriented programming concepts in development ofapplications.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Describe all concepts of OOPs	1	
2.	Conduct experiments to demonstrate OOPs concepts	2	1
3.	Develop solutions to problems using OOPs principles	2	1
4.	Apply Object-Oriented Programming principles using C++ to build modular, reusable, and maintainable software components.	2	

MODULE – 1	**7 Hrs.**

Principles of Object Oriented Programming: Object Oriented Programming Paradigm; Basic concepts of Object Oriented Programming; A Simple C++ Program; More C++ Statements; An Example with Class; Structure of C++ Program; Creating the Source File; Compiling and linking. Functions in C++: Introduction; The Main Function; Function Prototyping; Call by Reference; Return by Reference; Inline Function; Default Arguments; Const Arguments; Functions Overloading;

MODULE – 2	**7 Hrs.**

Classes and Objects: Specifying a Class; Defining Member Functions; A C++ Program with Class; Making an Outside Function Inline; Nesting of Member Functions; Memory Allocation for Objects; Static Data Members; Static Member Functions; Array of Objects; Objects as Function Arguments; Constructors and Destructors: Introduction; Constructors; Parameterized Constructors; Destructors.

MODULE -3	**7 Hrs.**

Operator Overloading and Type Conversions: Introduction; Defining Operator Overloading; Overloading Unary Operators; Overloading Binary Operators; Manipulation of String Using Operators; Rules for Overloading Operators; Inheritance; Extending Classes; Introduction; Defining derived Classes; Single Inheritance; Making a Private Member Inheritable; Multilevel Inheritance; Hierarchical Inheritance; Hybrid Inheritance;

MODULE -4	**7 Hrs.**

Templates: Introduction; Class Templates; Class Templates with Multiple Parameters; Function Templates; Function Templates with Multiple Parameters; Exception Handling: Introduction; Basic of Exception Handling; Exception Handling Mechanism; Throwing Mechanism; Catching Mechanism; Rethrowing an Exception; Specifying Exceptions.

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Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Object- oriented programming with C++,	E Balguruswamy	6th	Tata McGraw Hill	2014

Reference Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	The Complete Reference C++,	Herbert Scheldt	4th	Tata McGraw Hill	2012

EBooks and Online course material:

1. the CompleteReference c++

Online course and video lecture:

1. https://onlinecourses.nptel.ac.in/noc19_cs38/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-15Marks ABL-05Marks	20
Total		**50**

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Laboratory Plan:

Sl. No.	Program Description	Total Hours
1	Implement a simple C++ program to create a class with two data members and three member functions, create objects of this class and call the functions	4
2	Using reference variables and inline functions, Implement a C++ program to find the average of three real numbers.	4
3	Using function overloading concept, Implement a C++ program to a. add/ subtract two complex numbers and b. add/ subtract a real number to a complex number.	4
4	Using template function, Perform a generic sorting program and demonstrate the same for integers and real numbers.	3
5	Overloading the operators ++ and --, Implement a C++ program to create a stack of integers and demonstrate the push and pop operations.	4
6	Overloading the operators + and -, write a C++ program to a. Subtract two given dates and find the difference in days. b. Add given number of days to a given date	3
7	Using friend function concept, demonstrate a C++ program	3
8	Create a class called A and derive two classes B and C from this. Demonstrate single inheritance with suitable functions.	3
	Total	28

Activity Based Learning (26 Hours)

ABL(26 Hours): Design and implement a real-time application demonstrating the working and effectiveness of an C++ .		**Hours**
1.	Literature review on Object-Oriented Programming (OOP) principles and Java fundamentals.	4
2.	Meeting with faculty to finalize the problem statement (e.g., Library System, Student Info System).	3
3.	Designing and developing the application using core OOP concepts: Classes, Objects, Inheritance, Polymorphism, Encapsulation, and Abstraction.	12
4.	Testing, Debugging, and Enhancing the functionality of the application.	4
5.	Preparing a report and giving a final presentation/demo.	3
Total		**26**

Evaluation of Learning Process (8 Hours)

Type of Evaluation	Hours
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**DISCRETE MATHEMATICAL STRUCTURES AND COMBINATORICS**		
Course Code	**24IS306C**	**L-T-P**	**(3-0-0)3**
Exam	**3 Hrs.**	**Hours/Week**	**4**
SEE	**50 Marks**	**Total Hours**	**42L+48ABL=90**

Course Objective: Introduction of Discrete structures and principle of Combinatorics which may be employed as tools in the applications of Computer Science & Information Technology.

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

#	Course outcomes	Mapping to PO's	Mapping to PSO's
1	Apply logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers	1,2	-
2	Apply induction hypotheses, various methods of proof methods in decision taking problems.	1,2	-
3	Solve combinatorial problems using counting principles.	1,2	-
4	Apply graph concepts to model and analyse problems of information science & engineering	1,2	-

MODULE-1 **11 Hrs.**

Set theory: A review of set operations, statements of laws of set theory, verification of set identities using Venn diagrams and Membership table. Illustrated examples.
Counting principles: Rule of addition, multiplication principle. Inclusion and Exclusion Principle for 2 and 3 sets, principles of permutation, combination, generalized permutation and generalized combination principle. Illustrative examples

MODULE-2 **10 Hrs.**

Fundamentals of logic: Basic logic connectives and truth tables. Logical equivalence and Tautologies. Statement of laws o logic. Logic implication - Rules of inference theory.
Methods of proof: Using rules of inference theory, methods of direct and indirect proof.

MODULE-3 **11 Hrs.**

Relations: Cartesian products and relations, computer representation of a relation and directed graph, properties of relations, equivalence relations and partitions. Partially ordered set and Hasse diagram.
Functions: Definition, various types of functions - one to one function, onto function, bijective function, invertible functions and function composition Application of Stirling numbers of second kind.

MODULE-4 **10 Hrs.**

Graph theory: Basic terminologies of a graph. Discussion of connected and disconnected graphs, Euler and Hamilton graphs, Planar graphs and Graph colouring.
Trees: Definition, properties of a tree. Weighed trees, prefix codes and biconnected components. Modelling of real-life problems using graphical approach and their analysis.

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Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Discrete and Combinatorial Mathematics	R C Grimaldi	5th	Pearson's publications	2007

Reference Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Discrete Mathematical Structures	D. S. Malik & M. K. Sen	1st	Thomson's Publications	2006

EBooks and Online course material:

1.https://archive.org/details/discretemathemat0000mali

Online course and video lecture:

1.https://onlinecourses.nptel.ac.in/noc22_cs33/preview

Teaching -Learning– Evaluation Scheme:

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

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
Activity Details	Activity Based Learning1 – 10 Marks Activity Based Learning2– 10 Marks	20
Total		**50**

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Activity Based Learning (41 Hours)

ABL1 (30Hours): Each student selects a real-world problem or scenario from their daily life (e.g., social network analysis, travel routes, timetable scheduling, decision-making processes). They will model this situation using appropriate discrete structures (e.g., sets, logic propositions, graphs, functions), and analyze it based on learned principles.		**Hours**
1.	Problem statement	8
2.	Develop analytical and logical reasoning using discrete concepts.	6
3.	Enhance problem-solving through abstract mathematical thinking.	12
4.	Conclusion and preparing a report.	6
Total		**30**
ABL2 (11 Hours): Statistical Data Visualization from Real-Life Dataset		**Hours**
Collect any real-world dataset (e.g., marks of students, rainfall, sales data) and represent it using Bar chart**,** Histogram , Pie chart ,Box plot and Line graph.		11
Total Learning Hours/Semester		**41**

Evaluation o f Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test(1,2and3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

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

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Course Title	**GRAPH THEORY AND COMBINATORICS**		
Course Code	**24IS306D**	**L-T-P**	**(3-0-0)3**
Exam	**3 Hrs.**	**Hours/Week**	**4**
SEE	**50 Marks**	**Total Hours**	**42L+48ABL=90**

Course Objective: Students will be able to understand combinatorics, graphs, trees and their applications.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Identify and explain the properties of various types of graphs	1, 2	
2	Construct different types of trees, identify biconnected components and articulation points	1, 2	
3	Apply the generalized principle of Inclusion and Exclusion theorem	1, 2	
4	Apply the concept of generating functions to solve the given problems of counting theory	1, 2	

MODULE – 1	**10 Hrs.**

Introduction to Graph Theory: Definitions and Examples, Sub-graphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Circuits and Trails.
Planar Graphs & Graph Coloring: Definition and Examples, A Discussion on Kuratowski Graphs, Detection of Planarity of a Graph.

MODULE – 2	**11 Hrs.**

Dual Graphs and Properties of a Dual Graph with Respect to a Planar Graph: Chromatic Number and Chromatic Polynomial of aGraph.
Trees: Definition, Properties, and Examples. Rooted Trees and Binary Trees, Weighed Trees and Prefix Codes. Optimization and Matching: Transport Networks - Max-Flow Min-cut Theorem.

MODULE -3	**10 Hrs.**

Fundamentals of Counting: The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem,Combinations with Repetition. The Catalan Numbers. Pigeon Hole Principle, Advanced Counting Techniques: The Principle of Inclusion and Exclusion – Definition and Illustrative Examples, Generalizations of the Principle

MODULE -4	**11 Hrs.**

Derangements – Nothing Is In Its Right Place, Rook Polynomials, Arrangements with Forbidden Positions, Generating functions,introductory examples, Definition and examples. Calculational Techniques, Partitions of Integers, the Exponential Generating Function, the Summation Operator.

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Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Discrete and Combinatorial Mathematics	R C Grimaldi	5th	Pearson's publications	2007

Reference Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Narsing Deo, Graph Theory with Applications to Engineering and Computer Science	PHI Publications	4th	Tata McGraw-Hill Publications	2006

EBooks and Online course material:

1.https://archive.org/details/discretemathemat0000mali

Online course and video lecture:

1.https://onlinecourses.nptel.ac.in/noc22_cs33/preview

Teaching -Learning– Evaluation Scheme:

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

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
Activity Details **Activity Based Learning (48 Hours)**	Activity Based Learning1 – 10 Marks Activity Based Learning2 – 10 Marks	20
Total		**50**

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Activity Based Learning (41 Hours)

ABL1 (30Hours): Each student selects a real-life scenario where entities and their connections can be represented as a graph. Using graph theory concepts, students will model the scenario and perform relevant analysis (e.g., shortest path, connectivity, cycles, or optimization).		**Hours**
1.	Problem statement	8
2.	Develop analytical and logical reasoning using discrete concepts.	6
3.	Enhance problem-solving through abstract mathematical thinking.	12
4.	Conclusion and preparing a report.	6
Total		**30**
ABL2 (11 Hours): Statistical Data Visualization from Real-Life Dataset		**Hours**
Collect any real-world dataset (e.g., marks of students, rainfall, sales data) and represent it using Bar chart**,** Histogram , Pie chart ,Box plot and Line graph.		11
Total Learning Hours/Semester		**41**

Evaluation o f Learning Process (7Hours)

Type of Evaluation	**Hours**
Test(1,2and3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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Course Title	**R PROGRAMMING**		
Course Code	**24IS307A**	**(L-T-P) C**	**(0-0-2) 1**
Exam	**3Hrs.**	**Hours/Week**	**2Hrs**
SEE	**50Marks**	**Total Hours**	**28P + 2E = 30**

Course Objective: Students will be able to learn and practice programming techniques using R programming.
.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	The fundamental syntax of R data types, expressions and the usage of the R-Studio IDE.	1	-
2.	Develop a program in R with programming constructs: conditionals, looping and functions.	3	-
3.	Apply the list and data frame structure of the R programming language.	2	-
4.	Use visualization packages and file handlers for data analysis.	3	-

Teaching -Learning– Evaluation Scheme

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	Evaluation of Lab Work	-	-	02
Total Learning Hours/Semester				**30**

Sl.No	Experiments	Hours
1.	Demonstrate the steps for installation of Rand R Studio. Perform the following: a) Assign different type of values to variables and display the type of variable. Assign different types such as Double, Integer, Logical, Complex and Character and understand the difference between each data type. b) Demonstrate Arithmetic and Logical Operations with simple examples. c) Demonstrate generation of sequences and creation of vectors. d) Demonstrate Creation of Matrices e) Demonstrate the Creation of Matrices from Vectors using Binding Function. f) Demonstrate element extraction from vectors ,matrices and arrays **Suggested Reading** – Text Book 1 – Chapter 1 (What is R, Installing R, Choosing an IDE – R Studio, How to Get Help in R, Installing Extra Related Software), Chapter 2 (Mathematical Operations and Vectors, Assigning Variables, Special Numbers, Logical Vectors), Chapter 3(Classes,DifferentTypesofNumbers,OtherCommonClasses,CheckingandChanging Classes, Examining Variables)	3

2.	Assess the Financial Statement of an Organization being supplied with 2 vectors of data: Monthly Revenue and Monthly Expenses for the Financial Year. You can create your own sample data vector for this experiment) Calculate the following financial metrics: a. Profit for each month. b. Profit after tax for each month (Tax Rate is 30%). c. Profit margin for each month equals to profit after tax divided by revenue. d. Good Months – where the profit after tax was greater than the mean for the year. e. Bad Months – where the profit after tax was less than the mean for the year. f. The best month – where the profit after tax was max for the year. g. The worst month – where the profit after tax was min for the year. Note: a. All Results need to be presented as vectors b. Results for Dollar values need to be calculated with $0.01 precision, but need to be presented in Units of $1000 (i.e. 1k) with no decimal points c. Results for the profit margin ratio need to be presented in units of % with no decimal point. d. It is okay for tax to be negative for any given month (deferred tax asset) e. Generate CSV file for the data. Suggested Reading – Text Book 1 – Chapter 4 (Vectors, Combining Matrices)	3
3.	Develop a program to create two 3 X 3 matrices A and B and perform the following Operations a) Transpose of the matrix b) addition c) subtraction d) multiplication Suggested Reading – Text Book 1 – Chapter 4 (Matrices and Arrays – Array Arithmetic)	3
4.	Develop a program to find the factorial of given number using recursive function calls. Suggested Reading – Reference Book 1 – Chapter 5 (5.5 – Recursive Programming) Text Book 1 – Chapter 8 (Flow Control and Loops – If and Else, Vectorized If, while loops, for loops), Chapter 6 (Creating and Calling Functions, Passing Functions to and from other functions)	3
5.	Develop an R Program using functions to find all the prime numbers up to a specified number by the method of Sieve of Eratosthenes. Suggested Reading – Reference Book 1 - Chapter 5 (5.5 – Recursive Programming)Text Book 1 – Chapter 8 (Flow Control and Loops – If and Else, Vectorized If, while loops, for loops), Chapter 6 (Creating and Calling Functions, Passing Functions to and from other functions)	3
6.	The built-in data set mammals contain data on body weight versus brain weight. Develop R commands to: a) Find the Pearson and Spearman correlation coefficients. Are they similar? b) Plot the data using the plot command. Plot the logarithm (log) of each variable and see if that makes a difference. Suggested Reading – Text Book 1 –Chapter 12 – (Built-in Datasets) Chapter 14 – (Scatter plots) Reference Book 2 – 13.2.5 (Covariance and Correlation)	3
7.	Let us use the built-in dataset air quality which has Daily air quality measurements in New York, May to September 1973. Develop R program to generate histogram by using appropriate arguments for the following statements. a) Assigning names, using the air quality data set. b) Change colors of the Histogram c) Remove Axis and Add labels to Histogram d) Change Axis limits of a Histogram	4

	e) Add Density curve to the histogram Suggested Reading –Reference Book 2 – Chapter 7 (7.4 – The ggplot2 Package), Chapter 24 (Smoothing and Shading)	
8.	Design a data frame in R for storing about 20 employee details. Create a CSV file named "input.csv" that defines all the required information about the employee such as id, name, salary, start date, dept. Import into R and do the following analysis. a) Find the total number rows & columns b) Find the maximum salary c) Retrieve the details of the employee with maximum salary d) Retrieve all the employees working in the IT Department. e) Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file "output.csv" Suggested Reading – Text Book 1 – Chapter 12(CSV and Tab Delimited Files)	3
9.	Using the built in dataset mt cars which is a popular dataset consisting of the design and fuel consumption patterns of 32 different automobiles. The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models). Format A data frame with 32 observations on 11 variables : [1] mpg Miles/(US) gallon, [2] cyl Number of cylinders [3] disp Displacement (cu.in.), [4] hp Gross horsepower [5] drat Rear axle ratio,[6] wt Weight (lb/1000) [7] qsec 1/4 mile time, [8] vs V/S, [9] am Transmission (0 = automatic, 1 = manual), [10] gear Number of forward gears, [11] carb Number of carburetors. Develop R program, to solve the following:	3
	Total	**28**

Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Learning R: a step by step function guide to data analysis	Cotton	1st	O' reilly Media Inc	2017

Proposed Assessment Plan (for 50marks of CIE):

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

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Course Articulation Matrix:

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

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Course Title	**DATA ANALYTICS WITH EXCEL**		
Course Code	**24IS307B**	**(L-T-P)C**	**(0-0-2) 1**
Exam	**3 Hrs.**	**Hours/Week**	**2 Hrs**
SEE	**50 Marks**	**Total Hours**	**28P+2E=30**

Course Objective: To learn and practice various Data analytics using Excel tool.
Course outcomes: Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	To understand the mathematical calculation performed in Excel.	1,2	-
2	To apply sorting, Filtering and condition format for the various problems.	2,3,5	-
3	Gain insights into making data-driven decisions using Excel's analytical tools and present the findings in a clear, professional manner	5,7,8,9,10	-

Sl. No	Teaching and Learning Method	No. of Hours/Week	No.of weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	Evaluation of Learning Process	2	-	02
			Total	**30**

Sl. no	Program details	Hours
1.	In a company, 30 employee details (Name, Date of joining, Qualification and salary) are stored in Microsoft Access database and text file. Using Excel tool import the data from different sources for analysis.	2
2.	Suppose a class of size 40 having SGPA of 8 semesters between 5 to 10. Calculate the CGPA of each student in below Grade form. O: 100>=9 | S: 8-8.9 | A: 7-7.9 | B: 6-6.9 | C: 5-5.9	2
3.	Create 10 students name in the form of First name, Middle name and Last name. Concatenate all the names and store in one column and also find the length of each name.	4
4.	Suppose your customer survey results from the east and west regions, month wise are. MONTH | EAST | WEST | LOW(<50%) | MEDIUM (50%-80%) | HIGH(>80%) 15-Apr | 86.40% | 63.00% | 50% | 30% | 20% 15-May | 45.80% | 58.90% | 50% | 30% | 20% 15-Jun | 44.10% | 81.60% | 50% | 30% | 20% 15-Jul | 77.60% | 86.10% | 50% | 30% | 20% 15-Aug | 80.70% | 95.00% | 50% | 30% | 20% For the above date, display customer satisfaction survey using Band Chart.	4
5.	There is a loan of 5,000,000 for tenure of 30 years. You want to know the monthly payments (EMI) for varied interest rates. You also might be interested in knowing the amount of interest and Principal that is paid in the second year	4

6.	Suppose there is a bookstore that has 100 books in storage. The original price of the book is 250 and certain number of books was sold at that price. Later, the bookstore announced a 10% discount on that book and cleared off the stock. You might want to know how many books are sold at the original price to obtain total revenue of 24,500.	2
7.	Suppose you want to have a report displaying the following − • Data for five disciplines - Archery, Diving, Fencing, Figure Skating and Speed Skating. • Regions that scored more than 80 medals in these 5 disciplines. • The count of medals in each of the five disciplines in each of these regions. Total count of medals for the five disciplines in each of these regions.	4
8.	Consider the data of 20 employee are stored into two different tables. first table consists of name,employee id and second table consists of employee id ,salary.Find the employee salary using lookup table from second table to first.	2
9.	In Olympic, 20 countries participated and won various medals by male and female in equal propositions. Display the medal count for each country with power view charts (Pie,Column,Bar,Line,Scatter, and Bubble).	2
10.	Consider the sequence of the data from 1 to 100 where male 48% and female 52% in the data. For the given data, create male vs female info-graphic chart .	2
	Total	**28**

Proposed Assessment Plan (for 50 marks of CIE):

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

Course Articulation Matrix

Course Outcomes	**Program Outcomes [POs]**												
COs	**PO1**	**PO 2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3											
CO2		2	3		3								
CO3					3		3	3	3	3			

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Course Title	**COMPETITIVE CODING**		
Course Code	**24IS307C**	**(L-T-P) C**	**(0-0-2) 1**
Exam	**3Hrs.**	**Hours/Week**	**2Hrs**
SEE	**50Marks**	**Total Hours**	**28P+ 2E = 30**

Course Objective: Apply algorithmic thinking to analyze and solve computational problems efficiently**.**
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Analyze the time and space complexity of algorithms and select the most efficient approach for given problems.	1,2	-
2.	Implement standard algorithms and data structures (e.g., sorting, searching, recursion, dynamic programming, graph traversal) using programming languages such as C++, Java, or Python.	1,3	-
3.	Design, implement, and debug solutions under time constraints typical of programming contests.	2,3	-
4.	Demonstrate improved coding accuracy, speed, and logical reasoning suitable for technical interviews and contests.	2,3	-

Teaching -Learning– Evaluation Scheme

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

Sl. NO	Experiments	Hours
1.	Introduction & Basics Overview of competitive programming platforms.	4
2.	String-Based Question	4
3.	Recursion Basics of recursion,	4
4.	Stack-Based Questions	4
5.	Queue-Based Questions	4
6.	Linked List-Based Questions	4
7.	Tree-Based Questions Binary search and applications	4
	Total	**28**

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Proposed Assessment Plan (for 50 marks of CIE):

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

Course Articulation Matrix:

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**VERSION CONTROLLER WITH GIT**		
Course Code	**24IS307D**	**(L-T-P) C**	**(0-0-2) 1**
Exam	**3 Hrs.**	**Hours/Week**	**2 Hrs**
SEE	**50 Marks**	**Total Hours**	**28 P+ 2 E = 30**

Course Objective: Students will be familiarized with basic commands of Git and understand how to collaborate and work with Remote Repositories.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Use the basics commands related to git repository	1	-
2.	Create and manage the branches	1	-
3.	Apply commands related to Collaboration and Remote Repositories	2,5	-
4.	Use the commands related to Git Tags, Releases and advanced git operations, Analyse and change the git history	1,2	-

Teaching -Learning– Evaluation Scheme

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

Sl.NO	Experiments	Hours
1.	**Setting Up and Basic Commands** Initialize a new Git repository in a directory. Create a new file and add it to the staging area andcommit the changes with an appropriate commit message.	2
2.	**Creating and Managing Branches** Create a new branch named "feature-branch." Switch to the "master" branch. Merge the "feature-branch" into "master."	4
3.	**Creating and Managing Branches** Write the commands to stash your changes, switch branches, and then apply the stashed changes.	2
4.	**Collaboration and Remote Repositories** Clone a remote Git repository to your local machine.	2
5.	**Collaboration and Remote Repositories** Fetch the latest changes from a remote repository and rebase your local branch onto the updated	2

	remote branch.	
6.	**Collaboration and Remote Repositories** Write the command to merge "feature-branch" into "master" while providing a custom commitmessage for the merge.	2
7.	**Git Tags and Releases** Write the command to create a lightweight Git tag named "v1.0" for a commit in your local repository.	2
8.	**Advanced Git Operations** Write the command to cherry-pick a range of commits from "source-branch" to the current branch.	2
9.	**Analysing and Changing Git History** Given a commit ID, how would you use Git to view the details of that specific commit, including theauthor, date, and commit message?	2
10.	**Analysing and Changing Git History** Write the command to list all commits made by the author "JohnDoe" between "2023-01-01" and"2023-12-31."	2
11.	**Analysing and Changing Git History** Write the command to display the last five commits in the repository's history.	2
12.	**Analysing and Changing Git History** Write the command to undo the changes introduced by the commit with the ID "abc123".	4
	Total	**28**

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Version Control with GiT	Prem Kumar Ponuthorai, Jon Loeliger	3rd	O'Reilly Media	2017

Proposed Assessment Plan (for 50 marks of CIE):

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

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Course Articulation Matrix:

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**DATA STRUCTURES AND APPLICATION LABORATORY**		
Course Code	**24IS308**	**(L-T-P)C**	**(0-0-2) 1**
Exam	**3 Hrs.**	**Hours/Week**	**2 Hrs**
SEE	**50 Marks**	**Total Hours**	**28P+2E=30**

Course Objective: This laboratory course enables students to get practical experience in design, develop, implement, analyze.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Analyze various linear and non-linear data structures	**2**	
2	Demonstrate the working nature of different types of data structures and their applications	**2,3**	
3	Apply the appropriate data structure for solving real world problems	**2,3**	**1**

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				30
ABL1:Lab based learning(28 Hrs)				

Sl.No	Program deatils	hours
1.	Design and Implement a menu driven Program in C for the following Arrayoperations: 1.Creating an Array of N Integer Elements 2.Display of Array Elements with Suitable Headings 3.Inserting an Element (ELEM) at a given valid Position (POS) 4.Deleting an Element at a given valid Position (POS)	4
2.	Illustrate the concepts of malloc(), calloc(),realloc() for the dynamic allocation of memory	2
3.	Write a C Program to create a class called STACK to store Integers for the following operations (Array Implementation of Stack with maximum size MAX) a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate Overflow and Underflow situations on Stack	2
4.	Write recursive C Programs for 1. Searching an element in a given list of integers using the Binary searchmethod. 2. Solving the Towers of Hanoi problem.	2

5.	Develop a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.	4
6.	Create a Queue, perform different operations such as Insert, Delete and Display.	2
7.	Write a menu driven C Program to simulate the working of a Circular Queue ofintegers using an array. Provide the following operations: a. Insert b. Delete c. Display	2
8.	Write a menu driven C Program using dynamic variables and pointers, to construct a Singly linked list of integers and perform insertion and deletion operations.	2
9.	Write a menu driven C Program using dynamic variables and pointers to construct a Stack of integers using Singly linked list and to perform the following operations: a. Push b. Pop c. Display	4
10.	Write a menu driven C Program 1. To construct a binary search tree of integers. 2. To traverse the tree using all the methods i.e., In-order, Pre-order and Post-order.	4
TOTAL		28

Proposed Assessment Plan (for 50 marks of CIE):

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

Prescribed Text Book:

Sl.No	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1	Data structures using C and C++, PHI,	Yedidyah Langsam and Moshe J. Augenstein and Aaron M.Tenanbaum,	2nd	Pearson Education	2015

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Data Structures: A Pseudo-code approach with C	Gilberg and Forouzan	2nd	Cengage Learning	2014
2	Programming techniques through C - A beginner's companion,	M.G.Venkateshmurthy ,	2nd	Pearson Education	2002

Course Articulation Matrix

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

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**SOCIAL CONNECT & RESPONSIBILITY**		
Course Code	**24SCR**	**L-T-P**	**(0-0-2)1**
Exam	**3 Hrs.**	**Hours/Week**	**2**
CIE	**100 Marks**	**Total Hours**	**20 hours**

Course Objective: Provide a formal platform for students to communicate and connect withtheir surroundings and create a responsible connection with society.

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

#	Course Outcomes	Mapping to PO's
1	Describe societal challenges and build solutions to alleviate these complex social problems through immersion, design & technology.	3,5,6
2	Communicate and connect with their surroundings.	7,11

MODULE – 1

Plantation and adoption of a tree: Plantation of a tree that will be adopted by a group of students. They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature.

MODULE – 2

Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city,connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms.

MODULE -3

Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus.

MODULE -4

Water Conservation: knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices. **Food Walk** City's culinary practices, food lore, and indigenous materials of the region used in cooking.

Course Conduction

A total of 15-20 hours engagement per semester is required for the course. Students will bedivided into teams and each team will be handled by two **faculty mentors**. Faculty mentors will design the activities for evaluation.

Guideline for Assessment Process:

Continuous Internal Evaluation (CIE)

After completion of, the social connect, the student shall prepare, with daily **diary** as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluatedon the basis of the following criteria and/or other relevant criteria pertainingto the activity completed.

- Dairy recording the details of activity conducted
- Planning and scheduling the social connect
- Information/Data collected during the social connect
- Analysis of the information/data and report writing Considering all

above points allotting the marks as mentioned below

Excellent	80 to 100
Good	60 to 79
Satisfactory	40 to 59
Unsatisfactory and fail	<=39

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Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1			3		2	3							
CO2							3				3		

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Course Title	**NATIONAL SERVICE SCHEME(NSS)**		
Course Code	**24NYP1**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the importance of his/her responsibilities towards society	**6**	
2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.	**3,6**	
3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.	**3,6**	
4	Implement government or self-driven projects effectively in the field.	**11**	
5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.	**11**	

MODULE-1	**8 Hrs.**
Organic farming, Indian Agriculture(Past, Present and Future)Connectivity for marketing	

MODULE-2	**8Hrs.**
Waste management–Public, Private and Govt.organization,5R's.	

MODULE-3	**8 Hrs.**
Setting of the information imparting club for women leading to contribution in social and economic issues.	

Suggested Learning Resources:

Books:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka ,NSS cell, activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

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Course Title	**PHYSICAL EDUCATION(PE)**		
Course Code	**24NYP1**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the Fundamental concepts and skills of Physical Education, Health, Nutrient ion and Fitness	**9,10,12**	
2	Familiarization of health –related Exercises, Sports for over all growth and development	**9,12**	
3	Create a foundation for the professionals in Physical Education and sports	**12**	
4	Participate in the competition at regional/state/national/international levels.	**9,10,12**	
5	Create consciousness among the students on Health,fitness and Wellness in developing and maintain g a healthy lifestyle	**9,10,12**	

MODULE-1	**4 Hrs.**

Orientation- Lifestyle ,Health & Wellness, Pre-Fitness test.

MODULE-2	**4Hrs.**

General Fitness & Components of Fitness –Warming up(Free Hand exercises),Strength–Push-up/Pull-ups, Speed – 30 mtr Dash

MODULE-3	**16Hrs.**

Specific games(Any one to be selected by the student)

1. Kabaddi– Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.

2. Kho-Kho– Giving Kho, Single Chain, Poledive, Poleturning,3-6Up.

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**YOGA**		
Course Code	**24NYP1**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping toPSO's
1	Understand the Philosophical and Scientific Basis of Yoga	12	-
2	Demonstrate Proficiency in Basic Yoga Practices	9	-
3	Analyze the Role of Yoga in Managing Stress and Enhancing Lifestyle	7,12	-
4	Apply Yoga Principles for Personal and Professional Growth	10,12	-

MODULE-1 **8 Hrs.**

Lntroduction of Yoga

Aim and Objectives of yoga, Prayer, Brief introduction of yogic practices for common man, Rules and regulations, Misconceptions of yoga

MODULE-2 **8Hrs.**

Suryanamaskara

Suryanamaskar prayer and its meaner, Need, importance and benefits of Suryanamaskar12 count,2 rounds

MODULE-3 **8 Hrs.**

Different types of Asanas

a. Sittingl.Padmasana2. Vajrasana
b. Standing1.Vrikshana2.Trikonasana
c. Pronelinel.Bhujangasana2.Shalabhasana
d. Supineline1.utthitadvipadasana2.Ardhahalasana

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Course Title	**SOFTWARE ENGINEERING**		
Course Code	**24IS401**	**(L-T-P)C**	**(3-0-2) 4**
Exam	**3 Hrs.**	**Hours/Week**	**5**
SEE	**50 Marks**	**Total Hours**	**42L+28P+50ABL=120**

Course Objective: Use software engineering principles for application development.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Analyze a system for identifying the software requirements	2	2
2.	Differentiate process models to judge which process model has to be adopted for the given scenarios.	3	2
3.	Apply different approaches of verifying and validating a software product and analyze the agile methodology.	1,4,5	2
4.	Illustrate the role of project planning and quality management in software development.	3,7,8,9,10	2

MODULE – 1	**11 Hrs.**

Introduction: Professional Software Development, Software Engineering Ethics. Case studies, **Software Processes:** Software Processes models, Process activities, coping with change, The Rational Unified Process. **Agile Software Development:** Agile Methods, Plan-driven and Agile Development, Extreme programming. Agile Project Management. Scaling Agile Methods. Case Studies- A patient information system for mental health care, A wilderness weather station

MODULE – 2	**10 Hrs.**

Requirements Engineering: Functional and non-functional requirements. The software Requirements Document. Requirements Specification, Requirements Engineering Processes. Requirements Elicitation and Analysis. Requirements validation. Requirements Management. **System Models:** Context models. Interaction models. Structural models. Behavioral models. Model-driven engineering.

MODULE -3	**10 Hrs.**

Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open source development. **Software Testing:** Development testing, Test-driven development, Release testing, User testing. **Software Evolution**: Evolution processes, Program evolution dynamics. Software maintenance, Legacy system management. Designing UML diagrams

MODULE -4	**11 Hrs.**

Software Project Management: Software Project Management Complexities, Responsibilities of a software project Manager, Project Planning, Metrics for project size estimation, Project estimation techniques, Empirical estimation techniques, Scheduling, Organization and Team Structures, Staffing, Risk Management. COCOMO, ISO9000, SEI Capability Maturity Model, Six Sigma.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Software Engineering	Ian Sommerville	10th	Pearson Education	2017
2	Fundamentals of Software Engineering	Rajib Mall	4th	Prentice-Hall Of India Pvt. Ltd., ISBN(Chapters: 3)	2015

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Software Engineering - A Practitioners Approach	Roger S. Pressman	7th	McGraw-Hill,	2009
2	Software Engineering Principles and Practice	Waman S. Jawadekar	4th	Tata McGraw-Hill	2004
3	A Concise introduction to Software Engineering	Pankaj Jalot	3rd	Springer	2008

E-Book and online course material:

1) https://engineering.futureuniversity.com/BOOKS%20FOR%20IT/Software-Engineering-9th-Edition-by-Ian-Sommerville.pdf

Online Course and Video Lecture:

1) https://nptel.ac.in/courses/106/105/106105182

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	08
4	Activity Based Learning(ABL1&ABL2)	-	-	42
Total Learning Hours/Semester				**120**

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Three CIEs conducted for 20marks each and reduced to 10 marks	30
Activity Details	1) Lab Program Execution-10Marks 2) Case study-10Marks	20
Total		**50**

Integrated Lab component (28hours)

Sl. No	**Program Details**	**Hours**
1	Discuss success and failure stories of software, software ethical practices and Laws for IT industry in India.	4
2	Case study to understand the SDLC on video doorbell.	2
3	Create JIRA (similar tool) account and learn interface	4
4	Organize role play for requirement activities for Zomato and Identify a problem and prepare requirement document or Epics and user stories.	4
5	Configure JIRA for managing the project to solve the identified problem.	4
6	Draw UML diagram for given use case using Draw.io tool	2
7	Create Git(Similar tool) account and configure repository.	4
8	Create Sitemap and Wireframe for the user stories. (Using Figma tool)	4
Total		**28**

Activity Based Learning (42 Hours)

ABL1 (28Hours):		**Hours**
1.	Problem Analysis / Case Study Understanding: Clear explanation of the scenario / problem, objectives, and context and supporting survey data.	5
2.	Requirement & Design Artifacts	9
3.	UI/UX Design (Figma or similar)	14
4.	Version Control (Git/GitHub)	8
5.	Report and Presentation	6
Total Learning Hours/Semester		**42**

Evaluation of Learning Process (8 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

Course Articulation Matrix

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

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	MICROPROCESSOR AND MICROCONTROLLER		
Course Code	24IS402	(L-T-P)C	(3-0-2)4
Exam	3 Hrs.	Hours/Week	5
SEE	50 Marks	Total Hours	42L+28P+50ABL=120

Course Objective: To get acquainted with the importance and applications of Microprocessor and Microcontroller.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Describe the complete architecture of the 8086 processor and the Segmented memory management.	1	-
2	Develop and analyze assembly language programs using the 8086/8088 instruction set and assembler directives	3	-
3	Differentiate between microprocessors and microcontrollers, and explain the fundamentals of ARM architecture and embedded system components	2,5	-
4	Apply ARM instruction set to write and optimize assembly language programs using performance-aware techniques such as profiling and instruction scheduling..	3,5	-

MODULE – 1	11 Hrs.

The 8086/8088 Processors: Register Organization of 8086, Architecture, Signal descriptions of 8086, Physical memory organization, General bus operation, I/O Addressing capability, Special processor activities, 8086 Machine language Instruction formats, addressing modes of 8086, Instruction set of 8086/8088.

MODULE – 2	10 Hrs.

8086/8088 Instruction Set & Assembler Directives: Assembler Directives and Operators. Instruction Set. The art of Assembly Language Programming with 8086/8088: A few machine level programs, Machine coding the programs.

MODULE -3	11 Hrs.

Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table.

MODULE -4	10 Hrs.

Introduction to the ARM Instruction Set: Data Processing Instructions, Programme Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants. **ARM programming using Assembly language:** Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Advanced Microprocessors and Peripherals	Ajoy Kumar Ray & Kishor M Bhurchandi,	3rd	McGraw Hill publication	2018
2.	ARM system developer's guide,	Andrew N Sloss, Dominic Symes and Chris Wright,	3rd	Kaufman publishers	2008

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Microprocessors and Interfacing Programming and Hardware	Douglas V. Hall,	2nd	McGra Hill publication	2018
2	Microcontroller (ARM) and Embedded System	Raghunandan G.H	2nd	Cengage learning Publication	2019
3	The Insider's Guide to the ARM7 Based Microcontrollers, Ltd	Trevor Martin	1st	Hitex Publication	2005

E-Book and online course material:

1) https://www.mheducation.co.in/advanced-microprocessor-and-peripherals-9781259006135-india?utm_source=chatgpt.com

Online Course and Video Lecture:

1) https://onlinecourses.nptel.ac.in/n oc22_ee09/preview

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Classroom Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	09
4	Activity Based Learning	-	-	41
Total Learning Hours/Semester				**120**

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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
Activity Details	Lab Program Execution – 10 Marks Activity Based Learning – 10 Marks	20
Total		**50**

Integrated Lab Component (28 Hours)

Sl. No	**Program Details**	**Hours**
PART -A: Conduct the following 8086 Microprocessor experiments by writing program using MASM.		
1	Write a program to find factorial of a number.	2
2	Performing binary search on given 'n' 8 - bit and 16 - bit numbers.	2
3	Reversing a given string and check whether it is a palindrome or not.	2
4	Generating and print the first n Fibonacci numbers.	2
5	Performing the bubble sort on given n 8-bit numbers.	2
6	Finding out whether given sub string is present or not in main string of characters.	1
7	Computing Binomial coefficient using recursive procedure; assume n and r are non- negative integers.	1
8	Developing macros, to read a character from the key board in a module and to display a character from the module.	2
PART –B: Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.		
1	Display “Hello World” message using Internal UART.	2
2	Interface and Control a DC Motor.	2
3	Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.	2
4	Determine Digital output for a given Analog input using Internal ADC of ARM controller.	2
5	Interface a DAC and generate Triangular and Square waveforms.	2

6	Interface a 4x4 keyboard and display the key code on an LCD.	2
7	Demonstrate the use of an external interrupt to toggle an LED On/Off.	1
8	Display the Hex digits 0 to F on a 7-segment LED interface, with an in between appropriate delay	1
Total		**28**

Activity Based Learning (42Hours)

ABL1 (30Hours): Design and implement real-time application programs by installing MASM/TASM.		**Hours**
1.	In this activity, students will conduct a survey to explore and identify various real time applications.	8
2.	Meeting and discussing with the faculty and fixing the problem statement.	5
3.	Designing and implementing the project.	13
4.	Presentation and submitting the final report.	4
Total		**30**
ABL2 (12 Hours): Demonstration of 8086 program.		**Hours**
Demonstrating the 8086 real time Microprocessor program using MASM/TASM (9 Hours)		12
Total Learning Hours/Semester		42

Evaluation of Learning Process (8Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

MALNAD COLLEGE OF ENGINEERING, HASSAN
(An Autonomous Institution Affiliated to VTU, Belagavi)
DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Articulation Matrix

Course Outcomes	Program Outcomes[PO's]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2			2										
CO3		2			3								
CO4			3		3								

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	DATABASE MANAGEMENT SYSTEMS		
Course Code	24IS403	(L-T-P)C	(3-0-2) 4
Exam	3 Hrs.	Hours/Week	5
SEE	50 Marks	Total Hours	42L + 28P +50ABL = 120

Course Objective: Students will acquire the concepts of database, and application of SQL for solving problem.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Explain the fundamental concepts and applications of Database Management Systems.	1	-
2.	Design Entity-Relationship diagrams for real-world applications and construct appropriate SQL queries.	2, 3, 5	1, 2
3.	Apply normalization techniques and analyze transaction management concepts including concurrency and recovery mechanisms.	1, 2, 4	-
4.	Compare traditional relational databases with NoSQL systems and demonstrate basic CRUD operations in MongoDB.	5, 11	2

MODULE-1	11 Hrs.

Introduction: Introduction, an example, Characteristics of Database approach, Actors on the Screen Workers Behind the Scene, Advantages of Using DBMS Approach. Data Models, Schemas and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces The Database System Environment.

Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues.

MODULE-2	10 Hrs.

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra, Relational Database Design Using ER- to- Relational Mapping.

SQL: SQL Data Definition and Data Types, Specifying Basic Constraints in SQL, Basic Queries in SQL.

MODULE-3	10 Hrs.

SQL(contd.): More Complex SQL Queries, Insert Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views (Virtual Tables) in SQL, Schema Change Statements in SQL.

Database Design: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form	
MODULE-4	**11 Hrs**
Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock - Based Concurrency Control, Performance of Locking, Transaction Support in SQL, Introduction to Crash Recovery. Crash Recovery: Introduction to ARIES **NoSQL**: An overview of NoSQL, Characteristics of NoSQL, NoSQL storage types, Advantages and Drawbacks of NoSQL. Overview of MongoDB- what is MongoDB?,MongoDB Architecture, DBcollection and document structures, BSON format, CRUD operations.	

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Database Systems	Elmasri and Navathe	7th Edition	Addison-Wesley	2015
2	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke	3rd Edition	McGrawHill	2007

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Database System Concepts	Silberschatz, Korth and Sudarshan	6th	Mc-Graw Hill	2010
2	Introduction to Database Systems	C.J. Date, A. Kannan, S. Swamynatham	8th	Pearson Education	2006

E-Books-and-online-course-materials:

1) https://nptel.ac.in/courses/106105175
2) https://www.tutorialspoint.com/mongodb/mongodb_overview.html

Online Courses and Video Lectures:

1) https://www.youtube.com/watch?v=JSV7xjIikwg
2) https://www.youtube.com/watch?v=f-Id5Ct3Qvk

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Classroom Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	09
4	Activity Based Learning	-	-	41
Total Learning Hours/Semester				**120**

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
Activity Details	Lab Program Execution – 10 Marks Activity Based Learning – 10 Marks	20
Total		**50**

Integrated Lab Component (28 Hours)

Sl. No	Program Details	Hours
1.	**Introduction to DBMS & ER Modeling** **Objective:** Understand the DBMS environment, schemas, and ER modeling. **Task:** Design an ER diagram for the following system: **Scenario:** College Management System • The system maintains data about students, courses, departments, faculty, and enrollments. • A department has a unique department ID and name. • A course has a course ID, title, credits, and is offered by a department. • Each faculty member belongs to one department and can teach multiple courses. • Students have a USN, name, semester, and email. • Students enroll in courses; enrollment includes the grade obtained. **Instructions:** • Design the ER diagram using high-level conceptual modeling. • Convert the ER diagram to a relational schema. • Identify keys, weak entities, relationships, and appropriate constraints. a. Discuss concepts of schema, instance, and three-schema architecture.	4
2.	**Table Creation and Basic SELECT Queries**	4

	Objective: Practice DDL and basic DML commands. **Task:** • Create tables from Lab 1 relational schema. • Insert at least 5 records in each table. • **Write queries to:** 1. Retrieve names of all students from semester 5. 2. Find all faculty teaching more than one course. 3. Get all courses offered by the "ISE" department. Display students along with the courses they are enrolled in and their grades.	
3.	**Constraints, Views, and Triggers** **Objective:** Understand and apply schema constraints, views, and triggers. **Task:** **Given Schema:** • EMPLOYEE(EmpID, FullName, Salary, DeptCode) • DEPARTMENT(DeptCode, DeptName, OfficeLocation) • PAYROLL_LOG(EmpID, PreviousSalary, RevisedSalary, ModifiedDate) **Instructions:** • Apply appropriate constraints: NOT NULL, UNIQUE (on FullName), CHECK (e.g., Salary > 10000), DEFAULT (OfficeLocation = 'Hassan') • Create the following views: o Employees with salary above 50000 o Departments and number of employees in each • Triggers: On salary update, insert into PAYROLL_LOG	4
4.	**SQL Joins** **Objective:** Demonstrate the use of JOIN operations in SQL. **Scenario:** **Use the schema:** • CUSTOMER(CustomerID, CustomerName, RegionID) • REGION(RegionID, RegionName) • PURCHASE(CustomerID, ProductID) • PRODUCT(ProductID, ProductName, RegionID) Insert at least 5 rows for each table **Queries to Perform:** 1. INNER JOIN to get customers and their regions 2. LEFT OUTER JOIN to list all customers and their purchases (even if not purchased) 3. RIGHT OUTER JOIN to list all products and customers (even if product not purchased) FULL OUTER JOIN to get complete listing of customers and products with purchase info	4
5.	**Joins with Aggregates and Grouping** **Objective:** Apply JOINs in combination with GROUP BY, HAVING, and aggregate functions.	4

	Scenario: Extend the schema used in LAB 4. **Queries to Perform:** 1. Find the total number of purchases made by each customer. 2. List regions with average product price greater than a specified amount. 3. Retrieve customers who have purchased more than 2 different products (use GROUP BY and HAVING). 4. Display the product name and total quantity sold for each product (assume PURCHASE includes Quantity). 5. Find the region with the highest total purchase volume. **Note:** This lab reinforces advanced SQL skills through analytical queries.	
6.	**MongoDB Basics and CRUD Operations** **Objective:** Introduce document-based storage and perform full CRUD operations in MongoDB. **Task:** Create a database `retail_store` with collections `customers`, `staff`, and `products` **Operations:** • Create: o Insert documents using `insertOne()` and `insertMany()` into each collection • Read: o Use `find()`, `find({criteria})` to: o Get all customers from a specific city o List all products sold by a particular staff member o Display all products priced above a certain value • Update: o Update a customer's phone number or address o Update product price or quantity • Delete: o Delete a customer by ID Remove discontinued products from the collection	4
7.	**Object-Oriented Database Concepts** **Objective:** Explore Object-Oriented features in database design and implementation. **Task:** • Design a class hierarchy for a Vehicle Rental System: o `Vehicle` (VehicleID, Make, Model, Year) o `Car` (inherits Vehicle, has additional fields: SeatingCapacity, FuelType) o `Bike` (inherits Vehicle, has additional fields: GearType) o `Customer` (CustomerID, Name, LicenseNo) o `Rental` (RentalID, CustomerID, VehicleID, StartDate, EndDate) **Instructions:**	4

	• Use PostgreSQL (with object-relational extensions) or Oracle to: • Define object types and typed tables • Create table of objects using `CREATE TYPE` and `UNDER` keyword (if supported) • Simulate inheritance and demonstrate object attributes access **Perform:** • Insertion and retrieval of object data Querying with path expressions to access nested attributes	
Total		**28**

Activity Based Learning (41 Hours)

ABL (41 Hours): Design and Implementation of a Database Application Design and implement a mini-project using a DBMS of your choice (e.g., MySQL, PostgreSQL, MongoDB) to demonstrate the concepts learned, such as relational modeling, normalization, and advanced SQL queries.		**Hours**
1.	Conducting a literature survey to explore real-world DBMS applications and case studies.	6
2.	Meeting with faculty to finalize the use case, project scope, and schema design.	5
3.	Designing ER diagram, schema modeling, and normalization (up to BCNF).	9
4.	Creating the database using SQL or NoSQL (table creation, data insertion, constraints).	7
5.	Developing complex SQL queries (joins, grouping, nested queries, triggers, procedures).	6
6.	Implementing indexing, transaction features, and performance analysis.	4
7.	Preparing final documentation and project presentation.	4
Total		**41**

Evaluation of Learning Process (9 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
ABL Presentation	1
Semester End Exam	3
Total	**9**

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Course Articulation Matrix:

Course Outcomes	Program Outcomes[PO's]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3	3		3							3	3
CO3	3	2		2									
CO4					3						1		
CO5													2

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS		
Course Code	24IS404	(L-T-P)C	(3-0-0)3
Exam	3hrs	Hours/Week	3
SEE	50 Marks	Total Hours	42L+48ABL=90

Course Objective: Students will be able to design algorithms using various strategies and analyze it mathematically.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Apply various algorithm design techniques to solve the given problem.	3	1
2.	Analyze the time complexity of the algorithm using asymptotic notations.	2	1
3.	Differentiate tractable & intractable problems & apply techniques that help to cope up with limitation of algorithm power.	3	1
4.	Conduct experiments to implement the designed algorithms.	3	1

MODULE- 1	12 Hrs.

Introduction: Notion of Algorithm, Fundamentals of algorithmic problem solving. **Fundamentals of the Analysis of Algorithm Efficiency:** Analysis framework, Asymptotic notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms, Examples. **Brute Force:** Selection Sort and Bubble Sort, Sequential Search and String Matching, Exhaustive search.

MODULE- 2	10 Hrs.

Divide-and-Conquer: Binary Search, Merge Sort, Quick Sort, Binary tree traversals and related properties, Multiplication of large integers, Strassen's Matrix multiplication.

Decrease-and-Conquer: Insertion Sort, Depth First and Breadth First Search, Topological sorting, Algorithms for generating combinatorial objects.

MODULE- 3	10 Hrs.

Transform-and-Conquer: Pre-sorting, Balanced Search Trees, Heaps and Heap Sort, Problem reduction. **Space and Time Trade-off**: Sorting by counting, Input enhancement in string Matching (only Horspool), Hashing. **Dynamic Programming**: Computing a Binomial coefficient, Warshall's Algorithm, Floyd's algorithms, The Knapsack problem.

MODULE -4	10 Hrs

Greedy Technique: Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm, Huffman trees,

Limitations of Algorithm Power: Lower-bound arguments, Decision trees, P, NP and NP-Complete Problems, coping with the Limitations of Algorithm Power: Backtracking, Branch-and-bound.

Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to the Design and Analysis of Algorithms	Anany Levitin	3rd Edition	Pearson Education	2017.

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Algorithms	Thomas H. Coremen, Charles E. Leiserson, Ronald L. Rivest	4rd Edition	PHI	2022
2.	Computer Algorithms	Horowitz E., Sahani S., Rajasekharan S	2nd Edition	Galgotia Publications	2018

E-Book and online course material:

1) https://archive.org/details/introductiontode0000levi?utm_source=chatgpt.com

Online Course and Video Lecture:

1) https://nptel.ac.in/courses/106/106/10 6106131/

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Activity Based Learning (ABL1&ABL2)	-	-	41
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**90**

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 activity- 1) Students will choose a real-world problem or application, apply an algorithm to solve it, and present a demo of their solution. 2) Students will earn badges in hackthon / Leetcode etc .	20
Total		**50**

Activity Based Learning (27Hours)

ABL1 (29Hours): Students will demonstrate concepts of different algorithms and techniques applied to various applications, such as using sorting algorithms in online apps or solving minimum distance problems etc.		**Hours**
1.	In this activity, students will clearly identify and explain a real-world problem, and demonstrate the relevance and correctness of the chosen algorithm, including why it is suitable for the solution etc.	5
2.	Meeting and discussing with the faculty and fixing the problem statement.	5
3.	Designing and implementing the project.	15
4.	Presentation and submitting the final report.	4
Total		**29**
ABL2 (12 Hours): Problem solving in hackthon / Leetcode etc		**Hours**
Various problem solve in any registered website (9 Hours)		12
Total Learning Hours/Semester		**41**

Evaluation o f Learning Process (7Hours)

Type of Evaluation	**Hours**
Test(1,2 and 3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

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

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Course Title	**C# AND .NET TECHNOLOGIES**		
Course Code	**24IS405A**	**(L-T-P)C**	**(2-0-2) 3**
Exam	**3 Hrs**	**Hours/Week**	**4**
SEE	**50 Marks**	**Total Hours**	**28L+28P+34ABL=90**

Course Objective: Students will be able to apply Object Oriented Programming concepts for designing Applications using language C# and IDE – Visual Studio.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Develop C# programs using Visual Studio IDE.	1,2	-
2	Apply Object Oriented Programming concepts in C# programming language	2,3	-
3	Interpret Interfaces and define custom interfaces for application.	3,5	-
4	Analyze a C# program for identifying bugs.	3,5	-

MODULE – 1	**7Hrs.**

Introducing Microsoft Visual C# and Microsoft Visual Studio 2015: Welcome to C#, working with variables, operators, and expressions, writing methods, and applying scope, using decision statements, using compound assignment and iteration statements, Managing errors and exceptions.

MODULE – 2	**7Hrs.**

Understanding the C# object model: Creating and Managing classes and objects, understanding values and references, creating value types with enumerations and structures, Using arrays.

MODULE -3	**7Hrs.**

Understanding parameter arrays, working with inheritance, creating interfaces and defining abstract classes, Using garbage collection and resource management.

MODULE -4	**7Hrs.**

Defining Extensible Types with C#: Implementing properties to access fields, introducing generics, Using collections, Operator overloading.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Microsoft Visual C# Step by Step	John Sharp	8th Edition	PHI Learning Pvt. Ltd	2016

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Inside C#	Tom Archer, Andrew Whitechapel	2nd	WP Publishers	2012
2	The Complete Reference C# 3.0	Herbert Schildt	3rd	Tata McGraw Hill Education Private Limited	2007

E-Book and online course material:

1) https://www.ebooks.com/en-in/book/2256092/microsoft-visual-c-step-by-step/john-sharp/?utm_source=chatgpt.com

Online Course and Video Lecture:

1) https://www.coursera.org/l earn/intro-to-dotnet-core

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	08
4	Activity Based Learning(ABL1&ABL2)	-	-	26
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Lab Program Execution-10Marks 2) Mini projects-10Marks	20
Total		**50**

Integrated Lab Component (28Hours)

Sl. No	Program Details	Hours
1.	Develop a C# program to simulate simple arithmetic calculator for Addition, Subtraction, Multiplication, Division and Mod operations. Read the operator and operands through console.	4
2.	Develop a C# program to print Armstrong Number between 1 to 1000.	4
3.	Develop a C# program to list all substrings in a given string. [Hint: use of Substring() method]	2
4.	Develop a C# program to list all substrings in a given string. [Hint: use of Substring() method]	4
5.	Develop a C# program to generate and print Pascal Triangle using Two Dimensional arrays.	4
6.	Develop a C# program to generate and print Floyds Triangle using Jagged arrays.	2
7.	Develop a C# program to read a text file and copy the file contents to another text file.	4
8.	Design a class "Complex" with data members, constructor and method for overloading a binary operator '+'. Develop a C# program to read Two complex number and Print the results of addition	4
	Total	**28**

Activity Based Learning (26 Hours):

ABL (26 Hours): To design and implement a simulation or real-time application that demonstrates the working and effectiveness of a concept or algorithm using C# and .NET Technologies**.**		**Hours**
1.	Study various C#/.NET concepts such as collections, async/await, threading, serialization, etc.	6
2.	Meeting and discussing with the faculty and fixing the problem statement.	4
3.	Designing and implementing the project.	12
4.	Presentation and submitting the final report.	4
Total Learning Hours/Semester		**26**

Evaluation of Learning Process (8 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

Course Articulation Matrix

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

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Course Title	**INTERNET OF THINGS**		
Course Code	**24IS405B**	**(L-T-P)C**	**(2-0-2)3**
Exam	**3 Hrs.**	**Hours/Week**	**4**
SEE	**50 Marks**	**Total Hours**	**28L+28P+34ABL=90**

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; YANG; IoT Systems management with NETCONFYANF; NETOPE 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- Raspb erry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces, Other IoT devices. IoT Physical Servers & Cloud Offerings: Amazon Web Services for IoT, AmazonEC2, AmazonS3, 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 Map Reduce for Batch Data Analysis.

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Internet of Things - A Hands on Approach	Arshdeep Bahga and Vijay Madisetti	1st	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	Wiley	2012
2	Internet of Things: A Hands-On Approach Vijay Madisetti	Vijay Madisetti, ArshdeepBahga	1st	Orient Blackswan	2014

E-Book and online course material:

1) https://www.scribd.com/document/513453064/Internet-of-Things-a-Hands-On-Approach-by-Arshdeep-Bahga-Vijay-Madisetti?utm_source=chatgpt.com

Online Course and Video Lecture:

1) https://nptel.ac.in/courses/108/108/108108098/

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	09
4	Activity Based Learning(ABL)	-	-	25
Total Learning Hours/Semester				**90**

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Proposed Assessment Plan (for 50 marks of CIE):

Tool	**Remarks**	**Marks**
CIE	Three CIEs conducted for 20marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Program Execution-10Marks 2) Mini Project-10Marks	20
Total		**50**

Integrated Lab Component (28Hours)

Sl. No	**Program Details**	**Hours**
1.	To interface LED / Buzzer with Ardunio / raspberry Pi and write a program to turn on LED for one seconds after every two seconds.	4
2.	To interface push button Digital sensor(IR/LDR)with Ardunio / raspberry Pi and write a program to turn on LED when push button is pressed or at sensor detection.	4
3.	How do you display text on a 16*2 LED screen using potentiometer.	2
4.	How do you read input from a push button and display the status on the serial monitor.	4
5.	To interface DHT level sensor with Ardunio / raspberry Pi and write a program to print temperature and humidity readings.	4
6.	To interface motor using relay with Ardunio / raspberry Pi and write a program to turn on motor when push button is pressed.	2
7.	Write an Arduino program to interface an MQ-2 gas sensor with an LED and a buzzer to indicate the presence of combustible gases	4
8.	Implement an Arduino-based air drum kit that uses motion sensors (e.g., ultrasonic or IR sensors) to detect hand movements and trigger corresponding drum sounds or LED indicators for each drum hit.	4
Total		**28**

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Activity Based Learning (25 Hours):

ABL (25Hours): Design & Demo a Mini IoT Solution		**Hours**
1.	**Exploration:** Students explore common IoT components (e.g., Arduino/Raspberry Pi, DHT11 sensor, LED, WiFi module	6
2.	Meeting and discussing with the faculty and fixing the problem statement.	4
3.	Design & Build: Build a basic prototype using sensors and microcontrollers or design a logical flowchart/diagram of the system	11
4.	Presentation and submitting the final report.	4
Total Learning Hours/Semester		**25**

Evaluation of Learning Process (9 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution +Project Demo	3
Semester End Exam	3
Total	**9**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**OPTIMIZATION TECHNIQUES**		
Course Code	**24IS405C**	**(L-T-P)C**	**(2-0-2)3**
Exam Hrs.	**3**	**Hours / Week**	**4**
SEE	**50 Marks**	**Total Hours**	**28L+28P+34ABL=90**

Course Objective: Solve optimization problems using various methods
Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping To POs	Mapping To PSOs
1.	Develop mathematical model for a given problem.	1	-
2.	Apply techniques of Operations Research.	2	-
3.	Solve prediction and estimation problems.	1, 2	-
4.	Expose to the significance of various scientific tools.	5	-

MODULE – 1	**7 Hrs**

Introduction : Introduction: The origin, nature and impact of OR; Overview of the Operations Research Modeling Approach: Defining the Problem and Gathering Data; Formulating a Mathematical Model; Deriving Solutions from the Model; Testing the Model; Preparing to Apply the Model; Implementation **Linear Programming – 1 :** Prototype example; The Linear Programming (LP) Model, Assumptions of LP, Additional Examples

MODULE – 2	**7 Hrs**

Simplex Method - 1 : The Essence of the Simplex Method; Setting up the Simplex Method; The **Algebra** of the Simplex Method; The Simplex Method in Tabular Form; Tie Breaking in the Simplex Method **Simplex Method – 2 :** Adapting to other Model Forms; Post Optimality Analysis, Computer implementation.

MODULE – 3	**7 Hrs**

Revised Simplex Methods: Foundations of the Simplex Method, The revised simplex method, A Fundamental Insight **Duality Theory:** The Essence of Duality Theory; Economic Interpretation of Duality. Primal-Dual **Relationships**, Adapting to other primal forms, The role of duality in sensitive analysis; The essence of sensitivity analysis; Applying sensitivity analysis, The dual simplex method ; Parametric linear programming; The upper bound technique.

MODULE – 4	**7 Hrs**

Transportation Model: Definition of the Transportation Model, Nontraditional Transportation Models, The Transportation Algorithm. **Assignment Model and Network Models :** The Assignment Model, CPM and PERT

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Introduction to Operations Research	Frederick S. Hillier and Gerald J. Lieberman	9th Edition	Tata McGrawHill	2012
2	Operations Research: An Introduction	Hamdy A Taha,	8th Edition	Prentice Hall India,	2005

Reference Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Operations Research Applications and Algorithms",	Wayne L. Winston	4th Edition	Thomson Course Technology,	2003

E-Book and online course material:

1) https://archive.org/details/introduction-to-operations-research?utm_source=chatgpt.com

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Integrated Lab Component	2	14	28
3	Evaluation of Learning Process	-	-	08
4	Activity Based Learning(ABL)	-	-	26
Total Learning Hours/Semester				**90**

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
Activity Details	1) Program Execution-10Marks 2) Mini projects-10Marks	20
Total		**50**

Integrated Lab Component (28 Hours)

Sl. No	Program Details	Hours
1.	Develop a program to solve a linear programming problem using the Simplex Method.	4
2.	Write a program to solve a Transportation Problem using the Least Cost Method and optimize it using the MODI Method.	4
3.	Implement the Hungarian Algorithm to solve an Assignment Problem using a cost matrix.	2
4.	Write a program to minimize a given non-linear function using the Gradient Descent Method.	4
5.	Develop a program that uses Lagrange Multipliers to find the extrema of a function subject to an equality constraint.	4
6.	Implement a Genetic Algorithm to find the optimal value of a continuous function within a defined domain.	2
7.	Write a program to minimize a function using the Particle Swarm Optimization (PSO) algorithm.	4
8.	Develop a program to solve the Shortest Path Problem in a directed graph using Dynamic Programming.	4
Total		**28**

Activity Based Learning (26 Hours)

ABL (26 Hours): Real-World Optimization Problem Solving and Algorithm Implementation		**Hours**
1.	Problem Formulation	6
2.	Application of appropriate technique	6
3.	Use of tools and accuracy of results	8
4.	Report quality and documentation	6
Total Learning Hours/Semester		**26**

Evaluation of Learning Process (8 Hours)

Type of Evaluation	**Hours**
Test (1,2 and 3)	3
Lab program Execution	2
Semester End Exam	3
Total	**8**

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Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**PROBABILTIY, STASTISTICS AND QUEING**		
Course Code	**24IS405D**	**(L-T-P)C**	**(3-0-0)3**
Exam	**3 Hrs.**	**Hours/Week**	**3 Hrs**
SEE	**50 Marks**	**Total Hours**	**42L+48ABL=90**

Course Objective: To study the basics of statistics, measure central tendency and dispersion.

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 basics of probability, sample space, events, statistics and apply them to real life problems	1	-
2.	Distinguish probability density and distribution functions for single and multiple random variables.	1	-
3.	Use the probability, moment generating functions and characteristic functions.	1	-
4.	Formulate, analyze and validate models applicable to practical problems.	2	-

MODULE – 1	**11 Hrs.**

Probability Theory: Definition of probability: classical, empirical and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes theorem of inverse probability, Properties of probabilities with proofs, Examples.

MODULE – 2	**10 Hrs.**

Random Variable and Mathematical Expectation: Definition of random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs, Examples.

MODULE -3	**11 Hrs.**

Correlation: Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearmans rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient, Properties of Spearmans rank correlation coefficient, Probable errors, Examples.

MODULE -4	**10 Hrs.**

Linear Regression Analysis: Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient, Examples.

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Statistics	S. C. Gupta	46th Edition,	Himalaya Publishing House	-
2	Probability and Random Processes	G. V. Kumbhojkar	14th Edition	C. Jamnadas and co.	-

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Probability, Statistics with Reliability Queuing and Computer Science Applications	Kishor S. Trivedi	2ndEdition,	Wiley India Pvt. Ltd.	-
2	An Introduction To Probability And Statistics	A. K. Md. Ehsanes Saleh	3rd Edition	Wiley Publication.	-

E-Book and online course material:

1) https://books.google.co.in/books/about/Fundamentals_of_Statistics.html?id=zMUouAAACAAJ&redir_esc=y

Teaching -Learning– Evaluation Scheme:

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

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
Activity Details	Activity Based Learning – 20 Marks	20
Total		**50**

Activity Based Learning (41Hours)

ABL1 (30Hours): Application of Probability and Statistics in Daily Life: Each student selects a simple real-world situation and performs statistical analysis		**Hours**
1.	Problem statement	6
2.	Data collected or experiment performed	6
3.	Calculation and interpretation	12
4.	Conclusion and preparing a report.	6
Total		**30**
ABL2 (11 Hours): Probability Distribution and Statistical Data Visualization from Real-Life Dataset		**Hours**
Collect any real-world dataset (e.g., marks of students, rainfall, sales data) and represent it using Bar chart**,** Histogram, Pie chart, Box plot and Line graph.		11
Total Learning Hours/Semester		**41**

E

Evaluation o f Learning Process (7Hours)

Type of Evaluation	**Hours**
Test(1,2and 3)	3
Presentation	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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Course Title	**GREEN IT AND SUSTAINABILITY**		
Course Code	**24IS406A**	**(L-T-P)C**	**(1-0-0)1**
Exam	**3 Hrs.**	**Hours/Week**	**2 Hrs**
SEE	**50 Marks**	**Total Hours**	**14L+16ABL=30**

Course Objective: Students will be able to use appropriate data structures for solving problems.

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 fundamental concepts of Green IT and assess the environmental impacts of IT systems and practices.	1	-
2.	Analyze the lifecycle of IT hardware and evaluate sustainable practices such as reuse, recycling.	2	-
3.	Identify efficient software design principles and assess their impact on IT system energy consumption	2,6,7	-
4.	Develop strategies for implementing Green IT initiatives and outline the transformation roadmap for sustainable enterprise IT operations.	2,6,7	-

MODULE – 1	**4Hrs.**

Green IT: **An Overview** Green IT fundamentals - Environmental Impacts of IT - Green IT standards - Applying IT for enhancing environmental sustainability

MODULE – 2	**3Hrs.**

Green Devices And Hardware Life cycle of a device or hardware - Reuse, Recycle and dispose. Green software - Energy saving software techniques, Green information systems, evaluating software impact to platform power.

MODULE -3	**4Hrs.**

Managing Green IT Implementation of Green IT, Information Assurance and communication - Green Enterprise transformation roadmap -Green compliance.

MODULE -4	**3Hrs.**

Law, Standards and Protocols Regulatory environment and IT manufacturers, Non regulatory government initiatives, Green building standards, Green data centers.

Prescribed Text Book:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Green IT Strategies and Applications-Using Environmental Intelligence	Bhuvan Unhelkar	3rd Edition	CRC Press,	June 2014

References Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Harnessing Green IT Principles and Practices Green Home computing for dummies	Woody Leonhard, Katherine Murray	-	Wiley Publication	August 2012.

E-Book and online course material:

1) https://archive.org/details/greenitstrategie0000unhe?utm_source=chatgpt.com

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Classroom Teaching & Learning	1	14	14
2	Evaluation of Learning Process	-	-	07
3	Activity Based Learning	-	-	09
Total Learning Hours/Semester				**30**

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
Activity Details	Activity Based Learning – 20 Marks	20
Total		**50**

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Activity Based Learning (9 Hours)

ABL (9Hours): To engage students in identifying, analyzing, and proposing sustainable IT practices within their own campus or community through observation, teamwork, and innovation		**Hours**
1.	Short video or presentation on what Green IT means: energy-efficient systems, e-waste management	1
2.	Students form groups and conduct a walk-through of the campus: Availability of e-waste bins	2
3.	Data Analysis: Groups analyze their finding	2
4.	Green IT Proposal: Problem Identified	2
5	Presentation & Conclusion	1
Total		**09**

Evaluation o f Learning Process (7 Hours)

Type of Evaluation	**Hours**
Test(1,2&3)	3
Presentation	1
SEE	3
Total	**7**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**UI/UX LABORATORY**		
Course Code	**24IS406B**	**(L-T-P)C**	**(0-0-2)1**
Exam Hrs.	**3**	**Hours / Week**	**2**
SEE	**50 Marks**	**Total Hours**	**28P+2E=30**

Course Objective: To gain a solid understanding of fundamental UI/UX principles, including visual design, user-centered design, usability, and user experience.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Apply design principles and guidelines to create visually appealing and user-friendly interfaces for websites and mobile applications.	3	
2	Develop wire frames and interactive prototypes using design tools to visualize and communicate interface concepts and user flows.	3,5	

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				30

ABL: Lab based learning(28Hrs)		
Sl . No	**Program Details**	**Hours**
1	Designing a Login Form: Design a user-friendly login form for a mobile app. Consider the layout, input fields, button design, and error handling to create an intuitive and visually appealing login experience.	4
2	Creating a Navigation Menu: Design a navigation menu for a website that includes dropdown menus and a responsive design. Ensure the menu is easy to navigate and visually consistent across different screen sizes.	2
3	Redesigning a Landing Page: Redesign a landing page for a product or service. Improve the visual hierarchy, use compelling imagery, and optimize the layout to encourage user engagement and conversions.	2
4	Creating a Contact Form: Design a contact form for a website that captures essential user information. Consider input validation, error messages, and a confirmation message to enhance the user experience.	2
5	Designing a Product Card: Create a visually appealing product card for an e-commerce website. Include product images, title, price, and call-to-action buttons to entice users to learn more and make a purchase.	2

6	Improving Form Usability: Evaluate an existing form on a website for usability issues and propose improvements. Focus on optimizing the form's layout, labeling, and input validation to enhance user comprehension and completion rates.	4
7	Enhancing Mobile App On boarding: Design an on boarding experience for a mobile app. Create a series of screens that introduce users to the app's features and guide them through the setup process in a clear and engaging manner.	2
8	Redesigning a Checkout Process: Redesign the checkout process for an e-commerce Website. Simplify the steps, provide clear instructions, and optimize the layout and form inputs to streamline the purchasing experience.	4
9	Designing an Error Page: Design a visually appealing and helpful error page for a website. Consider the tone of the message, provide relevant information or suggestions, and include navigational elements to guide users back on track.	2
10	Creating an Interactive Prototype: Use a prototyping tool to create an interactive Prototype for a mobile app or website. Design key screens and transitions to showcase the user flow and interactions within the interface.	4
Total		**28**

Proposed Assessment Plan (for 50 marks of CIE)

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

Evaluation of Learning Process (2 Hours)

Type of Evaluation	**Hours**
Program Execution	02
Total	**02**

Course Articulation Matrix

Course Outcomes	**Program Outcomes [PO's]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1			3										
CO2			3		3								

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	**INTRODUCTION TO WEB TECHNOLOGY**		
Course Code	**24IS406C**	**(L-T-P)C**	**(0-0-2)1**
Exam	**3 Hrs.**	**Hours/Week**	**2**
SEE	**50 Marks**	**Total Hours**	**28P + 2E = 30**

Course Objectives: Initially Students will be taught the basic concepts about XHTML, JavaScript, PHP, MYSQL and following programming exercises are carried out to understand the concepts.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Understand the fundamentals of HTML, XHTML, Javascript, PHP and MYSQL	1	-
2.	Design and develop programs using JavaScript and PHP to implement interactive websites.	2, 3	-

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				30
ABL: Lab based learning(28Hrs)				
Web programming				

Sl .No	Program Details	Hours
1	Develop and demonstrate a XHTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color, and the tag.	4
2	Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible	4
3	Using JavaScript script, develop a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event	4

	handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected	
4	Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.	4
5	Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date- time on the web page up on reopening of the same page.	4
6	Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.	4
7	Using PHP and MySQL, develop a program to accept book information viz. Accession Number, Title, Authors, Edition and Publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.	4
Total		**28**

Scheme of Evaluation (Laboratory)

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

Prescribed Text Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Programming the World wide web	Robert W Sebesta	8th Edition	Pearson Education	-

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Web Programming building internet applications	Chris Bates	3rd Edition	Wiley India	-
2	Open Source Web Development with LAMP	James Lee, Brent Ware	-	Pearson Education	-

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Evaluation o f Learning Process (2 Hours)

Type of Evaluation	**Hours**
Program Execution	2
Total	**2**

Course Articulation Matrix

Course Outcomes	**Program Outcomes[PO's]**												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		2	2										

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Course Title	**TECHNICAL WRITING USING LATEX**		
Course Code	**24IS406D**	**(L-T-P)C**	**(0-0-2)1**
Exam	**3 Hrs**	**Hours/Week**	**2 Hrs**
SEE	**50 marks**	**Total Hours**	**28P + 2E = 30**

Course Objective: To introduce the basic syntax and semantics of the LaTeX scripting language

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Demonstrate the ability to set up a LaTeX environment and create structured documents using article and book classes.	1	-
2.	Customize document layout by applying page formatting techniques such as margin setting, headers/footers, multi-column layouts, and error resolution.	2,5	-
3.	Apply document content effectively using text styling, color customization, list structures, and the integration of mathematical expressions.	1	-
4.	Construct well-organized tables and insert and manipulate images with properties like scaling and rotation in LaTeX documents.	2,10	-

Teaching -Learning– Evaluation Scheme

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Laboratory Sessions	2	14	28
2	SEE	-	-	02
Total Learning Hours/Semester				**30**

ABL: Lab based learning(28Hrs)

Sl. No	Program Details	Hours
1	Introduction to LaTeX: Install LaTeX distribution and editor (TeXmaker/Overleaf), create a basic document with title, author, and date.	4
2	Text Formatting: Use sections, subsections, bold, italic, underline, lists (itemize/enumerate), and special characters.	2
3	Mathematical Typesetting: Use inline and display math, symbols, fractions, superscripts, subscripts, equations, and align environment.	2
4	Table Creation: Create simple and advanced tables with alignment, merging cells, borders, and captions.	2
5	Inserting Figures: Include external images, resize, position, and add captions and labels.	2

	Use figure environment.	
6	Cross-referencing: Create labels and references for sections, figures, and tables.	2
7	Bibliography Management: Use thebibliography environment and BibTeX for referencing. Cite sources in text.	2
8	Page Layout: Set margins, header/footer, page numbering, and multi-column layouts.	2
9	Creating Title Page and Abstract: Design custom title pages and format abstract section.	2
10	Using Packages: Use essential packages such as graphicx, amsmath, geometry, hyperref, multicol.	2
11	Presentation using Beamer: Create slides with frames, blocks, transitions, and themes.	2
12	Project Report Formatting: Combine all elements into a structured report (title, TOC, chapters, bibliography).	4
Total		**28**

Prescribed Text Book

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	LaTeX: A Document Preparation System	Leslie Lamport	2nd	Addison-Wesley	2017
2	The Not So Short Introduction to LaTeX2ε	Tobias Oetiker et al.	Latest	Available online	2022

Proposed Assessment Plan(for50marksof CIE)

Tool	Remarks	Marks
Internals	Conduct two tests, each of 20 marks. The total of the two will contribute 40 marks.	40
Record Writing	Based on neatness, completeness, formatting accuracy	5
Continuous Evaluation	Includes attendance, punctuality, participation, and regular submissions	5
Total		**50**

Scheme of Evaluation (Laboratory):

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

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Course Articulation Matrix

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

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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	BIOLOGY FOR ENGINEERS		
Course Code	24BEIS407	(L-T-P)C	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2
SEE	50 Marks	Total Hours	28P+2E=30

Course Objective: Realization of relation between Natural Engineering and man-made Engineering.
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	To familiarize engineering students with basic biological concepts	1	-
2	To involve students in an interdisciplinary vision of biology and engineering	2	-
3	To gain an appreciation for how biological systems can be designed and engineered to substitute natural system	2	-
4	To develop biological models using AI tools	3	-

MODULE – 1	7 Hrs.
Introduction to Human Anatomy: Overview of human anatomy, Structural organization of the human body- cardiovascular system, endocrine system, digestive system, respiratory system, excretory system, lymphatic system, nervous system, muscular system and skeletal system.	

MODULE – 2	7 Hrs.
Bioinspired Engineering based on human physiology: Circulatory system (artificial heart, pacemaker, stents), Nervous system (Artificial neural network).	

MODULE -3	7 Hrs.
Bioinspired Algorithms and Applications: Genetic algorithm, Gene expression modelling. Parallel Genetic Programming: Methodology, History, and Application to Real-Life Problems. Dynamic Updating DNA Computing Algorithms. Beehive: New Ideas for Developing Routing Algorithms Inspired by Honey Bee Behaviour.	

MODULE -4	7 Hrs.
Artificial Intelligence and Biology: Applications of AI in medical imaging, neural engineering, systems biology, microbiome and data mining.	

Prescribed Text Books:

Sl. No	Book Title	Authors	Publisher	Year
1	Bioinspired Engineering	Jenkins, C.H.	NY: Momentum press	2012
2	A Practical Guide to Bio-inspired Design,	Hashemi Farzaneh, Helena, Lindemann, Udo, Springer	Springer link	2019

References Book:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Bio inspired Engineering	Jenkins, C.H.	1st	NY: Momentum press	2012

E-Book and online course material:

1) https://archive.org/details/bioinspiredengin0000jenk?utm_source=chatgpt.com

Online Course and Video Lecture:

1) https://onlinecourses.nptel.ac.in/noc19_g e31/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Internals	Two tests conducted for 20 marks each	40
AAT	Presentation on Biology Topics	10
Total		**50**

Course Articulation Matrix

Course Outcomes	Program Outcomes[PO's]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		3											
CO3		3											
CO4			2										

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Course Title	UNIVERSAL HUMAN VALUES		
Course Code	24UHV	(L-T-P)C	(0-0-2)1
CIE	50 marks	Hours/Week	2 Hrs
SEE	50 marks	Total Hours	28P+2E=30

Course Objective: The course aims at the development of the value education by the right understanding through the process of self-exploration (about themselves), family, society and nature/existence. Strengthening of self-reflection by development of commitment and courage to act are presented as the prime focus throughout the course towards qualitative transformation in the life of the student.

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

#	Course Outcomes	Mapping to POs
1.	Start exploring themselves, get comfortable with each other and with the teacher and they start appreciating the need and relevance for the course. Also they are able to note that the natural acceptance (intention) is always for living in harmony.	6, 7, 8, 9
2.	Differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them and need to take appropriate steps to ensure right participation (in terms of nurturing, protection and right utilization) in the nature.	6, 7, 8, 9
3.	Present sustainable solutions to the problems in society and nature. They are also able to see that these solutions are practicable and draw roadmaps to achieve them.	6, 7, 8, 9

MODULE - 1	8 Hrs

Introduction to Value Education : Understanding Value Education, Self-exploration as the Processfor Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.

MODULE– 2	6 Hrs

Harmony in the Human Being : Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Lecture, Understanding Harmony in the Self Tutorial, Harmony of the Self with the Body to ensure self-regulation and Health.

MODULE-3	8 Hrs
Harmony in the Family, Nature and Existence: Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order. Whole existence as Coexistence: Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc	
MODULE-4	**6 Hrs**
Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definiteness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.	

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	2nd Revised Edition	Excel Books, New Delhi	2019
2	The Teacher's for a Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	2nd Revised Edition	Excel Books, New Delhi	2019

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Jeevan Vidya	EkParichaya, A Nagaraj, Jeevan Vidya Prakashan	-	Amarkantak	1999.
2	Human Values,	A.N. Tripathi	-	New Age Intl. Publishers	2004.

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching &Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				**30**

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Proposed Assessment Plan (for 50 marks of CIE):

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

Course Articulation Matrix

Course Outcomes	Program Outcomes[PO's]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**P08**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1						2	1	3	2				
CO2						2	1	3	2				
CO3						2	1	3	2				

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Course Title	**DESIGN AND ANALYSIS OF ALGORITHMS LABARATORY**		
Course Code	**24IS408**	**(L-T-P)C**	**(0-0-2) 1**
Exam	**3 Hrs.**	**Hours/Week**	**2 Hrs**
SEE	**50 Marks**	**Total Hours**	**28P+2E=30**

Course Objective: To design and implement various algorithms in C/C++ programming using suitable development tools to address different computational challenges. Students will be able to design algorithms using various strategies and analyze it mathematically.

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Design algorithms using appropriate design techniques.	3	1
2	Implement a variety of algorithms such assorting, graph related, combinatorial etc., in a high level language.	5	1
3	Analyze and compare the performance of algorithms using language features.	2	1
4	Apply and implement learned algorithm design techniques and data structures to solve real-world problems.	3,5	1

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	2	14	28
2	Evaluation of Learning Process	-	-	02
Total Learning Hours/Semester				30
ABL1:Lab based learning(28 Hrs)				
Implementation of Algorithms				
Sl .No	**Program Details**			**Hours**
1	Employees in an organization need to be grouped for a tournament based on their ages. Sort the ages using Merge sort and find the time required to perform the sorting.			2
2	Students in a department need to be selected for a high jump competition based on their height (integer values only). Sort the heights of students using Quick sort and find the time required for the sorting.			2
3	Print all the nodes reachable from a given starting node in a graph using Depth First Search method and Breadth First Search. Also check whether a			4

	graph is connected.	
4	Obtain the topological ordering of vertices in a given digraph.	4
5	Implement Horspool algorithm for String Matching.	2
6	Sort a given set of elements using the Heap sort method.	2
7	Implement Floyd's algorithm and Warshall's algorithm for a given graph.	4
8	There are n different routes from hostel to college. Each route incurs some cost. Find the minimum cost route to reach the college from the hostel using Prim's algorithm.	2
9	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm	2
10	Implement 0/1 Knapsack problem using dynamic programming.	2
11	Implement N Queen's problem using Backtracking.	2
Total		**28**

Scheme of Evaluation (Laboratory)

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

Evaluation o f Learning Process (2 Hours)

Type of Evaluation	**Hours**
Lab Program Execution	2
Total	**2**

Course Articulation Matrix

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

MALNAD COLLEGE OF ENGINEERING, HASSAN
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Course Title	**National Service Scheme(NSS)**		
Course Code	**24NYP2**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the importance of his/her responsibilities towards society	6	-
2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.	3,6	-
3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.	3,6	-
4	Implement government or self-driven projects effectively in the field.	11	-
5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.	11	-

MODULE-1	**8 Hrs.**
Water conservation techniques –Role of different stakeholders–Implementation.	
MODULE-2	**8Hrs.**
Preparing an action able business proposal for enhancing the village in come and approach for implementation.	
MODULE-3	**8 Hrs.**
Helping local schools to achieve good results and enhance their enrolment in Higher/technical/vocational education.	

Suggested Learning Resources:

Books:

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell , activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

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Course Title	**Physical Education(PE)**		
Course Code	**24NYP2**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and	6	-
2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.	3,6	-
3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.	3,6	-
4	Implement government or self-driven projects effectively in the field.	11	-
5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.	11	-

MODULE-1	**4 Hrs.**
Ethics and Moral Values Ethics in Sports, Moral Values in Sports and Games	
MODULE-2	**16Hrs.**
Specific games(Any one to be selected by the student) 1. Volleyball–Attack, Block, Service, Upper Hand Pass and Lower hand Pass. 2. Athletics (Track Events)–Any event as per availability of Ground.	
MODULE-3	**4 Hrs.**
Role of Organization and administration	

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Course Title	**Yoga**		
Course Code	**24NYP2**	**(L-T-P)C**	**(0-0-2)**
Exam	**-**	**Hours/Week**	**2**
SEE	**-**	**Total Hours**	**24**

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

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Understand the Philosophical and Scientific Basis of Yoga	12	-
2	Demonstrate Proficiency in Basic Yoga Practices	9	-
3	Analyze the Role of Yoga in Managing Stress and Enhancing Lifestyle	7,12	-
4	Apply Yoga Principles for Personal and Professional Growth	10,12	-

MODULE-1	**8 Hrs.**

Patanjali's Ashtanga Yoga
Yama : Ahimsa, satya, asteya, brahmacharya, aparigraha
Niyama: shoucha, santosh, tapa, svaadhyaya, Eshvarapranidhan

MODULE-2	**8Hrs.**

Different types of Asanas
a. Sitting: l. Sukhasana 2.Paschimottanasana
b. Standing: l.ArdhakatiChakrasana 2 .ParshvaChakrasana
c. Proneline: l. Dhanurasana
d. Supineline: 1.Halasana2.KarnaPeedasana

MODULE-3	**8 Hrs.**

Kapalabhati
Pranayama
1. Suryanuloma–Viloma
2. Chandranuloma-Viloma
3. Suryabhedana
4. ChandraBhedana
5. Nadishodhana