NEW HORIZON
COLLEGE OF ENGINEERING

Department of Information Science and Engineering

Academic Year 2024-25

3rd and 4th Semester

Scheme & Syllabus

BATCH: 2023-27

CREDITS:160

NEW HORIZON COLLEGE OF ENGINEERING

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

• To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

• To encourage long-term interaction between academia and industry through their involvement in the design of the curriculum and its hands-on implementation.

• To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

QUALITY POLICY

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at global level.

VALUES

- ➢ Academic Freedom
- ➢ Integrity
- ➢ Inclusiveness
- ➢ Innovation
- ➢ Professionalism
- ➢ Social Responsibility

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

VISION

To emerge as a Department of Eminence in Information Science and Engineering in serving the Information Technology industry and the nation by empowering students with a high degree of technical and practical competence.

MISSION

• To strengthen the theoretical, practical and ethical dimensions of the learning process by continuous learning and establishing a culture of research and innovation among faculty members and students, in the field of information science and engineering.

• To build long-term interaction between the academia and Information Technology industry, through their involvement in the design of curriculum and its hands-on implementation.

• To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

Program Education objectives (PEOs)

PEO 1	Excel as Information Science Engineers with the ability to solve a wide range of computational problems in the IT industry, Government or other work environments.
PEO 2	Pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO 3	Exhibit adaptive skills to develop computing systems using modern tools and technologies in multidisciplinary areas to meet technical and managerial challenges, which meet societal requirements.
PEO 4	Possess the ability to collaborate as a team member and leader with professional ethics to make a positive impact on society.

PEO to Mission Statement Mapping

PEO Statements	M1	M2	M3
PEO 1: Excel as an Information Science Engineer with the ability to solve a wide range of computational problems in the IT industry, Government or other work environments.	3	3	2
PEO 2: Pursue higher studies with profound knowledge enriched with academia and industrial skill sets.	3	3	2
PEO 3: Exhibit adaptive skills to develop computing systems using modern tools and technologies in multidisciplinary areas to meet technical and managerial challenges which meet societal requirements.	3	3	3
PEO 4: Possess the ability to collaborate as a team member and leader with professional ethics to make a positive impact on society.	2	2	3

Correlation: 3- High, 2-Medium, 1-Low

Program Specific Outcomes (PSO's)

PSO1: The ability to understand, analyze and develop computer programs in the areas of Information Science and Engineering related to System Software, Web Design, Big Data Analytics, Machine Learning, Internet of Things, Data Science, Networking and Security for efficient design of computer-based systems of varying complexity.

PSO2: The ability to apply standard practices and strategies in software project development using innovative ideas and open-ended programming environment with skills in teams and professional ethics to deliver a quality, sustainable product for business success in the field of Information Science.

Program Outcomes (PO) with Graduate Attributes

	Graduate Attributes	Program Outcomes (POs)
1.	Engineering Knowledge	**PO1:** The basic knowledge of Mathematics, Science and Engineering.
2.	Problem analysis	**PO2:** An Ability to analyze, formulate and solve engineering problems.

3.	Design and Development of Solutions	**PO3:** An Ability to design system, component or product and develop interfaces among subsystems of computing.
4.	Investigation of Problem	**PO4:** An Ability to identify, formulate and analyze complex engineering problem and research literature through core subjects of Computer Science.
5.	Modern Tool usage	**PO5:** An Ability to use modern engineering tools and equipments for computing practice.
6.	Engineer and society	**PO6:** An Ability to assess societal, health, cultural, safety and legal issues in context of professional practice in Computer Science & Engineering.
7.	Environment and sustainability	**PO7:** The broad education to understand the impact of engineering solution in a global, economic, environmental and societal context.
8.	Ethics	**PO8:** An understanding of professional and ethical responsibility.
9.	Individual & team work	**PO9:** An Ability to work both as individual and team player in achieving a common goal.
10.	Communication	**PO10:** To communicate effectively both in written and oral formats with wide range of audiences.
11.	Lifelong learning	**PO11:** Knowledge of contemporary issues, Management and Finance.
12.	Project management and Finance	**PO12:** An Ability to recognize the need and thereby to engage in independent and life-long learning for continued professional and career advancement.

Mapping of POs with PEOs

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
PEO 1	3	3	3	2	3	-	-	-	3	-	3	-
PEO 2	3	3	3	2	3	-	-	-	3	-	3	-
PEO 3	3	3	3	2	3	-	-	-	3	-	3	-
PEO 4	3	3	3	2	3	-	-	-	3	-	3	-

Correlation: 3- High, 2-Medium, 1-Low

NEW HORIZON COLLEGE OF ENGINEERING

B. E. in Information Science and Engineering

Scheme of Teaching and Examinations for 2023- 2027 BATCH

III Semester

S. No.	Course and Course Code		Course Title	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
					L	T	P	S			CIE	SEE	Total
1	BSC	22MAC31	Mathematical Foundation for Computing Sciences	BS	2	1	0	0	3	4	50	50	**100**
2	PCC	22ISE32	Digital Logic Design	IS	3	0	0	0	3	3	50	50	**100**
3	PCCL	22ISL32	Digital Logic Design Lab	IS	0	0	1	0	1	2	50	50	**100**
4	PCC	22ISE33	Advanced Data Structures	IS	3	0	0	0	3	3	50	50	**100**
5	PCCL	22ISL33	Advanced Data Structures Lab	IS	0	0	1	0	1	2	50	50	**100**
6	ESC	22ISE34X	Programming Language Course	IS	2	0	1	0	3	4	50	50	**100**
7	AEC	22ISE35X	Ability Enhancement Course – III	IS	0	0	1	0	1	2	50	50	**100**
8	BSC	22BIK36	Bio Inspired Design and Innovation	Any Dept	3	0	0	0	3	3	50	50	**100**
9	UHV	22UHK37	Universal Human Values and Life Skills	Any Dept	1	0	0	0	1	2	50	50	**100**
10	NCMC	22NSS30	National Service Scheme (NSS)	NSS coordinator	0	0	0	0	0	2	50	--	**50**
		22PED30	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YOG30	Yoga	Yoga Teacher									
								Total	**19**	**27**	**500**	**450**	**950**

12	NCMC	22DMAT31	Basic Applied Mathematics - I	BS	0	0	0	0	0	2	50	--	50

22DMAT31*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry students.

BSC: Basic Science Course, **PCC**: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC:** Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **S: SDA**: Self Study for Skill Development, **K:** This letter in the course code indicates common to all the stream of engineering. **ESC:** Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming Language Course, **CIE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation.

Programming Language Course (PLC)			
22ISE341	Linux System Programming	22ISE343	Python for Data Analytics
22ISE342	Web Design Technologies	22ISE344	Object Oriented Modeling and Design using Star UML

Ability Enhancement Course – III (For IT allied Branches, all are Laboratory Courses 0-0-1-0)			
22ISE351	Ruby Programming	22ISE353	Advanced Office Automation
22ISE352	GoLang Programming	22ISE354	Game Development
22ISE355	Programming principles and Practice using C++		

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education(PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Credit Definition:	
1-hour Lecture (L) per week=1Credit 2-hoursTutorial(T) per week=1Credit 2-hours Practical / Drawing (P) per week=1Credit 2-hous Self Study for Skill Development (SDA) per week = 1 Credit	03-Credits courses are to be designed for 40 hours in Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 15 hours of Teaching-Learning Sessions

NEW HORIZON COLLEGE OF ENGINEERING

B. E. in Information Science and Engineering

Scheme of Teaching and Examinations for 2023- 2027 BATCH

IV Semester														
S. No.	**Course and Course Code**		**Course Title**	**BoS**	**Credit Distribution**				**Overall Credits**	**Contact Hours**	**Marks**		
					L	**T**	**P**	**S**			**CIE**	**SEE**	**Total**
1	BSC	22MAC41	Discrete Mathematics and Graph Theory	BS	2	1	0	0	3	4	50	50	**100**
2	PCC	22ISE42	Data Base Management Systems	IS	3	0	0	0	3	3	50	50	**100**
3	PCCL	22ISL42	Data Base Management Systems Lab	IS	0	0	1	0	1	2	50	50	**100**
4	PCC	22ISE43	Object Oriented Programming with Java	IS	3	0	0	0	3	3	50	50	**100**
5	PCCL	22ISL43	Object Oriented Programming with Java lab	IS	0	0	1	0	1	2	50	50	**100**
6	PCC	22ISE44	Operating Systems	IS	3	0	0	0	3	3	50	50	**100**
7	PCCL	22ISL44	Operating Systems Lab	IS	0	0	1	0	1	2	50	50	**100**
8	ESC	22ISE45X	Programming Language Course	IS	2	0	1	0	3	4	50	50	**100**
9	AEC	22ISE46X	Ability Enhancement Course – IV	IS	0	0	1	0	1	2	50	50	**100**
10	UHV	22SCK47	Social Connect and Responsibility	Any Dept	0	0	1	0	1	2	50	--	**50**
11	PROJ	22ISE48	Mini Project - I	IS	0	0	1	0	1	0	50	50	**100**
12	NCMC	22NSS40	National Service Scheme (NSS)	NSS coordinator	0	0	0	0	0	2	50	--	**50**
		22PED40	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YOG40	Yoga	Yoga Teacher									
								Total	**21**	**29**	**600**	**500**	**1100**

13	NCMC	22DMAT41	Basic Applied Mathematics - II	BS	0	0	0	0	0	2	50	--	50

BSC: Basic Science Course, **PCC**: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **NCMC:** Non-Credit Mandatory Course, **AEC**: Ability Enhancement Course, **PROJ**: Mini Project work, **L:** Lecture, **T**: Tutorial, **P**: Practical **S: SDA**: Self Study for Skill Development, **K:** This letter in the course code indicates common to all the stream of engineering. **ESC:** Engineering Science Course, **ETC**: Emerging Technology Course, **PLC**: Programming Language Course, **CIE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation.

22DMAT41*: This non-credit mandatory course to be offered with only CIE and no SEE to Lateral entry students.

Programming Language Course (PLC)			
22ISE451	C# and .NET	22ISE453	Advanced Excel for Data Analytics
22ISE452	Programming for UI and UX design	22ISE454	Fundamentals of Open Source Software

Ability Enhancement Course – IV (For IT allied Branches, all are Laboratory Courses 0-0-1-0)			
22ISE461	Visual programming Techniques	22ISE463	File Structures
22ISE462	Google Workspace Laboratory	22ISE464	IoT Programming

Mini-project work: Mini Project is a laboratory-oriented/hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications etc. Based on the ability/abilities of the student/s and recommendations of the mentor. A student can do mini project as

(i) A group of 2 if mini project work is single discipline (applicable to all IT allied branches)
(ii) A group of 2- 4 if mini project work is single discipline (applicable to all Core Branches)
(iii) A group of 2 - 4 students if the Mini Project work is a multidisciplinary (Applicable to all Branches)

CIE procedure for Mini-project:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batches mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

The CIE marks awarded for the Mini-project, shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the percentage ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Credit Definition: 1-hour Lecture (L) per week=1Credit 2-hoursTutorial(T) per week=1Credit 2-hours Practical / Drawing (P) per week=1Credit 2-hous Self Study for Skill Development (SDA) per week = 1 Credit	03-Credits courses are to be designed for 40 hours in Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 15 hours of Teaching-Learning Sessions

THIRD SEMESTER

MATHEMATICAL FOUNDATION FOR COMPUTING SCIENCES

(Common to AIM, CEE, CSE, CDS, ISE)

Course Code	**22MAC31**	**CIE Marks**	**50**
L:T:P:S	**2:1:0:0**	**SEE Marks**	**50**
Hrs. / Week	**4**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22MAC31.1	Use appropriate numerical methods to solve algebraic equations and transcendental equations.
22MAC31.2	Solve initial value problems using appropriate numerical methods and also Evaluate definite integrals numerically.
22MAC31.3	Demonstrate the idea of Linear Dependence and Independence of sets in the vector space.
22MAC31.4	Gain ability to use probability distributions to analyze and solve real time problems
22MAC31.5	Justify the concept of sampling distribution to solve the engineering problems.
22MAC31.6	Use the large/small samples to analyse the data to make decision about the hypothesis.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22MAC31.1	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.2	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.3	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.4	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.5	3	3	-	-	-	-	-	-	-	-	-	-
22MAC31.6	3	3	-	-	-	-	-	-	-	-	-	-

MODULE-1	**NUMERICAL METHODS-1**	**22MAC31.1**	**8 Hours**

Numerical solution of algebraic and transcendental equations: Regula-falsi method and Newton-Raphson Method-Problems. Interpolation: Newton's forward and backward formulae for equal intervals, Newton divided difference, Lagrange's formula and Lagrange's inverse interpolation for unequal intervals (without proofs)-Problems.

Case Study	Case study on Numerical Analysis.
Text Book	Text Book 1: 28.2, 28.3, 29.6, 29.10, 29.11, 29.13, Text Book 2: 19.2, 19.3.

MODULE-2	**NUMERICAL METHODS-2**	**22MAC31.2**	**8 Hours**

Numerical solution of ordinary differential equations of first order and of first degree: Taylor's series method, Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor and corrector methods-Problems Numerical integration: Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Weddle's rule (without proofs)-Problems.

Applications	Application of numerical integration to velocity of a particle and volume of solids.
Text Book	Text Book 1: 32.3, 32.5, 32.7, 32.9, 30.7, 30.8, 30.10, Text Book 2: 19.5, 21.1.

MODULE-3	**VECTOR SPACES**	**22MAC31.3**	**8 Hours**

Vector Space definition and examples, Subspaces and Spanning sets, Linear Dependence and Independence, Linear Independence and Spanning Sets, Bases: Orthogonal and Orthonormal bases and Dimension.

Text Book	Text Book 3: 4.1, 4.2, 4.3, 4.4, 4.5.

MODULE-4	**PROBABILITY AND JOINT PROBABILITY DISTRIBUTIONS**	**22MAC31.4**	**8 Hours**

Random variables (discrete and continuous), probability density functions, moment generating function. Discrete Probability distributions: Binomial and Poisson Distributions-Problems. Continuous Probability distribution: Normal Distributions-Problems.

Concept of joint probability-Joint probability distribution, Discrete and Independent random variables. Expectation, Covariance, Correlation coefficient.

Case Study	Case study on Distributions.
Text Book	Text Book 1: 26.8, 26.9, 26.10, 26.11, 26.12, 26.14, 26.15, 26.16.

MODULE-5	SAMPLING THEORY	22MAC31.5 22MAC31.6	8 Hours

Sampling, Sampling distributions, test of hypothesis of large samples for means and proportions, Inferences for variance and proportion. Central limit theorem (without proof), confidence limits for means, Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples.

Case Study	Case Studies on sampling theory and significant measures of scores.
Text Book	Text Book 1: 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 27.10, 27.11, 27.12, 27.14, 27.15, 27.16, 27.19.

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	5	-
L2	Understand	5	5	-
L3	Apply	10	5	10
L4	Analyze	2.5	-	-
L5	Evaluate	2.5	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	5
L5	Evaluate	5
L6	Create	-

Suggested Learning Resources:

Text Books:

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.
3) David C Lay, Linear Algebra and its applications, Addison-Wesley Publishers, Fourth Edition, 2012, ISBN: 9780321385178.

Reference Books:

1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
2) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.
3) H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
4) N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Web links and Video Lectures (e-Resources):

1)https://youtu.be/IgoJV4g_0LM?si=JO1_bkIvMR8xlC0V
2)https://youtu.be/mIFwzg11uO4?si=Xd13dh0eNlmIswPS
3)https://youtu.be/74g5_3TC-tQ?si=yB2PHVGr4hxIlqPo
4)https://youtu.be/QQFIWwDA9NM?si=3wJrtlm1NdPSbXmB

5)https://youtu.be/5817fLmsTGE?si=Y7ORyV2ETSCxZRAZ
6)https://youtu.be/q3xj16shDuw?si=ewdlKAC8UEc6oRQV
7)https://youtu.be/89Z0tOvHjNU?si=3jT-oriJZaC1kSzx
8)https://youtu.be/dOr0NKyD31Q?si=dMBU-BXGdGL6jIZy
9)https://youtu.be/BR1nN8DW2Vg?si=melzz97SqhK3wr--
10)https://youtu.be/ugd4k3dC_8Y?si=xF5U2gjIgP0woDQt
11)https://youtu.be/z0Ry_3_qhDw?si=6IG2a65BZgdbaKsn
12)https://youtu.be/36cAE1Ovpq4?si=jfR8gkFmMOCkWNZ_
13)https://youtu.be/vFz2FG65HBc?si=SCHi3Y1XuHWg-pPT
14)https://youtu.be/2Dsz1lZBJ3Y?si=8ATLUE-mkJSMewO3

Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning:

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - Seminars

DIGITAL LOGIC DESIGN			
Course Code	**22ISE32**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

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

22ISE32.1	Understand the basic principles of the digital circuits and their significance
22ISE32.2	Apply the knowledge for design of combinational circuits and use of HDL tools
22ISE32.3	Analyze different types of combinational circuits based on the given application with the given specifications and use of HDL tools
22ISE32.4	Analyze different types of sequential circuits based on the given application with the given specifications and use of HDL tools
22ISE32.5	Design the application of registers and use HDL tools to simulate and verify Digital circuits
22ISE32.6	Design the application of counters and use HDL tools to simulate and verify Digital circuits

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE32.1	3	3	3	3	**-**	-	-	-	-	-	-	2	3	3
22ISE32.2	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE32.3	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE32.4	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE32.5	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE32.6	3	2	2	2	-	-	-	-	-	**-**	**-**	2	3	3

MODULE-1	**SIMPLIFICATION OF BOOLEAN FUNCTIONS**	**22ISE32.1**	**8 Hours**
Review of Boolean algebra, logic gates, canonical forms, Three Variable K – Maps, Four Variable K – Maps, Quine- McCluskey minimization technique			
Text Book	Text Book 1 – Chapter 2,3, Text Book 2 – Chapter 3		
MODULE-2	**DATA-PROCESSING CIRCUITS**	**22ISE32.2**	**8 Hours**

Multiplexers, Demultiplexers, Decoder, BCD-to-Decimal Decoders, Encoders, Priority Encoders, Seven-segment Decoders, Parity Generators and Checkers, Magnitude comparators (1 and 2 bit), HDL Implementation of Data Processing Circuits.

Text Book	Text Book 1 – Chapter 4 Text Book 2 – Chapter 5		
MODULE-3	**COMBINATIONAL LOGIC CIRCUITS**	**22ISE32.3, 22ISE32.4**	**8 Hours**

Introduction to Adders, Subtractors, Carry Look Ahead Adder, Parallel Adder, Binary Multiplication and Division, Code Converter, HDL Implementation of Combinational Circuits.

Text Book	Text Book 1 – Chapter 5,6 Text Book 2 – Chapter 7,8		
MODULE-4	**SEQUENTIAL LOGIC CIRCUITS**	**22ISE32.5**	**8 Hours**

Basic Flip-flop circuit, Clocked Flip-flops, Triggering of Flip-flops, types of Flip-flop, Master Slave Flip-Flops, Conversion of Flip-flops, types of Shift Registers, applications of shift registers, Verilog implementation of Flip-flops and Registers.

Text Book	Text Book 1 – Chapter 8,9 Text Book 2 – Chapter 9,10		
MODULE-5	**DESIGN AND ANALYSIS OF SEQUENTIAL CIRCUIT**	**22ISE32.6**	**8 Hours**

Design of Binary Counters, counters for other sequences using SR and J K Flip, Mealy and Moore Models, State Reduction and Assignment, Verilog implementation of counters.

Text Book	Text Book 1 – Chapter 10,11 Text Book 2 – Chapter 11

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	**15**	**10**
L1	**Remember**	5	**5**	**-**
L2	**Understand**	10	**5**	**5**
L3	**Apply**	5	5	5
L4	**Analyze**	5	-	-
L5	**Evaluate**	-	-	**-**
L6	**Create**	**-**	**-**	**-**

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	10
L2	**Understand**	20
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	--
L6	**Create**	--

Suggested Learning Resources:

Text Books:

1) Donald P Leach and Albert Paul Malvino , Digital Principles and Applications, , 8thEdition, Tata McGraw Hill, 2014.

2) James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007

3) M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.

Reference Books:

1) Digital Fundamentals, Thomas Floyd, 11th edition, 2014, Pearson Education

2) An Illustrative Approach to Logic Design, R. D. Sudhakar Samuel, 2010, Pearson Education.

3) Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata McGraw Hill, 2005

Web links and Video Lectures (e-Resources):

- https://onlinecourses.swayam2.ac.in/nou23_ec05/preview
- https://www.youtube.com/playlist?list=PLxCzCOWd7aiGmXg4NoX6R31AsC5LeCPHe

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

- Video demonstration of latest trends in the field of Logic design
- Mini projects related to logic design (Hardware or Simulation)
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues
  - Seminars

DIGITAL LOGIC DESIGN LABORATORY

Course Code	**22ISL32**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISL32.1	Analyze and design combinational logic circuits.
22ISL32.2	Realize flip flop and verify the truth table.
22ISL32.3	Implementation of counters using flip flops.
22ISL32.4	Implementation of logic circuits using DLD.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISL32.1	3	3	3	2	2	-	-	-	-	-	-	2	3	3
22ISL32.2	3	3	3	2	2	-	-	-	-	-	-	2	3	3
22ISL32.3	3	3	3	2	2	-	-	-	-	-	-	2	3	3
22ISL32.4	3	3	3	2	2	-	-	-	-	-	-	2	3	3

Exp. No.	List of Experiments	Hours	COs
	PART-A		
1	Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.	2	22ISL32.1
2	Perform half and full adder using combinational circuits.	2	22ISL32.1
3	Perform half and full subtraction using combinational circuits.	2	22ISL32.1
4	Realize JK, D and T Flip-Flops and verify its truth table	2	22ISL32.1
5	Design and implement Ring counter and Johnson counter using 4-bit shift register and demonstrate its working.	2	22ISL32.2
6	Design and implement a mod-n (n<8) synchronous up or down counter using J-K Flip-Flop ICs and demonstrate its working.	2	22ISL32.2

PART-B			
7	Simulate and verify the working of 8:1 multiplexer using Verilog code.	2	22ISL32.2
8	Simulate and verify the working of half and full adder using Verilog code.	2	22ISL32.2
9	Simulate and verify the working of half and full subtractor using Verilog code.	2	22ISL32.3
10	Simulate and verify the working of the JK,D and T Flip flop using Verilog code.	2	22ISL32.3
11	Simulate and verify the working of Ring and Johnson Counter using Verilog code.	2	22ISL32.4
12	Simulate and verify mod 8 synchronous up or down counter using Verilog code.	2	22ISL32.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Simulation of half and full adder using logic sim

https://de-iitr.vlabs.ac.in/exp/truth-table-gates/

2. Simulation of half and full subtraction using logic sim

https://de-iitr.vlabs.ac.in/exp/half-full-subtractor/

3. Simulation of 8:1 Mux using logic sim

https://de-iitr.vlabs.ac.in/exp/truth-tables-flip-flops/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	10	10
L3	Apply	5	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	10

Suggested Learning Resources:

Reference Books:

1) Joseph Cavanagh, "Verilog HDL Design Examples", Publisher: CRC Press, Taylor & Francis group, 2018, ISBN- 9781138099951

2) Dr. Cherry Bhargava and Dr. Rajkumar Sarma, "Hardware Description Language Demystified: Explore Digital System Design using Verilog HDL and VLSI Design Tools", Publisher: BPB Publications, 2020, ISBN- 9789389898040

3) Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning,2019

ADVANCED DATA STRUCTURES

Course Code	**22ISE33**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs/Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE33.1	Understand the fundamentals of data structures and their types, essential forProgramming and problem solving.
22ISE33.2	Apply the operational aspects of linear data structures: stacks and queues in Problem solving.
22ISE33.3	Implement the concept of different types of linked list data structure in Problem solving.
22ISE33.4	Examine the operational aspects of non-linear data structures: Trees, Graphs in Problem solving.
22ISE33.5	Apply appropriate data structures for a specified application.
22ISE33.6	Analyze the sorting algorithms and approximation algorithms.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE33.1	3	3	2	2	-	-	-	-	-	-	-	2	3	3
22ISE33.2	3	3	2	2	-	-	-	-	-	-	-	2	3	3
22ISE33.3	3	3	2	2	-	-	-	-	-	-	-	2	3	3
22ISE33.4	3	3	2	2	-	-	-	-	-	-	-	2	3	3
22ISE33.5	3	3	2	2	-	-	-	-	-	-	-	2	3	3
22ISE33.6	3	3	2	2	-	-	-	-	-	-	-	2	3	3

MODULE-1	**BASIC CONCEPTS**	**22ISE33.1**	**8 Hours**

Data Structures, Classifications (Primitive & Non Primitive), Data Structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions, Sparse Matrix, case study and applications.

Text Book	Text Book 1: Ch 2.1, Ch2.2, Ch 2.3, Ch2.4, Ch4.1, Ch 4.7 Text Book 2: Ch 1.1-1. Ch 5,2.1-2.3

MODULE-2	**STACKS AND QUEUES**	**22ISE33.2**	**8 Hours**

Stacks, Applications of stacks: Recursion, Evaluation of Expressions, Factorial, Tower of Hanoi. Multiple Stacks. Queues: Queue representation, Primitive operations on queue, array representation of queues, Circular queue, Priority queue, Double ended queue, Applications of queues.

Text Book	Text Book 1:CH.3.1,3.3,3.4,3.5,8.2 Text Book 2: CH.4.5.1,4.5.3,4.5.4,4.5.6,5.1-5.4,6.4.1,6.4.3,6.4.4

MODULE-3	**LINKED LISTS**	**22ISE33.3**	**8 Hours**

Introduction to linked list, Representation of linked list in memory, primitive operations on linked list, searching a linked list, doubly linked list, header linked list, Linked representation of stack, Linked representation of queue, circular linked list-Polynomial Representation, Applications of Linked List.

Text Book	Text Book 1: CH.4.2,4.3,4.4,4.5,4.8

MODULE-4	**TREES**	**22ISE33.4**	**8 Hours**

Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Heaps. Binary Search Trees, Selection Trees, Forests, Balanced Trees, AVL Trees, Single rotation, Double rotation, Splay Trees, Red-Black Trees.

Text Book	Text Book 1: CH.5.1,5.2,5.3,5.4,5.5,5.6, 5.7,5.8,5.9,10.2,10.5,10.7

MODULE-5	**GRAPHS AND SORTING**	**22ISE33.5, 22ISE33.6**	**8 Hours**

Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. Sorting-Internal Sorting, External Sorting, Insertion Sort, Selection Sort, Stable vs. Unstable sort. ,

Sets, Dictionaries, Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques.	
Text Book	Text Book 1: CH.6.1,6.2,7.3,7.4 Text Book 2: CH.10.1,10.2,10.3,10.4,11.5

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	-	-
L2	Understand	5	-	-
L3	Apply	5	5	5
L4	Analyze	5	5	5
L5	Evaluate	5	5	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Fundamentals Of Data Structures, by Ellis Horowitz, Sartaj Sahni, Computer Science Press, 2nd Edition, Universities Press,2007.

2) Debasis Samanta: Classic Data Structures,2nd Edition ,PHI,2009.

Reference Books:

1) Yedidyah, Augenstein, Tannenbaum:"Data Structures using C and C++,2nd Edition ,Pearson Education,2003.

2) Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning,2005.

3) Reema Thareja: "Data Structures Using C", Oxford university Press (2021)

Web links and Video Lectures (e-Resources):

- https://www.udemy.com/course/datastructurescncpp/
- https://www.coursera.org/specializations/data-structures-algorithms
- https://nptel.ac.in/courses/106102064

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

- Case Studies
- Problem Solving Exercises

ADVANCED DATA STRUCTURES LABORATORY

Course Code	**22ISL33**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISL33.1	Understand the fundamentals of data structures and their applications essential forProgramming/problem solving.
22ISL33.2	Examine the operational aspects of linear data structures: stacks, queues in Problem solving.
22ISL33.3	Implement the concept of linked list data structure in Problem solving.
22ISL33.4	Examine the operational aspects of non-linear data structures: Trees, Graphs in Problem solving.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISL33.1	3	2	2	2	3	-	-	-	-	-	-	2	3	2
22ISL33.2	3	2	2	2	3	-	-	-	-	-	-	2	3	2
22ISL33.3	3	2	2	2	3	-	-	-	-	-	-	2	3	2
22ISL33.4	3	2	2	2	3	-	-	-	-	-	-	2	3	2

Pgm. No.	List of Programs	Hours	COs
	Prerequisite Programs		
	Concepts of C Programming	2	NA
	PART-A		
1	Design, Develop and Implement a menu driven Program in C for the following array operations. a. Creating an array of N Integer Elements b. Display of array Elements with Suitable Headings c. Inserting an Element (ELEM) at a given valid Position (POS) d. Deleting an Element at a given valid Position (POS) e. Exit. Support the program with functions for each of the above operations.	2	22ISL33.1
2	Design, Develop and Implement a Program in C to create a structure tostore the name, account number and balance of customers(more than10) and store their information. 1 - Write a function to print the namesof all the customers having balance less than$200. . 2 - Write a functionto add$100inthebalanceofallthecustomershavingmorethan$1000in their balance and then print the incremented value of their balance	2	22ISL33.1
3	Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate how Stack can be used to check Palindrome d. Demonstrate Overflow and Underflow situations on Stack e. Display the status of Stack f. Exit Support the program with appropriate functions for each of the above operations	2	22ISL33.2

4	Design, Develop and Implement 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.	2	22ISL33.2
5	Design, Develop and Implement a Program in C for the following Stack Application: Evaluation of Postfix expression with single digitoperands and operators: +, -, *, /, %, ^.	2	22ISL33.2
6	Design, Develop and Implement a Program in C for the following Stack Application: Solving Tower of Hanoi problem with n disks.	2	22ISL33.2
	PART-B		
7	Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) a. Insert an Element on to Circular QUEUE b. Delete an Element from Circular QUEUE c. Demonstrate Overflow and Underflow situations on CircularQUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations	2	22ISL33.2
8	Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Branch, Sem, Ph.No a. Create a SLL of N StudentsData by using front insertion. b. Display the status of SLL and count thenumber of nodes in it c. Perform Insertion / Deletion at End of SLL d. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) e. Exit	2	22ISL33.3
9	Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, Ph.No a. Create a DLLof N Employees Data by using end insertion. b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Demonstrate how this DLL can be used as Double Ended Queue. f. Exit	2	22ISL33.3
10	Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.	2	22ISL33.3
11	Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers. a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Traverse the BST in In order, Preorder and Post Order c. Search the BST for a given element (KEY) and report the appropriate message d. Exit	2	22ISL33.4
12	Demonstrate binary search algorithm using anyone of the sorting techniques.	2	22ISL33.4

PART-C

Beyond Syllabus Virtual LabContent

(To be done during Lab but not to be included for CIE or SEE)

- Demonstrate QUEUE data structure in C.
  https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/posttest.html
- Implement a c program to print reverse of a linked list.
  https://github.com/topics/virtual-lab
- Implement Graph data structure in C.
  https://cse01iiith.vlabs.ac.in/List%20of%20experiments.html

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	5	10
L4	Analyze	5	10
L5	Evaluate	5	5
L6	Create	5	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	05
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	05

Suggested Learning Resources:

Reference Books:

1) Yedidyah, Augenstein, Tannenbaum: "Data Structures using C and C++, 2nd Edition, Pearson Education, 2003.
2) Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Cengage Learning,2005.
3) Reema Thareja: "Data Structures Using C", Oxford university Press (2021).

LINUX SYSTEM PROGRAMMING

Course Code	**22ISE341**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE341.1	Explain the fundamentals of Multi-User Operating system and commands
22ISE341.2	Apply the file manipulation commands and file APIs.
22ISE341.3	Analyze the mechanism of process creation and process APIs
22ISE341.4	Apply the networking commands and IPC mechanism.

22ISE341.5	Execute shell scripts effectively
22ISE341.6	Evaluate awk programs for various real-time applications.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE341.1	3	2	3	3	-	-	-	-	-	-	-	2	3	3
22ISE341.2	2	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE341.3	3	2	3	3	-	-	-	-	-	-	-	2	3	3
22ISE341.4	2	3	3	2	-	-	-	-	-	-	-	2	3	3
22ISE341.5	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE341.6	2	2	3	1	-	-	-	-	-	-	-	2	3	3

MODULE-1	**GENERAL PURPOSE UTILITIES**	**22ISE341.1**	**6 Hours**

Getting Started & Understanding LINUX Commands: LINUX Operating System, LINUX architecture, Features of LINUX, The POSIX Standards, API Common Characteristics.

General Purpose Utilities: passwd, who, tty, lock, sty, script, clear and tput, uname, date, cal, calendar, bc, man, echo, script, passwd, uname, who, date. Case study/ Applications

Laboratory Component: **3 Hours**

1. Execution of various general purpose utility commands
2. Execution of various filter commands
3. Execution of various file/directory handling commands

Text Book	Text Book 1 chapter 1

MODULE-2	**FILE SYSTEM AND ATTRIBUTES**	**22ISE341.2**	**6 Hours**

File System and Attributes: Introduction to LINUX file system, inode, FileTypes, File Attributes, Application program Interface to Files, LINUX kernel support for files

File Handling Commands: ls, cat, cp, mv, rm, wc, od, printf, pwd, mkdir, rmdir, cd, file and directory permissions- chmod, file ownership- chown,chgrp, umask, tar

Laboratory Component: **3 Hours**

1. Write a program to emulate the ln command.
2. Write a program to read the alternate nth byte and write it in another file.
3. Write a program that creates a zombie and then calls system to execute the ps command to verify that the process is zombie.

Text Book	Text Book 1 : chapter 2 & chapter 3

MODULE-3	**PROCESS**	**22ISE341.3**	**6 Hours**

PROCESS: Process, LINUX kernel support for processes, process attributes, process table, viewing processes – ps, system processes, starting new processes, waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec .

Laboratory Component: **3 Hours**

1. Write a program to implement the system function.
2. Write a program which demonstrates inter-process communication between a reader process and a writer process.
3. Write a shell script to accept a file and check if it is executable. If not make it executable.

Text Book	Text Book 1 chapter 4 , Text Book 2 chapter 5

MODULE-4	NETWORKING COMMANDS	22ISE341.4	6 Hours
Networking commands: ifconfig ,ulimit , finger, arp, ftp, telnet, hostname, traceroute, ping, netstat, ns lookup INTER PROCESS COMMUNICATION: Pipe, process pipes, pipe call, Named Pipes–FIFO, Message Queues– msgget, msgsnd, msgrcv, msgctl			
Laboratory Component: 1. Write a shell script to accept a file and check if it is executable. If not make it executable. 2. Write a shell script which displays a list of all the files in the current directory to which you have read, write and execute permissions. 3. Write a shell script which gets executed the moment the user logs in.It should display the message, "Good Morning", "Good Afternoon", "Good Evening" ,depending upon the time at which the user logs in.			**3 Hours**
Text Book	Text Book 1 chapter 6 ,Text Book 2 chapter 6		
MODULE-5	**SHELL & AWK PROGRAMMING**	**22ISE341.5, 22ISE341.6**	**6 Hours**
Shell Programming : Shell variables, shell scripts, read, positional parameters ,exit status, logical operators, exit, if conditions, test and[],case, expr, sleep and wait, while and for. AWK Programming: Splitting line into fields, printf – formatting output, comparison operators, number processing, BEGIN and END section, positional parameters, get line, built in variables and functions.			
Laboratory Component: 1. Write a script to demonstrate built in variables available in AWK 2. Write a script to demonstrate built in functions available in AWK 3. Writeashellscriptwhichacceptsanynumberofargumentsandprintstheminreverseorder			**3 Hours**
Text Book	Text Book 2 chapter 7		

CIE Assessment Pattern (50 Marks – Theory and Lab)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Lab
		25	05	20
L1	Remember	5	-	-
L2	Understand	5	-	5
L3	Apply	5	5	10
L4	Analyze	5	-	5
L5	Evaluate	5	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Linux for Beginners: A Practical and Comprehensive Guide to Learn Linux, Ethem Mining, ISBN: 978-1671228085,2019.
2) Your UNIX – The ultimate Guide, SUMITABHA DAS, TATA McGraw Hill Edition, 4th Edition Paper back 2017, McGraw Hill, ISBN:978-0070446878

Reference Books:

1) UNIX System Programming Using C++, Terrence Chan, Prentice-Hall of India Private Limited, ISBN:978-9332549975,2015.
2) Advanced Programming in the UNIX Environment, WRichard Stevens and Stephen A Rago, Addison Wesley Publications, Third Edition,2013,ISBN:978-0321637734.
3) UNIX and SHELL Programming, Richard F Gilberg and Behrouz A Forouzan, 15th impression, 2015, Cengage Learning, ISBN : 978-8131503256

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/117106113
- https://web.njit.edu/~alexg/courses/cs332/OLD/F2020/hand3f20/Linux-Tutorial.pdf
- https://www.youtube.com/watch?v=8lwxOAecpLQ

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

- Video demonstration of latest trends in programming
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues
  - Seminars

WEB DESIGN TECHNOLOGIES

Course Code	**22ISE342**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE342.1	Design webpages using XHTML and HTML5.
22ISE342.2	Design webpages using Cascading Style Sheets.
22ISE342.3	Develop JavaScript programs to validate dynamic Webpages.
22ISE342.4	Develop Javascript and DHTML programs.
22ISE342.5	Describe the methods to handle XML and PHP programming..
22ISE342.6	Inspect the management of state in web applications and JavaScript frameworks which facilitates developer to focus on core features.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE342.1	3	2	3	-	3	3	-	-	1	-	1	3	3	3
22ISE342.2	3	2	3	-	3	3	-	-	1	-	1	3	3	3
22ISE342.3	3	2	3	-	3	3	-	-	1	-	1	3	3	3
22ISE342.4	3	2	3	-	3	3	-	-	1	-	1	3	3	3
22ISE342.5	3	2	3	-	3	3	-	-	1	-	1	3	3	3
22ISE342.6	3	2	3	-	3	3	-	-	1	-	1	3	3	3

MODULE-1	**XHTML**	**22ISE342.1, 22ISE342.2**	**6 Hours**
XHTML: Basic syntax, Standard XHTML document structure; Basic text markup, Images; Hypertext Links, Lists, Tables, Forms, Syntactic differences between HTML and XHTML Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms,The Box model, Background images, The and tags			
Laboratory Component: 1. Design a personal web page using HTML5 which should include: a.) A brief description about yourself. b.) Your photo as the profile picture using canvas c.) An index which should be a list of different headings/sections present in a document in the form of link which when clicked takes you to that heading/section The different sections: • Your educational details(Has to be displayed using a table) • Your Achievements. 2. Apply styles to the web page using CSS			**3 Hours**
Text Book	Text Book 1: Ch2, Ch3		
MODULE-2	**HTML 5**	**22ISE342.2**	**6 Hours**
Detecting HTML 5 features – Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements. Canvas, video, local storage, web workers, offline applications, geo-location, input types. Let's call it drawing surface – Simple shapes, canvas, Paths ,texts, gradients and images.			
Laboratory Component: 1. Design a webpage form using the textbox, checkbox, radio buttons, submit andreset buttons 2. Write a HTML Program to design a simple calculator.			**3 Hours**
Text Book	Text Book 1: Ch 4		
MODULE-3	**Javascript**	**22ISE342.3**	**6 Hours**
Overview of JavaScript, General syntactic characteristics, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructor, Pattern matching using regular expressions.			
Laboratory Component: 1. Write a Program to display current date and time using HTML5 SemanticElements. 2. Write a JavaScript Program for the following problem: a. Input: A number n obtained using prompt Output: The first n Fibonaccinumbers b. input : A number output : factorial of the number.			**3 Hours**
Text Book	Text Book 4 : Chapter 5		
MODULE-4	**Javascript and HDML Documents**	**22ISE342.4**	**6 Hours**
JavaScript and DHTML Documents: The Document Object Model, Element access in JavaScript , Events and event handling. Moving elements, Element visibility, Dynamic content, Slow movement of elements.			
Laboratory Component: 1. Design and develop a XHTML document that includes JavaScript script to create stack of images such that images appear one top on another with imagesslightly visible. Whenever cursor is placed on an image that image should be completely visible and on moving cursor out image should go back to original position 2. Develop and demonstrate, using Javascript, 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) and semester (valid format digit from 1 to 8) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.			**3 Hours**

Self-study / Case Study / Applications	Download any business data set [House price, car resale value etc] and perform cleaning operation of the data, followed by that use the knowledge you can acquired to find the key insight about the data and summarize the same.		
Text Book	Text Book 4 : Chapter 6,7		
MODULE-5	**Basics of PHP and XML**	**22ISE342.5, 22ISE342.5,**	**6 Hours**
PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies **XML:** Introduction to XML, The Syntax of XML, Document structure, Document Type Definition (DTD).			
Laboratory Component: 1. Design a web page using XHTML and PHP to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.			**3 Hours**
Text Book	Text Book 3 : Chapter 4		

CIE Assessment Pattern (50 Marks – Theory and Lab)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Lab
		25	05	20
L1	Remember	5	-	-
L2	Understand	5	-	5
L3	Apply	5	5	10
L4	Analyze	10	-	5
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	--
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Robert W.Sebesta, "ProgrammingtheWorldWideWeb",8thEdition,PearsonEducation, 2015.
2) Randy Connolly, RicardoHoar, "Fundamentals of Web Development", 4stEdition, Pearson Education India, 2016
3) MarkPilgrim,"HTML5:Up and Running: Dive into HTML5", 1stEditionO'Reilly, Google Press Publishers & Distributors PvtLtd, 2010

Reference Books:

1) Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web How to program", 5th Edition, Pearson Education/PHI, 2012.
2) Robin Nixon, "Learning PHP, My SQL &Java Script with jQuery, CSS and HTML5",5thEdition, O'Reilly Publications, 2018.

Web links and Video Lectures (e-Resources):

- https://developer.mozilla.org/en-US/docs/Web/XML/XML_introduction
- https://www.browserstack.com/guide/top-html5-features
- https://www.w3schools.com/php/php_intro.asp
- https://www.w3schools.com/js/js_operators.asp https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

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

- Demonstration mini projects.
- Contents related activities (Activity-based discussions)
- Organizing Group wise discussions
- Seminars

PYTHON FOR DATA ANALYTICS			
Course Code	**22ISE343**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE343.1	Understand the function in python
22ISE343.2	Apply the concept of inheritance and overloading it the given problem.
22ISE343.3	Perform essential operation on Numpy and Pandas.
22ISE343.4	Design the data in the dataset for a given problem.
22ISE343.5	Analyze the data for missing value and correlation among the parameters considered,
22ISE343.6	Demonstrate the concept of Data Visualization.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE343.1	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE343.2	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE343.3	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE343.4	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE343.5	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE343.6	3	3	3	3	2	-	-	-	-	-	-	2	3	3

MODULE-1	**FUNCTION IN PYTHON**	**22ISE343.1**	**6 Hours**

Creating a function, Calling a function, Arguments, Arbitrary Arguments, Arbitrary keyword arguments, Default parameter value, Passing List, Dictionary and functions as arguments, Recursive function.

Laboratory Component:	**3 Hours**

1. Write a python program to find sum of n natural numbers using recursive function.
2. Write a Python Program to Create a Dictionary with Key as First Character and Value as Words Starting with that Character.
3. Implement a Python program to count the numbers of characters in the string and store them in a dictionary data structure

Text Book	Text Book: Ch.1,2,3

MODULE-2	**OBJECTS AND CLASS IN PYTHON**	**22ISE343.2**	**6 Hours**

List, Tuples, Basic operation in List and Tuples. Class definition, Constructors, Inheritance and Overloading.

Laboratory Component: 1. Design and Develop a Python Program to Append, Delete and Display Elements of a List Using Classes and Objects. 2. Demonstrate the concept of Method Resolution order in multiple inheritance in Python Program. 3. Design and Implement a Python Program to perform addition, subtraction, multiplication of two complex numbers using binary operators overloading.			**3 Hours**
Text Book	Text Book 1: Ch.1,2,3		
MODULE-3	**NUMERICAL PYTHON AND PANDAS**	**22ISE343.3**	**6 Hours**
Numpy: Creating an array, Generating array using built in functions, Advantage of Numpy, Reshape an array, Numpy operation, Accessing element from an array. Introduction to Pandas, Importing data, Creating copy of the data, Attributes of Data, Indexing and selecting Data. Checking data types, selecting data based on the data types, Summary of data frame.			
Laboratory Component: 1. Write a program to generate array in numpy using linespace, arrange and random functions. 2. Demonstrate with a python program to show the speed of execution is more when using numpy array. 3. Write a python program to perform numpy addition, subtraction, multiplication and remainder operation.			**3 Hours**
Text Book	Text Book 4 : Chapter 5		
MODULE-4	**DATA LOADING**	**22ISE343.4, 22ISE343.5**	**6 Hours**
Reading and writing data from text, csv and excelformat , interacting with databases, dealing with missing values, string manipulation, Exploring data analysis – Frequency Table, Two Way table and Correlation.			
Laboratory Component: 1. Performing an experiment to read the data in txt, csv and excel format. 2. Write a program to analysing the given data and perform the operation to find the missing data. 3. Write a program to read the data and perform correlation, Two way conditional probability, joint probability and marginal probability.			**3 Hours**
Self-study / Case Study / Applications	Download any business data set [House price, car resale value etc] and perform cleaning operation of the data, followed by that use the knowledge you can acquired to find the key insight about the data and summarize the same.		
Text Book	Text Book 4 : Chapter 6,7		
MODULE-5	**VISUALIZATION**	**22CSE35.6**	**6 Hours**
Data Visualizations and its merits, Matplotlib, Scatter Plot, Histogram and Bar Plot using Matplotlib library. Seaborn library, Scatter Plot, Histogram and Bar Plot, Grouped bar plot, box and whiskers pot using Matplotlib library			
Laboratory Component: 1. Read the data set and perform scatter plot, Histogram and Bar plot using Matplotlin library.s 2. Read the data set and perform scatter plot, Histogram and Bar plot susing seaborn library. 3. Read the data set and perform Box and whiskers plot using seaborn library.			**3 Hours**

Self-study / Case Study / Applications	Download any business data set and perform cleaning operation of the data, followed by that use the knowledge you can acquired to find the key insight about the data and summarize the same using graphical representation using python libraries.
Text Book	Text Book 3 : Chapter 4

CIE Assessment Pattern (50 Marks – Theory and Lab)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Lab
		25	05	20
L1	Remember	5	-	-
L2	Understand	10	-	-
L3	Apply	5	5	10
L4	Analyze	5	-	10
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	20
L3	Apply	10
L4	Analyze	10
L5	Evaluate	--
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Publisher: Shroff/ O'Reilly Publishers, 2nd edition, 2022, ISBN-10: 1636390471, ISBN-13: 978-1636390475
2) Mark Lutz, "Programming Python", O'Reilly Media, 4th edition, 2010.

Reference Books:

1) Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress, 1st edition, 2009.
2) Magnus Lie Hetland, "Beginning Python: From Novice to Professional", Apress, Second Edition, 2005.
3) Shai Vaingast, "Beginning Python Visualization Crafting Visual Transformation Scripts", Apress, 2nd edition, 2014

Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc23_cs99/preview
- https://www.youtube.com/watch?v=_uQrJ0TkZlc
- https://www.python.org/

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

- Quizzes & Assignments
- Demonstration mini projects using python for Data Science.
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues
  - Seminars

OBJECT ORIENTED MODELING AND DESIGN USING STAR UML

Course Code	**22ISE344**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE344.1	Understand Object Oriented Modeling techniques.
22ISE344.2	Develop class models using class diagrams from the requirements specified for a particular problem.
22ISE344.3	Develop state models using state diagrams from the requirements specified for a particular problem.
22ISE344.4	Construct use case models, sequence models from the requirements specified for a particular problem.
22ISE344.5	Construct activity models, collaboration diagrams from the requirements specified for a particular problem.
22ISE344.6	Construct a component and deployment diagram for a given problem description and analyze the use of Reverse Engineering.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE344.1	2	2	2	3	-	-	-	-	-	-	-	2	2	3
22ISE344.2	2	2	2	3	-	-	-	-	-	-	-	2	2	3
22ISE344.3	2	2	2	3	-	-	-	-	-	-	-	2	2	3
22ISE344.4	2	2	2	3	-	-	-	-	-	-	-	2	2	3
22ISE344.5	2	2	2	3	-	-	-	-	-	-	-	2	2	3
22ISE344.6	2	2	2	3	-	-	-	-	-	-	-	2	2	3

MODULE-1	**INTRODUCTION, MODELING CONCEPTS-1**	**22ISE344.1**	**6 Hours**

Unified Process, Object Orientation, OO methodology, Modelling as a Design Technique, The Three Models: Class Model, State Model, Interaction Model. Class, Object, Links and Associations, Multiplicity, Association End Names, Association Class, Generalization and Inheritance. n-ary Association, Aggregation, Composition. A sample Class Model.

Lab Component: **3 Hours**

1. General Study of UML
2. General Study of three models
3. Draw a class diagram for ATM System.

   Description: The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The ATM will communicate each transaction to the bank and obtain verification that it was allowed
   by the bank. If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it
   back. The system shows the list of items such as balance enquiry, withdrawal, cancel options. When the customer selects the balance enquiry option, then the system shows the balance that left in the account and prints as receipt. When the customer selects the withdrawal option then the system should ask the amount and dispense
   the amount after enquiring the balance. After all transactions, the customer should collect the ejected card.

Text Book	Text Book 1: Ch 1,3,4

MODULE-2	MODELING CONCEPTS-2	22ISE344.2	6 Hours
State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior, Advanced State Modeling: Nested state diagrams; Nested states; Concurrency; A sample state model; Relation of class and state models.			
Lab Component: 1. Identify the classes, States, Event and Event Flow for Telephone Line System. 2. Draw a class diagram for Telephone Line System. 3. Draw a state chart diagram for Telephone Line System. **Description:** This software is designed for the verification of the details of the caller and receiver, validity of the telephone number by the central computer. The details regarding the sender and receiver will be provided to the central computer through the administrator in the tele communication system will verify the details of the users and provide approval to the office. Then the call will be connected to the receiver.			**3 Hours**
Text Book	Text Book 1: Ch 5,6		
MODULE-3	**MODELING CONCEPTS-3**	**22ISE344.3, 22ISE344.4**	**6 Hours**
Interaction Modeling: Use case Scenario, Use case Diagrams; Use case relationships, Sequence scenario, Sequence Diagrams; Procedural sequence models; A sample Use case Sequence Model.			
Lab Component: 1. Identify the classes, use cases, Actors for Library Management Systems. 2. Draw a use case diagram for Library Management Systems. 3. Draw a sequence diagram for Library Management Systems. **Description:** This software is designed for the verification of the details of the student by the central computer. The details regarding the student will be provided to the central computer through the administrator in the library and the computer will verify the details of student and provide approval to the office. Then the books that are needed by the student will issue from the office to the him.			**3 Hours**
Text Book	Text Book 1: Ch 7,8		
MODULE-4	**MODELING CONCEPTS-3**	**22ISE344.5**	**6 Hours**
Activity Models: Activity Diagram Notations, Activity Diagram Guidelines, Sending and Receiving Signals, Swim lanes, Activity Diagram with Object Flow, Collaboration Diagram. A Sample Activity Model.			
Lab Component: 1. Draw a class and use case diagram for Exam Registration System. 2. Draw an sequence diagram for Exam Registration System. 3. Draw a collaboration diagram for Exam Registration System. **Description**: This software is designed for the verification of the details of the candidate by the central computer. The details regarding the candidate will be provided to the central computer through the administrator and the computer will verify the details of candidate and provide approval. Then the hall ticket will be issued from the office to the candidate.			**3 Hours**
Text Book	Text Book 1: Ch 8,9 TextBook2 : Ch 27		
MODULE-5	**ARCHITECTURAL MODELING**	**22ISE344.6**	**6 Hours**
Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application. Legacy Systems: Reverse engineering, Wrapping; Maintenance.			

Lab Component: 1. Draw a class, use case diagram for Recruitment System. 2. Draw a component diagram for Recruitment System. 3. Draw a deployment diagram for Recruitment System. **Description**: The recruitment system allows the job seekers to enroll their names through the process of registration. The employee also can get the list of available candidates and shortlist for their company requirement. Once the applicant enrolls he receives an id, which helps him in further correspondence. A fees amount is received from the job seekers for enrollment. This system makes the task of the job seeker easier rather than waiting in queue for enrollment. This also reduces the time consumption for both for the job seeker and employee. The recruitment system will select the candidate for an organization based on aptitude test, Interview. It generates results for the test taken up the candidates and reports to view the systems usage by the graduates and the employers in the recruitment process in a periodical base.	**3 Hours**
Text Book	Text Book 2: Ch 24,29,30

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	5	20
L1	Remember		-	-
L2	Understand	10	5	10
L3	Apply	10	-	10
L4	Analyze	5	-	-
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	20
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

TEXT BOOKS:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, Pearson Education ,2nd Edition, 2009.

2. Frank Buchmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.

REFERENCES:

1. Grady Booch et al: Object-Oriented Analysis and Design with Applications, Pearson Education ,3rd Edition, 2007.

2. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.

3. D Jeya Mala, S Geetha , Object-Oriented Modeling and Design with UML, McGraw-Hill Education (India) Private Limited,2013

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

- Quizzes & Assignments
- Demonstration of mini project using Star UML
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare UML Diagrams and Organizing Group wise discussions

RUBY PROGRAMMING			
Course Code	**22ISE351**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**1**	**Exam Hours**	**03**

Course outcomes:

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

22ISE351.1	Understand the fundamentals of Ruby Programming essential for problem solving.
22ISE351.2	Examine the operational aspects of Strings and Arrays in Ruby Programming
22ISE351.3	Analyse the concept of Classes and Objects in Ruby Programming.
22ISE351.4	Apply the Web-App Framework of Ruby on Rails.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE351.1	2	2	2	2	2	-	-	-	-	-	-	2	2	2
22ISE351.2	2	2	2	2	2	-	-	-	-	-	-	2	2	2
22ISE351.3	2	2	2	2	2	-	-	-	-	-	-	2	2	2
22ISE351.4	2	2	2	2	2	-	-	-	-	-	-	2	2	2

Pgm. No.	**List of Programs**	**Hours**	**COs**
	Prerequisite Programs		
	• Basics of Programming • Basics of Web Programming	2	NA
	PART-A		
1	Write Ruby program to get ruby version with patch number.	2	22ISE351.1
2	Write a Ruby program to display the current date and time.	2	22ISE351.1
3	Write a Ruby program which accept the radius of a circle from the user and compute the parameter and area.	2	22ISE351.1
4	Write a Ruby program to create a new string which is n copies of a given string where n is a non-negative integer.	2	22ISE351.2
5	Write a Ruby program to check whether a string 'Ruby' appears at index 1 in a given sting, if 'Ruby' appears return the string without 'Ruby' otherwise return the string unchanged.	2	22ISE351.2
6	Write a Ruby program which accept the user's first and last name and print them in reverse order with a space between them.	2	22ISE351.2
	PART-B		
7	Write a Ruby program to check whether the sequence of numbers 10, 20, 30 appears anywhere in a given array of integers.	2	22ISE351.2

8	Write a Ruby program to merge two integer arrays without using library function.	2	22ISE351.2
9	Write a Ruby program to sort an array in descending order using selection sort.	2	22ISE351.2
10	Ruby program to create a class with data members and initialize using initialize () method.	2	22ISE351.3
11	Write a Ruby program to initialize instance variables using the constructor	2	22ISE351.3
12	Write a Ruby Program to demonstrate inheritance	2	22ISE351.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Demonstrate Ruby/TK widget Classes
   https://www.tutorialspoint.com/ruby/ruby_tk_guide.htmDemonstrate Standard Configuration Options
2. Demonstrate Ruby/TK Event Handling
   https://www.tutorialspoint.com/ruby/ruby_tk_guide.htm4 3
3. Demonstrate Embedding Ruby Interpreter
   https://www.tutorialspoint.com/ruby/ruby_tk_guide.htm

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	5	10
L4	Analyze	5	5
L5	Evaluate	10	10
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	-
L3	Apply	10
L4	Analyze	20
L5	Evaluate	20
L6	Create	-

Suggested Learning Resources:

Text Books:

1) Ruby Programming for Beginners: An Introduction to Learning Ruby Programming with Tutorials and Hands-On Examples Kindle Edition by Nathan Metzler(Author).
2) The Ruby Programming Language: Everything You Need to Know 1st Edition by David Flanagan (Author), Yukihiro Matsumoto(Author).

Web links and Video Lectures (e-Resources):

- https://www.classcentral.com/classroom/freecodecamp-ruby-programming-language-full-course- 58000
- https://www.codecademy.com/learn/learn-ruby
- https://www.udemy.com/course/ruby-for-absolute-beginners/

Activity-BasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning
Practical Based Learning

GOLANG PROGRAMMING			
Course Code	**22ISE352**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE352.1	Apply the basic programming Go Lang constructs to develop standalone applications.
22ISE352.2	Apply the concept of functions and recursive functions in GoLang programming
22ISE352.3	Develop applications using GoRoutines and channels
22ISE352.4	Solve the real-world concurrency issues using concurrency with go concepts.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE352.1	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE352.2	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE352.3	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISE352.4	3	3	3	3	2	-	-	-	-	-	-	2	3	3

Pgm. No.	**List of Programs**	**Hours**	**COs**
	Prerequisite Programs		
	• Hello World program in GoLang	2	NA
	PART-A		
1	Design and Implement a Go program to print the name of the months and number of days based on user input number. Apply switch statement to implement the same.	2	22ISE352.1
2	Implement a calculator program thatdisplays a menu with options 1. Add 2. Sub 3. Mul 4. Div Read 2 numbers and performthe relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.	2	22ISE352.1
3	Accept an array of 5 positive integers. Create a program to find the smallest positive integer in the user input array which cannot be formed from the sum of 2 numbers in the array.	2	22ISE352.1
4	Develop a Go Program to check whether the user given matrix is a sparse or not.	2	22ISE352.1
5	Design and develop a simple Go function to find the longest substring without repeating characters in a given String.	2	22ISE352.2
6	Illustrate the different types of recursion in Go with suitable programs. Direct, Indirect, Tail and Head Recursion	2	22ISE352.2

PART-B			
7	Design a structure Employee with name and salary as its filed. Create three employee instances. Print the details and computer the average salary.	2	22ISE352.2
8	Create a program to swap two numbers using pointers in Go.	2	22ISE352.2
9	Apply pointer to structure concept to print the details of 3 student records. Assume Student record to contain USN, name and marks.	2	22ISE352.3
10	Develop a program to illustrate how to create an anonymous Goroutine.	2	22ISE352.3
11	Develop a program to illustrate how to start multiple Goroutines.	2	22ISE352.4
12	Solve Producer Consumer concurrency issue using Go concurrency concept.	2	22ISE352.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Develop a Go program to replace all occurrences of a word with another word in the given string.
   https://www.geeksforgeeks.org/python-program-to-replace-all-occurrences-of-a-with-in-a-string/
2. Develop a calculator program using switch cases in Go.
   https://www.geeksforgeeks.org/python-program-to-replace-all-occurrences-of-a-with-in-a-string/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	**30**
L1	**Remember**	**-**	**-**
L2	**Understand**	-	-
L3	**Apply**	5	10
L4	**Analyze**	5	10
L5	**Evaluate**	10	10
L6	**Create**	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	-
L2	**Understand**	-
L3	**Apply**	20
L4	**Analyze**	20
L5	**Evaluate**	10
L6	**Create**	-

Suggested Learning Resources:

Text Books:

1) Alan A. A Donovan, Brian W.Kernighan,"The Go Programming Language", Addison-Wesley Professional Computing Series ,2016(Reprint)

E-Reference Books:

1) www.tutorialgateway.org/go-programs
2) https://gobyexample.com

ADVANCED OFFICE AUTOMATION			
Course Code	**22ISE353**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs. / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE353.1	Understand the fundamentals of MS. Word
22ISE353.2	Understand the concepts of MS. Excel to perform accounting operations
22ISE353.3	Develop a PowerPoint presentation from the requirements specified for a particular problem.
22ISE353.4	Design a PowerPoint presentation by inserting background images, Slide transition

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE353.1	3	3	3	2	3	-	-	-	-	-	-	2	3	3
22ISE353.2	3	3	3	2	3	-	-	-	-	-	-	2	3	3
22ISE353.3	3	3	3	2	3	-	-	-	-	-	-	2	3	3
22ISE353.4	3	3	3	2	3	-	-	-	-	-	-	2	3	3

Pgm. No.	List of Programs	Hour	COs
	Prerequisite Programs		
	Basic concepts of MS. Word, MS. PowerPoint , MS.EXCEL	2	NA
	PART-A		
1	Create a Mathematical question paper using ,at least five equations a. With fractions, exponents, summation function b. With at least one „m*n" matrix c. Basic mathematical and geometric operators. d. Use proper text formatting, page color and page border.	2	22ISE353.1
2	Create a flowchart using, a. Proper shapes like ellipse, arrow, rectangle, and parallelogram. b. Use grouping to group all the parts of the flowchart into one single object.	2	22ISE353.1
3	Create a letter, which must be sent to multiple recipients. a. Use Mail-Merge to create the recipient list. b. Use excel sheet to enter the recipient. Start the mail merge using letter and directory format. State the difference	2	22ISE353.1
4	Create a newsletter Features to be covered:-Newspaper columns, Images from files and clipart, Drawing tool bar and WordArt, Formatting Images, Textboxes and Paragraphs	2	22ISE353.1

5	Create a table "Student result" with following conditions. 1. The heading must contain, Sl. No.., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry. 2. Use formulas for total and average. 3. Find the name of the students who hassecured the highest and lowest marks. 4. Round the average to the nearest highest integerand lowest integer (use ceiling and floor function n respectively).	2	22ISE353.2
6	Do as directed Create a notepad file as per the following fields Sl.no name Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 total % grade Import this notepad file into excel sheet using „data from text" option. The grade is calculated as, i. If%>=90, then grade A ii. If%>=80 and<90, then grade B iii. If%>=70 and<80, then grade C iv. If%>=60 and<70, then grade D v. If%<60, then grade F	2	22ISE353.2
PART-B			
7	Create as ales table for three items purchase din past three consecutive years and perform the following operations a. Draw the bar-graph to compare the sales of the three items for four years using insert option. b. Draw a line-graph to compare the sales of three items for four years using insert option. c. Draw different pie-charts for the given data using insert option. d. Use condition, to highlight all the cells Having value>=1000withredcolor (use conditional formatting).	2	22ISE353.2
8	Create a Cricket Score Card-Features to be covered:-PivotTables, Interactive Buttons, Importing Data, Data Protection, Data Validation.	2	22ISE353.2
9	Create a power-point presentation with minimum 10 slides a. Use word art to write the heading for each slides b. Insert at least one clip-art, one picture c. Insert at least one audio and one video d. Hide at least two slides	2	22ISE353.3, 22ISE353.4
10	Create a power-point presentation with minimum 5 slides a. Use custom animation option to animate the text; The text must move left to right one line at a time. b. b.Use proper transition for the slides.	2	22ISE353.3, 22ISE353.4
11	Create a slide show presentation for a seminar.	2	22ISE353.3, 22ISE353.4

12	Use bar chart (X-axis: Semester, Y-axis:%marks) for 6 subjects.	2	22ISE353.3, 22ISE353.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1.Create newsletter using MS word
https://www.edrawmax.com/newsletter/how-to-make-a-newsletter-in-word/

2.create a scheduler using MS Excel
https://www.zoomshift.com/blog/work-schedule-in-excel/

3. create a cricket score card by importing data using pivot tables in MS Excel
https://www.exceldemy.com/make-cricket-scorecard-in-excel/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	10	10
L3	Apply	10	5
L4	Analyze	-	5
L5	Evaluate	-	10
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Reference Books:

1) Comdex Information Technology course tool kit Vikas Gupta,WILEY Dreamtech,2005
2) Comdex14-1in-1Computer course Kit by Vikas Gupta, published by Dream Tech
3) The Complete Computer up grade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech

GAME DEVELOPMENT			
Course Code	**22ISE354**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE354.1	Apply the workflows for creating 2D video games.
22ISE354.2	Implement different types of video games and its components.
22ISE354.3	Apply the best practices to enable an entrepreneurial position in the gaming marketplace
22ISE354.4	Create multiple gaming applications

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE354.1	3	3	3	3	2	-	-	-	-	1	-	2	3	3
22ISE354.2	3	3	3	3	2	-	-	-	-	1	-	2	3	3
22ISE354.3	3	3	3	3	2	-	-	-	-	1	-	2	3	3
22ISE354.4	3	3	3	3	2	-	-	-	-	1	-	2	3	3

Pgm. No.	**List of Programs**	**Hours**	**COs**
	Prerequisite Programs		
	Knowledge of Programming language	2	NA
	PART-A		
1	Create a prototype using C for tic tac toe game	2	22ISE354.1
2	Design a Prototype for Rock Paper Scissors	2	22ISE354.1
3	Design a Prototype for Dot and Boxes	2	22ISE354.1
4	Develop a Prototype for Flappy Bird	2	22ISE354.1
5	Develop a Prototype for Hangman	2	22ISE354.2
6	Design a Prototype for Matching game	2	22ISE354.2
	PART-B		
7	Design a Prototype for Fruit Ninja using C++	2	22ISE354.2
8	Design a Prototype for Connect –Four using python	2	22ISE354.2
9	Design a Prototype for memory matching puzzle	2	22ISE354.3
10	Design a Prototype for Duck Hunt	2	22ISE354.3
11	Design a Prototype for Snack game	2	22ISE354.4
12	Design a Prototype for Sliding puzzle game	2	22ISE354.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

- Design a Prototype for Mind Reader
  https://veconlab.econ.virginia.edu/gg/gg.php
- Design a Prototype for Guess the Colour
  https://veconlab.econ.virginia.edu/mgn/mgn.php
- Design a Prototype for Maze Game
  https://veconlab.econ.virginia.edu/td/td.php

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		**Test (s)**	**Weekly Assessment**
		20	**30**
L1	**Remember**	-	-
L2	**Understand**	5	-
L3	**Apply**	5	10
L4	**Analyze**	5	10
L5	**Evaluate**	5	10
L6	**Create**	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	-
L2	**Understand**	-
L3	**Apply**	10
L4	**Analyze**	20
L5	**Evaluate**	20
L6	**Create**	**-**

Suggested Learning Resources:

Text Books:

1) Alan A. A Donovan, Brian W.Kernighan,"The Go Programming Language", Addison-Wesley Professional Computing Series ,2016(Reprint)

E-Reference Books:

1) www.tutorialgateway.org/go-programs

2) https://gobyexample.com

Programming principles and Practice using C++

Course Code	**22ISE355**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE355.1	Illustrate basic concept of OOP features and C++ concept.
22ISE355.2	Analyse overloading concepts of function and operators.
22ISE355.3	Implement concept of inheritance and polymorphism.
22ISE355.4	Implement program using exception handling and templates

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE355.1	3	3	3	3	3	-	-	-	-	-	-	2	3	3
22ISE355.2	3	3	3	3	3	-	-	-	-	-	-	2	3	3
22ISE355.3	3	3	3	3	3	-	-	-	-	-	-	2	3	3
22ISE355.4	3	3	3	3	3	-	-	-	-	-	-	2	3	3

Pgm. No.	List of Programs	Hours	COs
	PART-A		
1	a) Write a C++ program to find the largest of three numbers using inline function. b) Write a C++ program to sort an array of integer in ascending order using a function called exchange () which accepts two integer arguments by reference. c) Write a C++ Program to implement currency converter (Dollar to INR, EURO to INR, YEN to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.	2	22ISE355.1
2	a) Write a C++ program to perform matrix addition using static variable, default argument and friend function. b) Write a C++ program for matrix manipulation with dynamic memory allocation using copy constructor and overloading of assignment operator c) Create a class 'COMPLEX' to hold a complex number. Write a friend function to add two complex numbers. Write a main function to add two COMPLEX objects	2	22ISE355.1
3	a) Write a C++ program to implement function overloading in order to compute power (m,n) where i) m is double and n is int ii) m and n are int b) Create a 'STRING' class which overloads '= = ' operator to compare two STRING objects 3. write a C++ program to overload new and delete operators	2	22ISE355.1
4	a) Write a C++ program to perform matrix addition using static variable, default argument and friend function. b) Write a C++ program for matrix manipulation with dynamic memory allocation using copy constructor and overloading of assignment operator.	2	22ISE355.1
5	Create a class student having data members to store roll no, name of student, name of 3 subjects, max marks, min marks and obtain marks. Use nesting of member function Declare an array of object to input data of 3 students. Provide facilities to display result of all students and to display result of specific student whose roll number is given?	2	22ISE355.2
6	Write a C++ program to generate Fibonacci series use the concept of function overriding.	2	22ISE355.2
	PART-B		
7	a) Write a C++ program to demonstrate the static and non-static variable usage defining them within a function. b) Create a class 'COMPLEX' to hold a complex number. Write a friend function to add two complex numbers. Write a main function to add two COMPLEX objects.	2	22ISE355.2
8	a) Create a 'MATRIX' class of size m X n. Overload the '+' operator to add two MATRIX objects.	2	22ISE355.2

	b) Derive a class 'MAT' from MATRIX class created in the above program. Add a member function to overload '*' operator to multiply two objects. (Single Inheritance).		
9	a) Write a C++ program to generate Fibonacci series use the concept of function overriding. b) Write a C++ program to solve Diamond problem (Hybrid inheritance and virtual base class).	2	22ISE355.3
10	a) Create a base class shape having two data members with two-member function getdata (pure virtual function) and printarea (not pure virtual function). b) Derive classes triangle and rectangle from class shape and redefine member function printarea in both classes triangle and rectangle and test the functioning of classes using pointer to base class objects and normal objects.	2	22ISE355.3
11	a) Write a C++ program for bubble sort using template. b) Define a function template for finding the minimum value contained in an array. Write main function to find the minimum value of integer array and minimum value of floating point numbers in an array.	2	22ISE355.4
12	Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. a) Write a C++ Program to read two integers a and b. Compute a/b and print, when b is not Zero. Raise an exception when b is equal to Zero. b) Write a C++ Program to read an array. Compute the addition of all the array elements. Raise an exception when trying to access the elements out of range.	2	22ISE355.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1) At the time of execution, the program should print the message on the console as: Enter the value of N to find prime numbers up to: For example, if the user gives the input as: Enter the value of N to find prime numbers up to: 20 then the program should print the result as: 2 3 5 7 11 13 17 19
https://codingjr.online/home/virtual_labs
2) Write a C++ program to implement the following collision resolution techniques using templates.
   a. Linear Probing
   b. Quadratic Probing
https://codingjr.online/home/virtual_labs

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	10	10
L4	Analyze		5
L5	Evaluate	10	10
L6	Create		-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	20
L4	Analyze	-
L5	Evaluate	20
L6	Create	-

Suggested Learning Resources:

Reference Books:

1) C++ How to Program, Paul Deitel, Harvey Deitel,Pearson Education Limited , 9thEdition, 2016.
2) Object Oriented Programming with C++, E Balagurusamy, , TMH, 6th Edition, 2013
3) C++ Primer Plus, Stephen Prata,Pearson Education Limited, 6th Edition, 2015.

BIO INSPIRED DESIGN AND INNOVATION

Course Code	**22BIK36**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**03**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22BIK36.1	Understand the biomimetics principles in relation to the needs at that moment.
22BIK36.2	Evaluate the Bio-material properties for health care applications.
22BIK36.3	Investigate novel bioengineering initiatives by evaluating design and development principles.
22BIK36.4	Investigate creative biobased solutions for socially vital issues with critical thought.
22BIK36.5	Analyze the bio computing optimization through research and experiential learning.
22BIK36.6	Explain the fundamental biological ideas through pertinent industrial applications and case studies.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BIK36.1	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.2	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.3	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.4	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.5	3	3	3	3	2	-	-	-	1	1	-	2
22BIK36.6	3	3	3	3	2	-	-	-	1	1	-	2

MODULE-1	BIO-INSPIRED DESIGN AND ENGINEERING	22BIK36.1	8 Hours
Bio-Inspired Engineering and design, History, Evolution, Basics of Biomimetics and other Disciplines, Rawling's Classifications, Need for Bio-Inspired Designs. Bio inspired Additive manufacturing techniques, (self-healing, self-assembly).			
Self-study	Investigate the Challenges of Bio inspired design, Compare with traditional areas of science and engineering.		
Text Book	Text Book 1: 1.2, 1.3, 1.4, 1.13, 1.15, 1.16		
MODULE-2	**BIO MATERIALS AND BIO HEALTHCARE DESIGN**	**22BIK36.2**	**8 Hours**
Biomaterials, Design of Forms- (Hexagonal unit cells, anisotropy), Design of materials- (Hierarchy, fracture tough materials, structural colours, Actuating Materials, Bio-Compatible Materials). Bio-Mechanics, Applications of Biomaterials and Bio systems in Health care design.			
Self-study	Investigate Bio-Compatible alloys and polymers for human implants and health care applications.		
Text Book	Text Book 1: 2.2, 2.3, 2.4 to 2.15		
MODULE-3	**BIO SUSTAINABLE DEVELOPMENT**	**22BIK36.3, 22BIK36.4**	**8 Hours**
Innovations in Energy (Termite mound inspired shopping malls), Innovations in Resource-Air (purification, filtration), Dew water collection systems, water purification, desalination, Management of spaces, designs for megastructures.			
Case Study	Explore the Bio inspired environmental constructions and development.		
Text Book	Text Book 2: 3.1, 3.3, 3.5, 3.7, 3.10		
MODULE-4	**BIO COMPUTING AND OPTIMISATION**	**22BIK36.5**	**8 Hours**
No Free Lunch Theorem, Bat Algorithm, Flower Pollination Algorithm, Genetic Algorithm- Crossover and Mutation Operations. Bio-Inspired Optimisation, Ant Colony Optimisation (ACO), Swam Intelligence- Particle Swam Optimisation (PSO).			
Self-study	Scrutinize the Different types of Optimization techniques, genetic research.		
Text Book	Text Book 1: 6.1, 6.3, 6.5, 6.7, Text Book 2: 10.1, 10.3, 10.5, 10.7		
MODULE-5	**APPLICATIONS OF BIO-INSPIRED INNOVATIONS**	**22BIK36.6**	**8 Hours**
Bioinspired innovations in– Automotive, Automation, Materials and Manufacturing, Sensors, Controllers, Communications, Healthcare, Agriculture, food production, and Sports, Environment infrastructure. Carbon Neutral Solutions (Coral Reefs, Eco-cements), Carbon Free Solutions (Lotus leaf inspired paints), eco-restorations (Eco-friendly pesticide).			
Applications	Survey on Bio inspired Innovations, design, applications and case studies of the same.		
Text Book	Text Book 2: 12.1 to 12.10		

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	-	-	-
L2	Understand	5	-	-
L3	Apply	10	5	5
L4	Analyze	5	5	5
L5	Evaluate	5	5	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Helena Hashemi Farzaneh, Udo Lindemann, "A Practical Guide to Bio-inspired Design", Springer Vieweg, 1st edition 2019, ISBN-10 : 366257683X, ISBN-13 : 978-3662576830

2) Torben A. Lenau, Akhlesh Lakhtakia," Biologically Inspired Design: A Primer (Synthesis Lectures on Engineering, Science, and Technology)", Publisher: Morgan & Claypool Publishers, 2021, ISBN-10: 1636390471, ISBN-13: 978-1636390475

Reference Books:

1) French M, "Invention and evolution: Design in nature and engineering", Publisher: Cambridge University Press, 2020

2) Pan L., Pang S., Song T. and Gong F. eds, "Bio-Inspired Computing: Theories and Applications", 15th International Conference, BIC-TA 2020, Qingdao, China, October 23-25, 2020, Revised Selected Papers (Vol. 1363). Springer Nature, 2021

3) Wann D, "Bio Logic: Designing with nature to protect the environment", Wiley Publisher, 1994

Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc22_ge24/preview
- https://biodesign.berkeley.edu/bioinspired-design-course/
- https://nsf-gov-resources.nsf.gov/2023-03/Bio-inspired%20Design%20Workshop%20Report_2232327_October%202022_Final.508.pdf

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

- Bio Materials printing using 3D Printing
- Flipped class room
- Organizing Group wise discussions on sub topics
- Student presentations

UNIVERSAL HUMAN VALUES AND LIFE SKILLS

Course Code	22UHK37	CIE Marks	50
L:T:P:S	1:0:0:0	SEE Marks	50
Hrs / Week	2	Total Marks	100
Credits	01	Exam Hours	02

Course outcomes:

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

22UHK37.1	Understand the concept and significance of life skills and universal human values.
22UHK37.2	Develop Self-awareness and Self-management skills to promote personal growth.
22UHK37.3	Apply Critical and Creative thinking and ethical decision-making skills in various contexts.
22UHK37.4	Promote teamwork and collaboration while respecting diversity and inclusivity.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
22UHK37.1	**-**	**-**	**-**	**-**	**-**	3	1	3	-	2	-	2
22UHK37.2	**-**	**-**	**-**	**-**	**-**	1	2	1	-	2	-	2
22UHK37.3	**-**	**-**	**-**	**-**	**-**	3	1	3	1	2	-	2
22UHK37.4	**-**	**-**	**-**	**-**	**-**	2	2	1	3	3	-	3

MODULE-1	**Self-Awareness and Self-Management**	**22UHK37.1** **22UHK37.2**	**3 Hours**
Emotional Intelligence, Techniques of self-awareness: SWOT and JOHARI WINDOWS, Stress management and coming out of comfort zone, managing failure, Time Management to recalibrate priorities. Self-Exploration as a process of Value Education, the basic human Aspirations: Prosperity and Happiness, understanding infatuation.			
Self-study / Role play	Understand qualities of Role Models, explore self and do SWOT analysis for growth; participate in role play and presentations to come out of comfort zone		
MODULE-2	**Towards Yourself**	**22UHK37.1** **22UHK37.3**	**3 Hours**
Exploring opportunities, understanding expectations and self for right fitment in profession, Goal Setting – Personal and Professional, aligning Personal and Professional goals for greater achievement, Mind-Maps as a tool for Goal Setting			
Self-study / Mind Maps	Understand industry expectations to set professional goals; realizing connection between personal and professional goals for peaceful living		
MODULE-3	**Leading self to lead others**	**22UHK37.3** **22UHK37.4**	**3 Hours**
Quality analysis of leader and self-evaluation, Critical thinking, Creative thinking and Ethical decision making, Critical thinking and Creative thinking for contribution to technical world, Six thinking hats, Exploring ethical decision-making frameworks and principles.			
Case study	Case studies for Critical thinking and activities for Creative thinking		
MODULE-4	**Ownership towards Family and Society**	**22UHK37.2** **22UHK37.3** **22UHK37.4**	**3 Hours**
Responsibility, Diversity and Inclusivity: Understanding personal and social responsibility; Appreciating diversity and managing inclusivity, promoting teamwork and collaboration while respecting differences.			
Self-study / Interview with corporate people	Working on Task bar; team building activities; Interviewing Corporate experts to understand expectations		
MODULE-5	**Towards Nature and Industry**	**22UHK37.3** **22UHK37.4**	**3 Hours**
Personal code of conduct for harmony between self and nature, resisting external pressures, negotiation and conflict resolution, assertiveness and empathy, change management			
Role play	Role play to understand contributions to nature and industry.		

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Marks Distribution	
		Test (s)	Alternative Assessment (s)
		25	25
L1	Remember	-	-
L2	Understand	7	6
L3	Apply	8	7
L4	Analyze	10	7
L5	Evaluate	-	5
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Group Discussion)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	10
L5	Evaluate	--
L6	Create	--

Suggested Learning Resources:

REFERENCE BOOKS:

1. The 7 Habits of Highly Effective People, Stephen R Covey, Neha publishers.
2. Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998.
3. Emotional Intelligence, Daniel Coleman, Bantam Book, 2006.
4. How to win friends and influence people, Dale Carnegie.
5. BHAGAVADGITA for college students, Sandeepa Guntreddy.

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

- Conduct interviews with HR personnel of corporates to understand expectations in terms of Soft Skills and Values
- Participate in role plays and presentations to come out of comfort zone
- Talk to industry people to understand opportunities available
- Make a short movie to display creativity
- Use Mind maps to plan successful completion of semester
- Actively participate in Group Discussions and JAM sessions

NATIONAL SERVICE SCHEME (NSS)			
Course Code	**22NSS30, 22NSS40, 22NSS50, 22NSS60**	**CIE Marks (each Semester)**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4 = 200**
Credits	**00**	**Exam Hours**	**02**
Course outcomes: At the end of the course, the student will be able to:			
22NSS30.1	Understand the importance of his / her responsibilities towards society.		

22NSS30.2	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
22NSS30.3	Evaluate the existing system and to propose practical solutions for the same for sustainable development. Implement government or self-driven projects effectively in the field.
22NSS30.4	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22NSS30.1	-	-	-	-	-	3	3	-	2	-	-	1
22NSS30.2	-	-	-	-	-	3	3	-	2	-	-	1
22NSS30.3	-	-	-	-	-	3	3	-	2	-	-	1
22NSS30.4	-	-	-	-	-	3	3	-	2	-	-	1

Semester/ Course Code	CONTENT	Cos	HOURS
3RD 22NSS30	**1.** Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing **2.** Waste management–Public, Private and Govt organization, 5R's. **3.** Setting of the information imparting club for women leading to contribution in social and economic issues.	22NSS30.1, 22NSS30.2, 22NSS30.3, 22NSS30.4	30 HRS
4TH 22NSS40	**4.** Water conservation techniques – Role of different stakeholders– Implementation. **5.** Preparing an actionable business proposal for enhancing the village income and approach forimplementation. **6.** Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	22NSS40.1, 22NSS40.2, 22NSS40.3, 22NSS40.4	30 HRS
5TH 22NSS50	**7.** Developing Sustainable Water management system for rural areas and implementationapproaches. **8.** Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill developmentprograms etc. **9.** Spreading public awareness under rural outreach programs. (minimum 5 programs).	22NSS50.1, 22NSS50.2, 22NSS50.3, 22NSS50.4	30 HRS
6TH 22NSS60	**10.** Organize National integration and social harmony events / workshops / seminars. (Minimum TWO programs). **11.** Govt. school Rejuvenation and helping them to achieve good infrastructure.	22NSS60.1, 22NSS60.2, 22NSS60.3, 22NSS60.4	30 HRS

CIE Assessment Pattern (50 Marks – Activity based) –

CIE component for every semester	Marks
Presentation – 1 Selection of topic, PHASE – 1	10
Commencement of activity and its progress – PHASE – 2	10
Case study-based Assessment Individual performance	10
Sector wise study and its consolidation	10
Video based seminar for 10 minutes by each	10

student at the end of semester with Report.	
Total marks for the course in each semester	**50**

- Implementation strategies of the project (NSS work).
- The last report should be signed by NSS Officer, the HOD and principal.
- At last report should be evaluated by the NSS officer of the institute.
- Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.

Suggested Learning Resources:

Reference 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.

Pre-requisites to take this Course:

1. Students should have a service-oriented mindset and social concern.
2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.
3. Students should be ready to sacrifice some of the time and wishes to achieve service-oriented targets on time.

Pedagogy:

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last, in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.
- State the need for NSS activities and its present relevance in the society and provide real-life examples.
- Support and guide the students for self-planned activities.
- NSS coordinator will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills.

Plan of Action:

- Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.
- Practice Session Description:
    - Lecture session by NSS Officer
    - Students Presentation on Topics
    - Presentation – 1, Selection of topic, PHASE – 1
    - Commencement of activity and its progress – PHASE – 2
    - Execution of Activity
    - Case study-based Assessment, Individual performance
    - Sector/ Team wise study and its consolidation
    - Video based seminar for 10 minutes by each student at the end of semester with Report.

S. No	Topic	Groupsize	Location	Activity execution	Reporting	Evaluation of the Topic
1.	Organic farming, IndianAgriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land/Villages/ roadside / Community area / College campus	Site selection /proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
2.	Waste management– Public, Private and Govtorganization, 5 R's.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Site selection /proper consultation/51onti n Cous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
3.	Setting of the information imparting club for women leading to contributionin social and economic issues.	May be individual or team	Women empowerment groups/ Consulting NGOs & Govt Teams / College campus	Group selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
4.	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
6.	Helping local schools toachieve good results and enhance their enrolment in Higher/	May be individual or team	Local government / private/ aided schools/Government Schemes officers	School selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned	Evaluation as per the rubrics of scheme and syllabus by NSS officer

	technical/ vocational education.				evaluation authority	
7.	Developing SustainableWater management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	site selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
8.	Contribution to any national level initiative of Government of India.For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme,Skill development programs etc.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
9.	Spreading public awareness under ruraloutreach programs. (minimum5 programs)	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
10.	Organize National integration and socialharmony events / workshops / seminars. (Minimum 02 programs).	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
11.	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted byindividual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)			
Course Code	**22PED30, 22PED40, 22PED50, 22PED60**	**CIE Marks (each semester)**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4= 200**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

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

22PED30.1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
22PED30.2	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle
22PED30.3	Perform in the selected sports or athletics of student's choice and participate in the competition at regional/state / national / international levels.
22PED30.4	Understand the roles and responsibilities of organization and administration of sports and games

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22PED30.1	-	-	-	-	-	2	-	3	3	-	-	2
22PED30.2	-	-	-	-	-	2	-	3	3	-	-	2
22PED30.3	-	-	-	-	-	2	-	3	3	-	-	2
22PED30.4	-	-	-	-	-	2	-	3	3	-	-	2

Semester	CONTENT	Cos	HOURS
3RD 22PED30	**Module 1: Orientation** A. Lifestyle, B. Fitness C. Food & Nutrition D. Health & Wellness E. Pre-Fitness test.	22PED30.1, 22PED30.2	5 HRS
	Module 2: General Fitness & Components of Fitness A. Warming up (Free Hand exercises) B. Strength – Push-up / Pull-ups C. Speed – 30 Mtr Dash D. Agility – Shuttle Run E. Flexibility – Sit and Reach F. Cardiovascular Endurance – Harvard step Test	22PED30.2, 22PED30.3	15 HRS
	Module 3: Recreational Activities A. Postural deformities. B. Stress management. C. Aerobics. D. Traditional Games.	22PED30.3, 22PED30.4	10 HRS
4TH 22PED40	**Module 1: Ethics and Moral Values** A. Ethics in Sports B. Moral Values in Sports and Games	22PED40.1, 22PED40.2	5 HRS
	Module 2: Specific Games (Anyone to be selected by the student) A. Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. B. Throwball – Service, Receive, Spin attack, Net Drop & Jump	22PED40.3	20 HRS

	throw. C. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. D. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up. E. Table Tennis – Service (Fore Hand & Back Hand), Receive (Fore Hand & Back Hand), Smash. F. Athletics (Track / Field Events) – Any event as per availability of Ground.		
	Module 3: Role of Organization and administration	22PED40.4	5 HRS
5TH 22PED50	**Fitness Components:** Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. **Practical Components:** Speed, Strength, Endurance, Flexibility, and Agility **Athletics**: 1. Track -Sprints: • Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block. • Acceleration with proper running techniques. • Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. 2. Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick)and Landing 3. Throws- Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique) **Handball OR Ball Badminton** **Handball:** A. Fundamental Skills 1. Catching, Throwing and Ball control, 2. Goal Throws: Jumpshot, Centershot, Diveshot, Reverseshot. 3. Dribbling: High and low. 4. Attack and counter attack, simple counter attack, counter attack from two wings and center. 5. Blocking, Goal Keeping and Defensive skills. 6. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of officials **Ball badminton:** A. Fundamental Skills 1. Basic Knowledge: Various parts of the Racket and Grip. 2. Service: Short service, Long service, Long-high service. 3. Shots: Overhead shot, Defensive clearshot, Attacking clearshot, Dropshot, Netshot, Smash. 4. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.	22PED50.1, 22PED50.2, 22PED50.3, 22PED50.4	Total 30 Hrs/ Semester 2 Hrs/week

6TH 22PED60	**Athletics**: 1. Track -110 Mtrs and 400Mtrs: • Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Over the Hurdles • Crouch start (its variations)use of Starting Block. • Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. 2. Jumps- High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing. 3. Throws- Discus Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle). **Football OR Hockey** **Football:** A. Fundamental Skills 1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. 2. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. 3. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. 4. Heading: In standing, running and jumping condition. 5. Throw-in: Standing throw-in and Running throw-in. 6. Feinting: With the lower limb and upper part of the body. 7. Tackling: Simple Tackling, Slide Tackling. 8. Goal Keeping: Collection of Ball, Ball clearance-kicking, throwing and deflecting. 9. Game practice with application of Rules and Regulations. A. Rules and their interpretation and duties of officials. **Hockey:** A. Fundamental Skills 1. Passing: Short pass, Longpass, pushpass, hit 2. Trapping. 3. Dribbling and Dozing 4. Penalty stroke practice. 5. Penalty corner practice. 6. Tackling: Simple Tackling, Slide Tackling. 7. Goal Keeping, Ball clearance- kicking, and deflecting. 8. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials	22PED60.1, 22PED60.2, 22PED60.3, 22PED60.4	Total 30 Hrs/ Semester 2 Hrs/week

CIE Assessment Pattern (50 Marks – Practical) –

CIE to be evaluated every semester end based on practical demonstration of Sports and Athletics activities learnt in the semester.

CIE	Marks
Participation of student in all the modules	10
Quizzes – 2, each of 7.5 marks	15
Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	25
Total	**50**

Suggested Learning Resources:

Reference Books:

1. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, et.al., Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey H.C., Basketball, Discovery Publishing House, New Delhi.
11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
12. Jack Nagle, Power Pattern Offences for Winning basketball, Parker Publishing Co., New York.
13. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
14. SallyKus, Coaching Volleyball Successfully, Human Kinetics.

YOGA

Course Code	**22YOG30, 22YOG40, 22YOG50, 22YOG60**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4 = 200**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

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

22YOG30.1	Understanding the origin, history, aim and objectives of Yoga
22YOG30.2	Become familiar with an authentic foundation of Yogic practices
22YOG30.3	Practice different Yogic methods such as Suryanamaskara, Pranayama and some of the Shat Kriyas
22YOG30.4	Use the teachings of Patanjali in daily life.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22YOG30.1	-	-	-	-	-	3	-	-	-	-	-	1
22YOG30.2	-	-	-	-	-	3	-	-	-	-	-	1
22YOG30.3	-	-	-	-	-	3	-	-	-	-	-	1
22YOG30.4	-	-	-	-	-	3	-	-	-	-	-	1

Semester / Course Code	CONTENT	Cos	HOURS
3rd 22YOG30	**Introduction of Yoga:** Aim and Objectives of yoga, Prayer: Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer **Brief introduction of yogic practices for common man:** Yogic practices for common man to promote positive health **Rules and regulations:** Rules to be followed during yogic practices by practitioner **Misconceptions of yoga:** Yoga its misconceptions, Difference between yogic and non-yogic practices. **Suryanamaskara:** 1. Suryanamaskar prayer and its meaning, Need, importance and b of Suryanamaskar. 2. Suryanamaskar 12 count,2rounds **Different types of Asanas**: 1. Sitting: Padmasana, Vajrasana, Sukhasana 2. Standing: Vrikshana, Trikonasana, Ardhakati Chakrasana 3. Prone line: Bhujangasana, Shalabhasana 4. Supineline: Utthitadvipadasana, Ardhahalasana, Halasana	22YOG30.1, 22YOG30.2, 22YOG30.3, 22YOG30.4	Total 32 Hrs/ Semester 2 Hrs/week
4TH 22YOG40	**Suryanamaskara:** Suryanamaskar 12 count,4rounds **Brief introduction and importance of:** **Kapalabhati:** Revision of Kapalabhati -40strokes/min3rounds **Different types of Asanas**: 1. Sitting: Paschimottanasana, Ardha Ushtrasana, Vakrasana, Aakarna Dhanurasana 2. Standing: Parshva Chakrasana, Urdhva Hastothanasana, Hastapadasana 3. Prone line: Dhanurasana 4. Supine line: Karna Peedasana, Sarvangasana, Chakraasana **Patanjali's Ashtanga Yoga**: Asana, Pranayama **Pranayama:** Chandra Bhedana, Nadishodhana, Surya Bhedana	22YOG40.1, 22YOG40.2, 22YOG40.3, 22YOG40.4	Total 32 Hrs/ Semester 2 Hrs/week
5TH 22YOG50	**Kapalabhati:** Revision of Kapalabhati – 60strokes/min3rounds **Brief introduction and importance of:** **Different types of Asanas**: 1. Sitting: Yogamudra in Padmasana, Vibhakta Paschimottanasana, Yogamudra in Vajrasana 2. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 3. Prone line: Padangushtha Dhanurasana, Poorna Bhujangasana / Rajakapotasana 4. Supine line: Navasana/Noukasana, Pavanamuktasana, Sarvanga **Patanjali's Ashtanga Yoga**: Pratyahara, Dharana **Pranayama:** Ujjayi, Sheetali, Sheektari	22YOG50.1, 22YOG50.2, 22YOG50.3, 22YOG50.4	Total 32 Hrs/ Semester 2 Hrs/week
6TH 22YOG60	**Kapalabhati:** Revision of Kapalabhati – 80 strokes/min3rounds **Brief introduction and importance of:** **Different types of Asanas**: 1. Sitting: Bakasana, Hanumanasana, Ekapada Rajakapotasana 2. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 3. Supine line: Setubandhasana, Shavasanaa (Relaxation posture)	22YOG60.1, 22YOG60.2, 22YOG60.3, 22YOG60.4	Total 32 Hrs/ Semester 2 Hrs/week

	4. Balancing: Sheershasana **Patanjali's AshtangaYoga**: Dhyana (Meditation), Samadhi **Pranayama:** Bhastrika, Bhramari, Ujjai **Shat Kriyas:** Jalaneti and sutraneti, Sheetkarma Kapalabhati		

CIE Assessment Pattern (50 Marks – Practical)

CIE to be evaluated every semester based on practical demonstration of Yogasana learnt in the semester and internal tests (objective type)

CIE	Marks
Avg of Test 1 and Test 2	25
Demonstration of Yogasana	25
Total	**50**

Suggested Learning Resources:

Reference Books:

4. Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
5. Tiwari, O P: Asana Why and How
6. Ajitkumar: Yoga Pravesha (Kannada)
7. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga, Munger)
8. Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)
9. Nagendra H R: The art and science of Pranayama
10. Tiruka: Shatkriyegalu (Kannada)
11. Iyengar B K S: Yoga Pradipika (Kannada)
12. Iyengar B K S: Light on Yoga (English)

Web links and Video Lectures (e-Resources):

- **https://youtu.be/KB-TYlgd1wE**
- **https://youtu.be/aa-TG0Wg1Ls**

BASIC APPLIED MATHEMATICS-I

(Common to all Branches)

Course Code	**22DMAT31**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs. / Week	**2**	**Total Marks**	**50**
Credits	**00**	**Exam Hours**	**--**

Course outcomes:

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

22DMAT31.1	Know the principles of engineering mathematics through calculus
22DMAT31.2	Determine the power series expansion of a function
22DMAT31.3	Find the definite integrals with standard limits and also develop the ability to solve different types of differential equations
22DMAT31.4	Apply ideas from linear algebra in solving systems of linear equations and determine the Eigen values and Eigen vectors of a matrix

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22DMAT31.1	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT31.2	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT31.3	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT31.4	3	3	-	-	-	-	-	-	-	-	-	-

MODULE-1	DIFFERENTIAL CALCULUS	22DMAT31.1 22DMAT31.2	8 Hours
Polar Curves-Problems on angle between the radius vector and tangent, Angle between two curves-Problems, Pedal equation for polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.			
Text Book	Text Book 1: 4.4, 4.7, 4.8, Text Book 2: 15.4		
MODULE-2	**PARTIAL DIFFERENTIATION**	**22DMAT31.1**	**8 Hours**
Definition and Simple problems, Euler's theorem for Homogeneous function (NO Derivation and NO extended theorem Problems, Jacobians of order two – definition and problems.			
Text Book	Text Book 1: 5.4, 5.7,		
MODULE-3	**INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS**	**22DMAT31.3**	**8 Hours**
Problems on evaluation of sin n x and cos n x integrals with standard limits (0 to π/2). Solution of first order and first-degree differential equations-Variable separable, Linear and Exact differential equations.			
Text Book	Text Book 1: 6.2, 11.6, 11.9, 11.11, Text Book 2: 1.3, 1.4, 1.5		
MODULE-4	**LINEAR ALGEBRA-1**	**22DMAT31.4**	**8 Hours**
Problems on rank of a matrix by elementary transformations, Solution of system of linear equations by Gauss elimination method-Problems.			
Text Book	Text Book 1: 2.7, 28.6, Text Book 2: 7.3, 7.4		
MODULE-5	**LINEAR ALGEBRA-2**	**22DMAT31.4**	**8 Hours**
Linear transformation, Eigen values and Eigen Vectors of square matrix-Problems.			
Text Book	Text Book 1: 2.11, 2.13, Text Book 2: 7.9, 8.1.		

CIE Assessment Pattern (50 X 2=100 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	**15**	**10**
L1	**Remember**	5	5	-
L2	**Understand**	5	5	-
L3	**Apply**	10	5	10
L4	**Analyze**	2.5	-	-
L5	**Evaluate**	2.5	-	-
L6	**Create**	-	-	-

Suggested Learning Resources:

Text Books:

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.

Reference Books:

1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
2) V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.
3) K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
4) N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Web links and Video Lectures (e-Resources):

1)https://youtu.be/IUV0_Nj4d1s?si=eO3s7keCbCO1_jcz
2)https://youtu.be/VzUcs7aiqgg?si=YLtTUGr4Xp88KGY3
3)https://youtu.be/LDBnS4c7YbA?si=udUOdJ-u0ZxFmBAW
4)https://youtu.be/palSdK9P-ns?si=7A8_VSxEI4lGvksB
5)https://youtu.be/Bw5yEqwMjQU?si=jzbklZmVev1w8K2S
6)https://youtu.be/LBqdGn1r_fQ?si=DWcAIiFnosT7zikY
7)https://youtu.be/N5YCGOyTSuU?si=Wsf75V5fkUpfVVxr
8)https://youtu.be/gd1FYn86P0c?si=7drzBEqVFSv6sQeZ
9)https://youtu.be/cSj82GG6MX4?si=4QN1DFXEqaJoUBn7
10)https://youtu.be/0c3yq9btr3A?si=jIoz8eu5TgV7mh8G
11)https://youtu.be/PhfbEr2btGQ?si=HVK1uk65oHph0t8G

Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning:

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - Seminars

FOURTH SEMESTER

DISCRETE MATHEMATICS AND GRAPH THEORY

(Common to AIM, CEE, CSE, CDS, ISE)

Course Code	**22MAC41**	**CIE Marks**	**50**
L:T:P:S	**2:1:0:0**	**SEE Marks**	**50**
Hrs. / Week	**4**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22MAC41.1	Justify the arguments with propositional and predicate logic and from truth tables.
22MAC41.2	Illustrate the principle of Inclusion and Exclusion
22MAC41.3	Apply Pigeon hole principle to solve real life problems. Solve the engineering problems involving relations and functions.
22MAC41.4	Analyze the computer science problems by using graph theory techniques.
22MAC41.5	Illustrate the fundamental concepts of trees, connectivity and planarity graphs
22MAC41.6	Ability to represent and apply graph theory in solving computer science problems.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22MAC41.1	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.2	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.3	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.4	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.5	3	3	-	-	-	-	-	-	-	-	-	-
22MAC41.6	3	3	-	-	-	-	-	-	-	-	-	-

MODULE-1	**MATHEMATICAL LOGIC**	**22MAC41.1**	**9 Hours**
Basic Connectives and Truth Tables, Tautology and Contradiction, Logic Equivalence, The Laws of Logic, Converse, Inverse and Contra positive, Logical Implication, Rules of Inference.			
Case Study	Case studies on roles of logic in specification of computation.		
Text Book	Text Book 1: 2.1, 2.2, 2.3.		
MODULE-2	**PRINCIPLES OF COUNTING**	**22MAC41.2**	**9 Hours**
Catalan Numbers, Ramsey Numbers, Stirling Numbers and Bell Numbers, The principle of Inclusion and Exclusion, Generalizations of the principle, Derangements, Rook-Polynomials, Arrangements with Forbidden Positions.			
Text Book	Text Book 1: 1.5, 8.1, 8.2, 8.3, 8.4, 8.5.		
MODULE-3	**RELATIONS AND FUNCTIONS**	**22MAC41.3**	**9 Hours**
Cartesian Products and Relations, One-to-One and onto functions. The Pigeon hole Principle, Function Composition and Inverse Functions. Properties of Relations, Equivalence Relations and Partitions.			
Text Book	Text Book 1: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 7.4.		
MODULE-4	**GRAPH THEORY**	**22MAC41.4 22MAC41.6**	**9 Hours**
Graphs-Definitions and examples, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, graph isomorphism, Euler graphs, Hamiltonian paths and cycles.			
Case Study	Case studies on Network Analysis.		
Text Book	Text Book 1: 11.1, 11.2, 11.3, 11.5. Text Book 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9.		
MODULE-5	**TREES, CONNECTIVITY AND PLANARITY**	**22MAC41.5 22MAC41.6**	**9 Hours**
Trees, Properties of trees, Rooted and binary trees. Spanning trees, cut sets, Properties of cut set, all cut sets, Fundamental circuits Network flows: Kruskal's algorithm, Planar graphs, Dual of planar graphs, Different representation of a planar graph.			
Case Study	Case studies on Social Network Analysis.		

Text Book	Text Book 1: 11.4, 12.1, 12.2, 12.3, 13.2, Text Book 2: 3.1, 3.5, 3.7, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 5.2, 5.6, 5.7.

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	5	-
L2	Understand	5	5	-
L3	Apply	10	5	10
L4	Analyze	2.5	-	-
L5	Evaluate	2.5	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	20
L4	Analyze	5
L5	Evaluate	5
L6	Create	-

Suggested Learning Resources:

Text Books:

1) Ralph P. Grimaldi, Discrete and Combinatorial Mathematics-an applied introduction, Pearson Education, Fifth Edition, 2019, ISBN: 9789353433055.
2) Narsingh Deo, Graph Theory with Application to Engineering and Computer Science, Dover Publications Inc., First Edition, 2016, ISBN: 978-0486807935.

Reference Books:

1) Basavaraj S. Anami and Venakanna S. Madalli, Discrete Mathematics – A Concept based approach, Universities Press, 2016, ISBN: 9788173719998.
2) Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, McGraw Hill Education**,** Seventh Edition, 2017, ISBN: 9780070681880.
3) D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson, 2004. ISBN: 9780619212858.
4) Thomas Koshy, Discrete Mathematics with Applications, Elsevier, First Edition 2005, ISBN: 9788181478870.

Web links and Video Lectures (e-Resources):

1)https://youtu.be/O4Qf0SQKkZw?si=1r9joVe2-rP04fCH
2)https://youtu.be/Hbyj6vEi7fY?si=_GaCjUHBNdV2MArP
3)https://youtu.be/7hLvm_4DNqs?si=viYHH_fZDZQ9Fmdw
4)https://youtu.be/7hLvm_4DNqs?si=viYHH_fZDZQ9Fmdw
5)https://youtu.be/6Z_eengdMVE?si=-ZlPy2xl18oMUwfR
6)https://youtu.be/fwSiTaCs8KM?si=wpZcCEG-pNDuIPkS
7)https://youtu.be/iHC1ZdLdKjw?si=tuN-6pLqhMWPN4Mb
8)https://youtu.be/auvGQCoYdu4?si=3ELSyG5g-475AN1_
9)https://youtu.be/GLHWih_RB38?si=FuoNQAzNR2IlYpU0
10)https://youtu.be/hrumNRQwTV8?si=8o3hB1BbFD-MCNXS
11)https://youtu.be/sWsXBY19o8I?si=ALqpJIlzrAafEVDq

Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning:

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - Seminars

DATABASE MANAGEMENT SYSTEM			
Course Code	**22ISE42**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs/Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

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

22ISE42.1	Understand the fundamental knowledge and practical experience with database concepts.
22ISE42.2	Build entity relationship diagrams and map into relational database schema
22ISE42.3	Analyze the concept of functional dependencies and normalization techniques to refine
22ISE42.4	Apply the concepts of relational database theory to manage relational database management
22ISE42.5	Apply knowledge about basic SQL fundamentals and table operations. Practical experience gained designing and constructing data models and using SQL.
22ISE42.6	Design a database for any specified domain according to well-known design principles that balanced at a retrieval performance with data consistency guarantees.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE42.1	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE42.2	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE42.3	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE42.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE42.5	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE42.6	3	3	3	3	3	-	-	-	-	-	-	3	3	3

MODULE-1	**INTRODUCTION**	**22ISE42.1, 22ISE42.2**	**8 Hours**

Introduction to Database. Hierarchical, Network and Relational Models. Three-schema architecture and data independence. Data Definition Language (DDL), Data Manipulation Language (DML). Database Administrator, Users. Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ER Issues, weak entity sets. ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key. Case study/Applications.

Self-study / Case Study /Applications	Draw and explain ER diagram for hospital management.
Text Book	TextBook1:CH:1,2,7

MODULE-2	**RELATIONAL DATA MODEL AND LANGUAGE**	**22ISE42.2, 22ISE42.3**	**8 Hours**

Relational data model concepts, Logical view of data, keys, integrity rules. Integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints. Functional dependencies, features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).			
Self-study / Case Study /Applications	Apply referential integrity constraint using suitable example.		
Text Book	TextBook1:CH:3,9,15		
MODULE-3	**RELATIONAL ALGEBRA**	**22ISE42.4**	**8 Hours**
Introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.			
Self-study / Case Study /Applications	Examine the concept of Division operator by using an example.		
Text Book	Text Book 1:CH.6		
MODULE-4	**SQL**	**22ISE42.5**	**8 Hours**
Introduction, data definition in SQL, table, and key and foreign key revisit, update behaviors. Querying in SQL – basic select-from-where block and its semantics, nested queries-correlated and uncorrelated, notion of aggregation, aggregation functions group by and having clauses, embedded SQL.			
Self-study / Case Study /Applications	Differentiate between where and having clause.		
Text Book	Text Book 1:CH.4,5		
MODULE-5	**TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL**	**22ISE42.6**	**8 Hours**
Transaction processing and Error recovery- concepts of transaction processing, ACID properties, and serializability concurrency control, Lock based concurrency control (2PL,Deadlocks), Time stamping methods, optimistic methods, and database recovery Management, RAID.			
Self-study / Case Study /Applications	Illustrate the different types of 2PLs.		
Text Book	Text Book 1:Ch21, 22,23		

CIE Assessment Pattern (50 Marks–Theory)–

RBT Levels		**Marks Distribution**		
		Test(s)	**Qualitative Assessment(s)**	**MCQ's**
		25	**15**	**10**
L1	**Remember**	5	-	-
L2	**Understand**	10	-	5
L3	**Apply**	5	10	5
L4	**Analyze**	5	5	-
L5	**Evaluate**	-	-	-
L6	**Create**	-	-	-

SEE Assessment Pattern (50 Marks–Theory)

		Exam Marks
L1	**Remember**	10
L2	**Understand**	20
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	-
L6	**Create**	-

Suggested Learning Resources:

Text Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson/Addison-Wesley,7th Edition 2021
2. Abraham Silberschatz, Henry F.Korth, S.Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2013.

Reference Books:

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Wisdom, Database System, Pearson, 2nd Edition.
2. C. J. Date, An Introduction to Database Systems, 8th Edition.
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2013.

Web links and Video Lectures (e-Resources):

- https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
- https://www.geeksforgeeks.org/introduction-of-relational-algebra-in-dbms/
- https://www.youtube.com/watch?v=a6KIAX5Aubg&list=PLEwMbEiHdJ2y1YRbjbhOSr6AEGF3sqhwV

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

- Demonstration of mini project using Database concepts
- Video demonstration of latest trends in Databases
- Contents related activities (Activity-based discussions)
  - ➢ For active participation of students, instruct the students to prepare ER Diagrams and Relational Diagrams
  - ➢ Organizing Group wise discussions

DATABASE MANAGEMENT SYSTEMS LABORATORY			
Course Code	**22ISL42**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISL42.1	Create a database as per the given requirements.
22ISL42.2	Use SQL to retrieve and process the data in the given database and usage of operators and Aggregate and other SQL Functions.
22ISL42.3	Apply the concepts of Constraints, Clauses and Joins in DBMS using SQL.
22ISL42.4	Apply the concepts of Transactions and complex queries.

<table>
<tr><td colspan="14">Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:</td></tr>
<tr><td></td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>22ISL42.1</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>2</td></tr>
<tr><td>22ISL42.2</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>2</td></tr>
<tr><td>22ISL42.3</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>2</td></tr>
<tr><td>22ISL42.4</td><td>3</td><td>2</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>2</td></tr>
<tr><td>Prog. No.</td><td colspan="11">List of Program</td><td>Hour</td><td colspan="2">COs</td></tr>
<tr><td colspan="14">Prerequisite Programs</td></tr>
<tr><td></td><td colspan="11">• Basic knowledge about keys, constraints and database concepts.</td><td>2</td><td colspan="2">NA</td></tr>
<tr><td colspan="14">PART A</td></tr>
<tr><td>1</td><td colspan="11">Introduction to SQL Commands:
a) DDL (Data Definition Language),Implementation of Create, Alter, Drop, rename, truncate.
DML (Data Manipulation Language): Implementation of Insert, Update, Delete.</td><td>2</td><td colspan="2">22ISL42.1
22ISL42.2</td></tr>
<tr><td>2</td><td colspan="11">Implementation of relational and logical operators.</td><td>2</td><td colspan="2">22ISL42.2</td></tr>
<tr><td>3</td><td colspan="11">Implementation of Aggregate and other SQL Functions.</td><td>2</td><td colspan="2">22ISL42.2</td></tr>
<tr><td>4</td><td colspan="11">a) Implementation of Constraints: NOT NULL, Unique, Primary Key, Check and Foreign Key Constraints.
b) Implementation of Referential Integrity Constraints using on delete cascade and on delete set null.</td><td>2</td><td colspan="2">22ISL42.3</td></tr>
<tr><td>5</td><td colspan="11">Implementation of Natural, Cartesian and Outer Joins.</td><td>2</td><td colspan="2">22ISL42.3</td></tr>
<tr><td>6</td><td colspan="11">Create department table with the following structure.
<table><tr><td>Name</td><td>Type</td></tr><tr><td>Eno</td><td>Number(3)</td></tr><tr><td>EName</td><td>Varchar2(10)</td></tr><tr><td>Dept No.</td><td>Number(3)</td></tr><tr><td>Dept Name</td><td>Varchar2(10)</td></tr><tr><td>Salary</td><td>Number(7,2)</td></tr><tr><td>Location</td><td>Varchar2(10)</td></tr><tr><td>Job</td><td>Varchar2(10)</td></tr></table>
a. Calculate the average salary for each different job.
b. Show the average salary of each job excluding manager.
c. Show the average salary for all departments employing more than three people.
d. Display employees who earn more than the lowest salary in department 30
e. Show that value returned by sign (n) function.
How many days between day of birth to current date.</td><td>2</td><td colspan="2">22ISL42.3</td></tr>
<tr><td colspan="14">PART-B</td></tr>
<tr><td>7</td><td colspan="11">Consider the following schema for a Library Database:
BOOK (Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS(Book_id, Author_Name)
PUBLISHER(Name, Address, Phone)
BOOK_COPIES(Book_id, Programme_id, No-of_Copies)
BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out,</td><td>2</td><td colspan="2">22ISL42.4</td></tr>
</table>

	Due_Date)		
8	Consider the following schema for Order Database: SALESMAN (Salesman_id, Name, City, Commission) CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to Insert at least 5 records for each table. Add appropriate database constraints. 1. Count the customers with grades above Bangalore's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.	2	22ISL42.4
9	1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015(use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. Update rating of all movies directed by 'Steven Spielberg' to 5	2	22ISL42.4
10	Consider the schema for College Database: STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) Insert at least 5 records for each table. Add appropriate database constraints Write SQL queries to 1. List all the student details studying in fourth semester 'C'section. 2. Compute the total number of male and female students in each semester and in each section. 3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects. 4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students. 5. Categorize students based on the following criterion: If FinalIA = 17to 20 then CAT ='Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8thsemester A, B, and C section students.	2	22ISL42.4
11	EMPLOYEE(SSN, Name, Address, Sex, Salary, Super, SSN, DNo) DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate) DLOCATION(DNo, DLoc)	2	22ISL42.4

	PROJECT(PNo, PName, PLocation, DNo) WORKS_ON(SSN, PNo, Hours) Insert at least 5 records for each table. Add appropriate database constraints Write SQL queries to 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a managerof the department that controls the project. 2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department 4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000		
12	Implementation of Transaction Commands (Commit, Rollback)	2	22ISL42.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Write a Pl/SQL program using FOR loop to insert ten rows into a database table.
   https://www.youtube.com/watch?v=lSUZO4EEVHA
2. Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID)
   write a cursor to select thefive highest paid employees from the table.
   https://www.youtube.com/watch?v=QvVtDo9KZKs

CIE Assessment Pattern(50 Marks – Lab) –

RBT Levels		Test(s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	10	10
L4	Analyze	10	-
L5	Evaluate	-	-
L6	Create	-	15

SEE Assessment Pattern(50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Reference Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems" , Sixth Edition, Pearson / Addison - Wesley, 7th Edition 2021
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2013.
3. Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education.

Object Oriented Programming with Java

Course Code	**22ISE43**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE43.1	Understand the real-world entities using Object Oriented Programming concepts.
22ISE43.2	Understand the importance of inheritance and interface concepts and apply to model relationships
22ISE43.3	Analyze the importance of exception handling and string handling operations
22ISE43.4	Apply the concept of Multithreading in concurrent programming
22ISE43.5	Develop applications using collections framework for managing user defined types
22ISE43.6	Solve the real-world problems using Object Oriented concepts and collectionFrame work in Java.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE43.1	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE43.2	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE43.3	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE43.4	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE43.5	3	3	3	3	-	-	-	-	-	-	-	2	3	3
22ISE43.6	3	3	3	3	-	-	-	-	-	-	-	2	3	3

MODULE-1	**INTRODUCTION TO JAVA**	**22ISE43.1**	**8 Hours**

The Java Language, Java Development Kit (JDK); Java Buzzwords, Byte Code, JVM ,JRE and Java environment, Data types, variables and Arrays, Operators, Control statement, command line Arguments, Language fundamentals Object Oriented Programming with JAVA: Object Oriented concepts, Classes, Objects and Methods, Method Overloading, Constructor, static members, Implicit this

Text Book	Text Book 1: Part 1Chapter 1 to 7

MODULE-2	**INHERITANCE AND INTERFACING**	**22ISE43.2**	**8 Hours**

Inheritance, Method Overriding, Access specifiers, Abstract Classes, Final members, The Object Class, Interfaces, Package Fundamentals. Case study/ Applications

Text Book	Text Book 1: Part 1Chapter 8 9

MODULE-3	**STRING MANIPULATION**	**22ISE43.3 22ISE43.4**	**8 Hours**

Constructors, Length Operations, Character Extraction, Comparison, Searching, Modifying, StringBuffer, Exception handling: Fundamentals, Types, Using try, catch, throw, throws, finally, User Defined Exceptions.

Text Book	Text Book 1: Part 2 Chapter 15,16 Part 1 Chapter 10		
MODULE-4	**MULTI-THREADING**	**22ISE43.5**	**8 Hours**
Thread Concept, Java Thread Model, The main method, Creating Threads, Thread Priorities, Synchronization, join.			
Text Book	Text Book 1: Part 1Chapter 11		
MODULE-5	**COLLECTION FRAMEWORK**	**22ISE43.6**	**8 Hours**
Collections Overview, Collection Interfaces, Set, List, Map, Queue, Collection Classes, Generics, Type Wrappers, Accessing a collection using an Iterator, Sorting collections, equals()			
Text Book	Text Book 1: Part 1 Chapter 14		

CIE Assessment Pattern(50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember		-	-
L2	Understand	5	-	-
L3	Apply	10	5	5
L4	Analyze	5	5	5
L5	Evaluate	5	5	-
L6	Create	-		-

SEE Assessment Pattern(50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	20
L3	Apply	20
L4	Analyze	10
L5	Evaluate	-
L6	Create	--

Suggested Learning Resources:

Text Books:

1) Herbert Schildt, "Java: The Complete Reference", 12th Edition, Oracle Press, Tata McGraw Hill,2017 (Reprint) 2)T. Budd, "Understanding Object-Oriented Programming with Java", Updated Edition , Pearson Education,2018 Reference Books:

2) J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & sons, 2019 (Reprint).

3) Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education.

R. A. Johnson, "Java Programming and Object-Oriented Application Development", Cengage Learning, 2020 (Reprint)

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=bm0OyhwFDuY&list=PLsyeobzWxl7pe_IiTfNyr55kwJPWbgxB5
- https://www.youtube.com/watch?v=CFD9EFcNZTQ
- https://www.youtube.com/watch?v=r59xYe3Vyks&list=PLS1QulWo1RIbfTjQvTdj8Y6yyq4R7g-Al

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

- Contents related activities (Activity-based discussions)
- Hands-on with coding platforms using Java

Object Oriented Programming with Java lab			
Course Code	**22ISL43**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISL43.1	Understand the real world applications using Object Oriented Programming concepts.
22ISL43.2	Apply the concept of Multithreading and exception handling in java programming
22ISL43.3	Develop applications using collections framework for managing user defined types
22ISL43.4	Solve the real world problems using Object Oriented concepts and collection framework in Java.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISL43.1	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISL43.2	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISL43.3	3	3	3	3	2	-	-	-	-	-	-	2	3	3
22ISL43.4	3	3	3	3	2	-	-	-	-	-	-	2	3	3

Pgm. No.	List of Programs	Hours	COs
	Prerequisite Programs		
	Hello World program on Eclipse must be run	2	NA
	PART-A		
1	Design and Implement a Java program to print the sum of the elements of the array with the given below condition. If the array has 6 and 7 in succeeding orders ignore 6 and 7 and the numbers between them for the calculation of sum. Eg1) Array Elements - 10,3,6,1,2,7,9O/P: 22 [i.e. 10+3+9] Eg2) Array Elements - 7,1,2,3,6 O/P:19 Eg3) Array Elements - 1,6,4,7,9 O/P:10	2	22ISL43.1
2	Design and Implement a Java program that displays a menu with options 1.Add 2. Sub 3.Multiply 4. Divide Based on the options chosen, read two numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.	2	22ISL43.1
3	Design and implement an algorithm to accept an array of positive integers. The algorithm must then find the smallest positive integer in the array which cannot be formed from the sum of numbers in the array.	2	22ISL43.1
4	Develop a Java program Write a program to check if the program has received command line arguments or not. If the program has not received the values the n print "NoValues", else print all the values in a single lines separated by,(comma). Eg1) java Example	2	22ISL43.1

	O/P : No values Eg2)java Example Mumbai Bangalore O/P: Mumbai, Bangalore		
5	Design and develop a simple Java program to find the longest substring without repeating characters in a given String. Accept the String through Command Line argument.	2	22ISL43.2
6	Given a string and a non-empty word string, return a string made of each char just before and just after every appearance of the word in the string Ignore cases where there is no char before or after the word, and a char may be included twice if it is between two words. •If inputs are "abcXY123XYijk" and "XY", output should be "c13i". •If inputs are "XY123XY" and "XY", output should be "13". If inputs are "XY1XY" and "XY", output should be "11". Create a Java program for the same.	2	22ISL43.2
PART-B			
7	Design a class that can be used bya health care professional to keep trackof a patient's vital statistics. Here's what the class should do: ● Construct a class called Patient ● Store a String name for the patient ● Store weight and height for patient as doubles ● Construct a new patient using these values Write a method called BMI which returns the patient's BMI as a double.BMI can be calculated as BMI = (Weight in Pounds / (Height in inches x Height in inches)) x 703Next, construct a class called "Patients" and create a main method. Create a Patient object and assign some height and weight to that object. Display the BMI of that patient.	2	22ISL43.2
8	Create a class in Java called "Calculator" which contains the following: ● A static method called powerInt(int num1,int num2) that accepts two integers and returns num1 to the power of num2 (num1 power num2). ● A static method called powerDouble(double num1,int num2) that accepts one double and one integer and returns num1 to the powerof num2 (num1 power num2). Call your method from another class without instantiating the class.	2	22ISL43.2
9	Develop a Program to take care of Number Format Exception if user enters values other than integer for calculating average marks of 2 students. The name of the students and marks in 3 subjects are taken from the user while executing the program. ● In the same Program write your own Exception classes to take care of Negative values and values out of range (i.e. other than in the range of 0-100) Include finally to output the statement "Program terminated".	2	22ISL43.3
10	Create class of SalesPersons as a thread that will display fives sales persons name. Create a class as Days as other Thread that has array of seven days. Call the instance of SalesPersons in Days and start both the Threads. Suspend SalesPersons on Sunday and resume on Wednesday.	2	22ISL43.3
11	Create a Student Attendance Management System using a HashMap Collection type. Perform the following operations: Add the key-value pair.Retrieve the value associated with a given key Check whether a particular key/value exist.	2	22ISL43.4

	replace a value associated with a given key in the HashMap		
12	Develop a program to solve the problem given: An array of length N is provided. Count the number of (i,j) pairs where 1<=i<j<=N such that the difference of the array elements on that indicesis equal to the sum of the square of their indices. Input : 4, 9, 6, 29, 30 Output: 3 (1,2), (2,4),(1,5) satisfy the above condition	2	22ISL43.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

- Develop a Java Program to calculate the average of students marks entered by the user. Create a User defined Exception to handle negative number for students marks. Provide appropriate exception message to the user.
- Demonstrate how ArrayList can be used to add string objects and manipulate them.
- Create an employee class with name and age as members. Add 5 employees into the arraylist and iterate to print their details.
- Develop a java program to replace all occurrences of a word with another word in the given string.
- https://java-iitd.vlabs.ac.in/exp/exceptions/
- https://java-iitd.vlabs.ac.in/exp/threading
- https://java-iitd.vlabs.ac.in/exp/collections

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	10	10
L4	Analyze	10	5
L5	Evaluate	-	5
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	-
L3	Apply	10
L4	Analyze	20
L5	Evaluate	20
L6	Create	-

Suggested Learning Resources:

Reference Books:

1) J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java", John Wiley & sons,2019(Reprint).
2) Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education.
3) R. A. Johnson, "Java Programming and Object-Oriented Application Development", Cengage Learning, 2017

OPERATING SYSTEM			
Course Code	**22ISE44**	**CIE Marks**	**50**
L:T:P:S	**3:0:0:0**	**SEE Marks**	**50**
Hrs / Week	**3**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE44.1	Understand the concept of services provided by and the structure of an operating system.
22ISE44.2	Compare various CPU scheduling algorithms.
22ISE44.3	Implement various operations on deadlock.
22ISE44.4	Analyze various CPU scheduling algorithms.
22ISE44.5	Analyze the efficiency aspect of using system resources and memory management schemes. Handle operations for disk scheduling and file operations
22ISE44.6	Develop various Linux commands that are used to manipulate system operations and file system commands

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE44.1	3	3	3	2	-	1	-	-	-	2	1	2	2	3
22ISE44.2	3	3	3	2	-	1	-	-	-	2	1	2	2	3
22ISE44.3	3	3	3	2	-	1	-	-	-	2	1	2	2	3
22ISE44.4	3	3	3	2	-	1	-	-	-	2	1	2	2	3
22ISE44.5	3	3	3	2	-	1	-	-	-	2	1	2	2	3
22ISE44.6	3	3	3	2	-	1	-	-	-	2	1	2	2	3

MODULE-1	**Operating System**	**22ISE44.1**	**8 Hours**
Concept, Components, Operations, Protection and Security. User view, System View, System Calls: Concept, Types of System Calls. Types of Operating Systems. Process Management: Process Concept, Operation on Processes, Cooperating Processes, Inter-Process Communication, critical section problem, semaphores, Threads.			
Text Book	Text book 1: Chapter 1, 2.1, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 2.10, 3.1, 3.2, 3.3, 3.4		
MODULE-2	**CPU Scheduling**	**22ISE44.2**	**8 Hours**
Basic Concepts, Preemptive strategies, Non preemptive strategies, Scheduling Criteria, Scheduling algorithms, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling			
Text Book	Text book 1: Chapter 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7		
MODULE-3	**Deadlock**	**22ISE44.3**	**8 Hours**
System Models, Deadlock Characterization, Resource Allocation Graph, Deadlock Prevention, Avoidance, Detection and Recovery, Banker's algorithm			
Text Book	Text book 1: Chapter 7		
MODULE-4	**Memory Management**	**22ISE44.4**	**8 Hours**
Contiguous Memory Allocation, Fragmentation, Paging, And Segmentation. Virtual Memory: Demand Paging, Page Replacement, Page replacement algorithm, Allocation of frames, Thrashing			
Text Book	Text book 1: Chapter 8.1 to 8.6		
MODULE-5	**File-System Interface**	**22ISE44.5, 22ISE44.6,**	**8 Hours**

Concepts, Access Methods, Directory and Disk Structure. File-System Structure **Protection**: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.	
Text Book	Text book 1: Chapter 91. To 9.6, 10.1 to 10.5

CIE Assessment Pattern (50 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	15	10
L1	Remember	5	-	-
L2	Understand	10	-	5
L3	Apply	5	10	5
L4	Analyze	5	5	-
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	20
L3	Apply	10
L4	Analyze	10
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Text Books:

1) Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006
2) Silber schatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 10th Edition, 2018.
3) William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Prentice Hall, 2018.

Reference Books:

1) Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 3rd edition.
2) UNIX-Concepts Applications, SUMITABHADAS, McGraw Hill, TATA McGraw Hill Edition, 4th edition, 26th reprint 2019
3) D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition, Tata McGraw Hill Education,2017

Web links and Video Lectures (e-Resources):

- https://www.geeksforgeeks.org/what-is-an-operating-system/
- https://www.javatpoint.com/operating-system
- https://onlinecourses.nptel.ac.in/noc21_cs72/preview
- https://www.udemy.com/course/operating-system-j/

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

- Quizzes & Assignments
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Flowcharts and Handouts
  - Organizing Group wise discussions on issues
  - Seminars

OPERATING SYSTEM LABORATORY			
Course Code	**22ISL44**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISL44.1	Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.
22ISL44.2	Implement various process scheduling algorithms
22ISL44.3	Implement various operations on deadlock
22ISL44.4	Implement various File Organization, File Allocation Strategies and Disk Scheduling Algorithms.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISL44.1	3	3	3	3	3	-	-	-	-	-	-	1	3	3
22ISL44.2	3	3	3	3	3	-	-	-	-	-	-	1	3	3
22ISL44.3	3	3	3	3	3	-	-	-	-	-	-	1	3	3
22ISL44.4	3	3	3	3	3	-	-	-	-	-	-	1	3	3

Pgm. No.	List of Programs	Hours	Cos
	Prerequisite Programs		
	• To understand the basics of Unix command and shell programming. • To implement various CPU scheduling algorithms. • To implement Deadlock Avoidance and Deadlock Detection Algorithms • To implement Page Replacement Algorithms • To implement various memory allocation methods. • To be familiar with File Organization and File Allocation Strategies.	2	NA
	PART-A		
1	Introduction- Linux Architecture- Shell, Kernel, System calls. Linux installation- Steps for installing Linux Operating System Internal & External commands in Linux. • Internal commands- echo, type, etc. • External commands- ls, cp, mv, rm, cat, etc • Other commands – tput clear, who, cal, date, bc, man, passwd, uname (with different options). • Expressions & search patterns .(dot operator), *, A, +, ?, grep, egrep, fgrep	2	22ISL44.1
2	Working with files & directories. • Know the categories of files. • Directory related Commands – pwd, mkdir, rmdir, cd, ls • Manipulating Absolute paths and Relative paths using cd command. • File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc Basic File attributes. • Listing seven attributes of a file : ls and its options	2	22ISL44.1

	• File Permissions: Absolute and Relative permissions • Manipulating File permissions using chmod command • Manipulating File Ownership using chown command • Manipulating Hardlink and Softlink using ln command		
3	Process Management commands. • Process creation, status, Identifying process, ps -f &its options, • Running process in background, Job control, and Proces termination. Changing process priority, scheduling process (Usage of sleep and wait commands)	2	22ISL44.1
4	Design, Develop and Implementation of CPU scheduling by using a. FCFS b. Priority	2	22ISL44.2
5	Design, Develop and Implementation of CPU scheduling by a. SJF b. Round Robin	2	22ISL44.2
6	Design, Develop and Implement Threading and synchronized applications	2	22ISL44.3
	PART-B		
7	Design, Develop and Implement an Algorithm for Dead Lock Detection.	2	22ISL44.3
8	Design, Develop and Implement an Algorithm for Deadlock using Banker's Algorithm.	2	22ISL44.3
9	Design, Develop and Implement a Program by using page replacement algorithms for virtual memory management	2	22ISL44.3
10	Design, Develop and Implement the various File Organization Techniques	2	22ISL44.4
11	Design, Develop and Implement the following File Allocation Strategies a. Sequential b. Indexed c. Linked	2	22ISL44.4
12	Design, Develop and Implement various disk scheduling algorithms	2	22ISL44.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Develop a Program to implement shared memory and IPC
   https://www.javatpoint.com/ipc-through-shared-memory
2. Develop a Program to implement Multilevel Queue Scheduling
   https://www.geeksforgeeks.org/multilevel-queue-mlq-cpu-scheduling/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	**Remember**	-	-
L2	**Understand**	-	-
L3	**Apply**	5	10
L4	**Analyze**	5	5
L5	**Evaluate**	5	5
L6	**Create**	5	10

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	-
L2	**Understand**	-
L3	**Apply**	10
L4	**Analyze**	20
L5	**Evaluate**	10
L6	**Create**	10

Suggested Learning Resources:

Text Books:

1) Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006
2) Silber schatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 10th Edition, 2018.
3) William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Prentice Hall, 2018.

Reference Books:

1) Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 3rd edition.
2) UNIX-Concepts Applications, SUMITABHADAS, McGraw Hill, TATA McGraw Hill Edition, 4th edition, 26th reprint 2019
3) D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition, Tata McGraw Hill Education,2017

C# & .NET

Course Code	**22ISE451**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE451.1	Understand the technologies of the .NET framework
22ISE451.2	Understand the basic and object oriented concepts in C#.
22ISE451.3	Design the real world entities as classes and objects using C# object oriented Programming concepts.
22ISE451.4	Apply exception handling and gain efficient testing, debugging skills in C#.
22ISE451.5	Apply interfaces and Events in C# programming.
22ISE451.6	Develop Windows applications based on C# programming libraries and .NET Framework.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE451.1	3	3	3	2	2	-	-	-	-	-	-	2	3	2
22ISE451.2	3	3	3	2	2	-	-	-	-	-	-	2	3	2
22ISE451.3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
22ISE451.4	3	3	3	2	2	-	-	-	-	-	-	2	3	2
22ISE451.5	3	3	3	2	2	-	-	-	-	-	-	2	3	2
22ISE451.6	3	3	3	2	2	-	-	-	-	-	-	2	3	2

MODULE-1	**INTRODUCTION TO .NET**	**22ISE451.1**	**6 Hours**

The C# Environment: .NET Framework –An Overview, Components of .NET , Common Language Specification (CLS), Common Language Runtime (CLR), Microsoft Intermediate Language ("MSIL" or "IL"), The Common Type System (CTS), .NET Framework Base Classes, Object-Oriented Programming concepts: Encapsulation, Polymorphism, Inheritance, The .Net Languages.

Lab Component: 1) Download and install first visual studio. 2) Creating First Console application. 3) Write a C# Sharp program to swap two numbers.			**3 Hours**
Text Book	Text Book 1: 1.2,1.3,1.4.1,2.1, Text Book 2:7.2		
MODULE-2	**AN OVERVIEW OF C#**	**22ISE451.2, 22ISE451.3**	**6 Hours**
C# Program – Execution, Sample Programs, Command Line Arguments, Programming Examples, Literals, Variables and Data Types: Keywords, Identifiers, Literals, Variables, Data Types, Boxing and Unboxing. operators, branching and looping.			
Lab Component: 1) Develop C# program to show command line arguments. 2) Demonstrate boxing and unboxing. 3) Develop C# console application with looping and branching logics.			**3 Hours**
Text Book	Text Book 1: chapter 2.2,3.1- 3.8,4.1-4.3,5.1-5.9 & 11.11		
MODULE-3	**STRUCTURES AND ENUMERATIONS**	**22ISE451.3**	**6 Hours**
Structures- Defining a Structure, Assigning Values to Members ,Structures with Methods , Nested Structures , Classes Vs Structures, Guidelines to use Structures; Enumerations- Enumerator Initialization, Enumerator Base Types, EnumeratorType Conversion. Classes and Objects: Classes, Constructors & Destructors, Nesting of Classes, Members, Properties.			
Lab Component: 1) Develop C# application using classes and object to display student data by using a) Ordinary method. b) Constructors. 2) Develop static classes and show how to display current salary and upraised salary using static methods 3) C# program to illustrate Nesting of structures.			**3 Hours**
Text Book	Text Book 1: 6.1-6.2,6.4-6.5,10.2,12.10-12.13		
MODULE-4	**EXCEPTION HANDLING**	**22ISE451.4**	**6 Hours**
Exceptions – An Overview, Exception Handling Syntax, Multiple Catch Statements, The Exception Hierarchy, General Catch Handler, Using 'Finally', Nested Try Blocks, User Defined Exceptions, Checked and Unchecked.			
Lab Component: 1) Demonstrate c# program to handle error using try catch. 2) Demonstrate user Defined exception in c#. 3) Demonstrate Checked and unchecked in C#.			**3 Hours**
Text Book	Text Book 1: 13.1-13.13		
MODULE-5	**INTERFACES AND DELEGATES**	**22ISE451.5, 22ISE454.6**	**6 Hours**
Defining Interfaces, Extending Interfaces, Implementing Interfaces, Explicit Interface Implementation, Abstract Classes and Interfaces, Delegates, Multicast Delegates,. Developing Windows Applications			

Lab Component: 1) Demonstrate usage of delegates. 2) Demonstrate interface concept. 3) Develop a small Windows based application	**3 Hours**
Text Book	Text Book 2: 6.2-6.4

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	**5**	**20**
L1	**Remember**	5	-	-
L2	**Understand**	10	-	5
L3	**Apply**	5	5	5
L4	**Analyze**	-	-	-
L5	**Evaluate**	5	-	10
L6	**Create**	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	10
L2	**Understand**	20
L3	**Apply**	10
L4	**Analyze**	-
L5	**Evaluate**	-
L6	**Create**	10

Suggested Learning Resources:

Text Books:

1) Herbert Schildt, "The Complete Reference: C# 4.0",TataMcGraw Hill, 2012.
2) Mark J. Price," C# 8.0 and .NET Core 3.0" – Modern Cross-Platform Development, Fourth Edition ,Expert Insight,2019.

Reference Books:

1. "Professional C# and .NET: 2021 Edition" by Christian Nagel, Wrox publisher, ISBN: 978-1119797203.
2. C# 10 in a Nutshell: The Definitive Reference" by Joseph Albahari, O'Reilly Media, 28 February 2022

Web links and Video Lectures (e-Resources):

- https://ict.iitk.ac.in/courses/introduction-to-c-sharp/
- https://dotnet.microsoft.com/en-us/languages/csharp
- https://www.udemy.com/course/c-net-core-for-beginners
  https://www.youtube.com/watch?v=SXmVym6L8dw&list=PLAC325451207E3105

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

- Demonstration of visual studio
- Video demonstration of window application
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to work in batches
  - Organizing Group wise discussions on programs
  - Seminars

PROGRAMMING FOR UI AND UX DESIGN

Course Code	**22ISE452**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE452.1	Understand the goals of user interface design.
22ISE452.2	Understand the design processes and development methodologies in UI.
22ISE452.3	Apply knowledge on Menus, Form Filling, Dialog boxes.
22ISE452.4	Understand how users interact with interfaces and designing intuitive interactions.
22ISE452.5	Conduct tests to evaluate the usability and effectiveness of designs.
22ISE452.6	Implement multidisciplinary teams and communicating design decisions.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE452.1	3	2	3	2	3	-	-	-	-	-	-	2	3	2
22ISE452.2	3	2	3	2	3	-	-	-	-	-	-	2	3	2
22ISE452.3	3	2	3	2	3	-	-	-	-	-	-	2	3	2
22ISE452.4	3	2	3	2	3	-	-	-	-	-	-	2	3	2
22ISE452.5	3	2	3	2	3	-	-	-	-	-	-	2	3	2
22ISE452.6	3	2	3	2	3	-	-	-	-	2	2	2	3	2

MODULE-1	**USER INTERFACE DESIGN**	**22ISE452.1**	**6 Hours**

Introduction, Goals of user interface design, Motivations for human factors in design, Object-Action Interface model, The Eight Golden rules of Interface design.

Laboratory Component: 1. Organize the steps to get started with UI designing tool Figma. 2. Create a design system with linked UI components in Figma. 3. Create a project in Figma.	**3 Hours**

Text Book	Text Book 1: 1.1,1.3,1.4,2.3,2.5

MODULE-2	**DESIGN PROCESSES**	**22ISE452.2**	**6 Hours**

The Three Pillars of design, Development methodologies, and Social impact statement for earlydesign review, Expert Reviews, Acceptance Tests and Controlled Psychologically Oriented Experiments.

Laboratory Component: 1. Create a project for UI and UX design using wonder share Mockitt tool. 2. Add UX design Widgets. 3. Create and preview interactions for UX design.	**3 Hours**

Text Book	Text Book 1: 3.3,3.4,3.8,4.2,4.5,4.7

MODULE-3	**DIRECT MANIPULATION AND VIRTUAL ENVIRONMENT**	**22ISE452.3**	**6 Hours**

Direct Manipulation systems, Spatial data management, Visual Thinking, Task related organization, Response time and display rate, Fast movement through MENUS, Form Filling, and
Dialog Boxes.

Laboratory Component: 1. Build a navigation menu with components in Figma. 2. Designing and prototyping forms in Figma. 3. Create a dialog box in Figma.	**3 Hours**

Text Book	Text Book 1: 6.1, 6.2.3,6.4,7.2,7.4,7.5,7.7,7.8		
MODULE-4	**INTERACTION DEVICES**	**22ISE452.4**	**6 Hours**
Keyboards and Function Keys, Pointing Devices, Speech Recognition, Image and video displays,User Productivity, Nonan thropomorphic design, Display Design, Color, Preparation of printedmanuals.			
Laboratory Component: 1. Create connections and flows in Figma 2. implementation of 3. interaction design and functional layout. 4. Implementation of Interactive design and functional layout. 5. Create a working UI/UX prototype using prototyping tools.			**3 Hours**
Text Book	Text Book 1:9.2,9.3,9.4,9.5,10.4,11.3,11.4,11.5,12.3		
MODULE-5	**VISUALIZATION**	**22ISE452.5, 22ISE452.6**	**6 Hours**
Database query and phrase search, Information visualization, Advanced filtering, Hypertext andHypermedia, World wide web.			
Laboratory Component: 1. Data Visualization design tool for UI/UX Designers. 2. Add links to text. 3. Web and UI design using Figma and Webflow.			**3 Hours**
Text Book	Text Book 1: 15.2,15.4,15.5,16.2,16.3		

CIE Assessment Pattern(50 Marks – Theory) –

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	Lab
		25	**05**	**20**
L1	**Remember**	5	-	-
L2	**Understand**	10	-	5
L3	**Apply**	5	5	10
L4	**Analyze**	5	-	5
L5	**Evaluate**	-	-	**-**
L6	**Create**	**-**	**-**	**-**

SEE Assessment Pattern(50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	10
L2	**Understand**	10
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	10
L6	**Create**	--

Suggested Learning Resources:

Text Books:

1) Designing the user interface strategies for effective Human-Computer Interaction, Third Edition by Ben Shneiderman.
2) The Essential Guide to User Interface Design - d Edition: An Introduction to GUI Design Principle s and Techniques Paperback – Import, 17 April 2007by WO Galitz.

Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc21_ar05/preview
- https://www.udemy.com/course/ui-ux-web-design-using-adobe-xd/
- https://www.coursera.org/specializations/user-interface-design
- https://www.figma.com/

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

- Demonstration of information architecture for digital product
- Design user flows and wire frames
- Video demonstration of creating prototypes and testing products on real-users
  - For active participation of students, instruct the students to join with UX designers to make sure the user ourney reflects the UX team's product vision
  - Organizing Group wise discussions on issues
  - Seminars

ADVANCED EXCEL FOR DATA ANALYTICS

Course Code	**22ISE453**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE453.1	Apply techniques to datasets in Excel
22ISE453.2	Use Pivot Tables and Pivot Charts to streamline your workflow in Excel
22ISE453.3	Identify the functions for cleaning Data with text .
22ISE453.4	Analyse Excel functions and techniques for analysis by using Multiple Worksheets.
22ISE453.5	Build presentation ready dashboards in Excel
22ISE453.6	Create Worksheet for forecasting and Predictive analysis

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE453.1	3	3	-	3	3	-	2	-	-	-	-	2	3	3
22ISE453.2	2	3	-	3	3	-	2	-	-	-	-	2	3	3
22ISE453.3	3	3	-	3	3	-	2	-	-	-	-	2	3	3
22ISE453.4	2	3	-	2	3	-	2	-	-	-	-	2	3	3
22ISE453.5	3	3	-	3	3	-	2	-	-	-	-	2	3	3
22ISE453.6	2	3	-	1	3	-	2	-	-	-	-	2	3	3

MODULE-1	**INTRODUCTION TO EXCEL**	**22ISE453.1**	**6 Hours**

Cells –Creating and editing worksheets-Cell Formatting- Insertion of rows and columns, Drag & Fill, use of Aggregate functions. Importing data, Data Entry & Manipulation, Sorting & Filtering.

Laboratory Component: **3 Hours**

1. Create new Excel sheet, Rename it with your USN number , insert 5 rows and 3 columns in it, then enter data. Hide the 3 rd row and 2 nd column , resize row height to 30 and column width to 18.Now apply borders
2. Align entire data to the left side of the cells and perform SUM , AVERAGE ,IF and COUNTIF operations on backlogs and credit columns. Bold all the USN number's. Sort and filter the students of less average.
3. Create a table "Student result" with following conditions. 1. The heading must contain, Sl. No., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry. 2. Use formulas for total and average. 3. Find the name of the students who has secured the highest and lowest marks. 4. Round the average to the nearest highest integer and lowest integer (use ceiling and floor function respectively).

Text Book	Text Book 1

MODULE-2	**Data Analysis Process**	**22ISE453.2**	**6 Hours**

Data Analysis Process: Data Validation, Pivot Tables & Pivot Charts. Conditional Formatting, What-If Analysis, Data Tables, Charts & Graphs.

Laboratory Component: **3 Hours**

1. Create a Pivot table and Pivot chart in Spreadsheet.
2. Create Excel sheet for a students marks list and Use conditional formatting to display list of students whose mark is less than the average mark.
3. Create Excel Sheet and display the details in charts and graphs.

Text Book	Text Book 1

MODULE-3	**Cleaning Data with Text Functions**	**22ISE453.3**	**6 Hours**

Use of UPPER and LOWER, TRIM function, Concatenate. Cleaning Data Containing Date and Time Values: use of DATEVALUE function, DATEADD and DATEDIF, TIMEVALUE functions.

Laboratory Component: *1.* Create Excel sheet and Use TRIM function and Concatenate functions for a sample data. *2.* Create Excel sheet with Data Containing Date and Time Values and also use of DATEVALUE function, DATEADD and DATEDIF, TIMEVALUE functions. *3.* Create Excel sheet and use UPPER ,LOWER function for a sample data.			**3 Hours**
Text Book	Text Book 1		
MODULE-4	**Working with Multiple Sheets**	**22ISE453.4**	**6 Hours**
Working with Multiple Sheets: work with multiple sheets within a workbook , create multiple worksheets, organize, manage data , perform complex calculations and create comprehensive reports.			
Laboratory Component: 1. Create Multiple sheets , copy sheet from one file to another file. 2. Create Multiple sheets for a sample Student Database. 3. Create worksheet with following fields: Empno, Ename, Basic Pay(BP), Travelling Allowance (TA), Dearness Allowance(DA), House Rent Allowance(HRA), Income Tax(IT), Provident Fund(PF), Net Pay(NP). Use appropriate formulas to calculate the above scenario. Analyse the data using appropriate chart and report the data.			**3 Hours**
Text Book	Text Book 2		
MODULE-5	***Excel for Forecasting and Predictive Analytics***	**22ISE453.5, 22ISE453.6**	**6 Hours**
Linear Forecasting using FORECAST function. Non-Linear Forecasting using Trendline function. Advanced Predictive Analytics using Data Analysis ToolPak.			
Laboratory Component: 1. Create Excel sheet and for the given data set perform Linear Forecasting using FORECAST function. 2. Create Excel sheet and for the given data set perform Non-Linear Forecasting using Trendline function. 3. Create Excel sheet and use Data analysis ToolPak for given set of Data.			**3 Hours**
Text Book	Text Book 2		

CIE Assessment Pattern (50 Marks – Theory and Lab)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Lab
		25	05	20
L1	Remember	5	-	-
L2	Understand	5	-	5
L3	Apply	5	5	10
L4	Analyze	5	-	-
L5	Evaluate	5	-	5
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	10
L2	Understand	10
L3	Apply	10
L4	Analyze	10
L5	Evaluate	10
L6	Create	--

Suggested Learning Resources:

Text Books:

1. Berk & Carey - Data Analysis with Microsoft® Excel: Updated for Offi ce 2007®, Third Edition, © 2010 Brooks/Cole, Cengage Learning, ISBN-13: 978-0-495-39178-4.
2. Wayne L. Winston - Microsoft Excel 2019: Data Analysis And Business Modeling, PHI, ISBN: 9789389347180, PHI, ISBN: 978938934718

Reference Books:

1. Data analysis with Microsoft Excel by Kenneth N. Berk and Partrick Carey.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=rJPWi5x0g3I&list=PLWPirh4EWFpEpO6NjjWLbKSCb-wx3hMql&index=23
- https://www.youtube.com/watch?v=4PWVFBiFVVU&list=PLWPirh4EWFpEpO6NjjWLbKSCb-wx3hMql&index=704. PIVOT CHART:
- https://www.youtube.com/watch?v=mc7xO8F8Pj8&list=PLWPirh4EWFpEpO6NjjWLbKSCb-wx3hMql&index=695. ONDITIONAL FORMATTING

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

- Real world problem solving using group discussion.
- Real world examples of Windows Framework.

FUNDAMENTALS OF OPEN SOURCE SOFTWARE

Course Code	**22ISE454**	**CIE Marks**	**50**
L:T:P:S	**2:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2+2**	**Total Marks**	**100**
Credits	**03**	**Exam Hours**	**03**

Course outcomes:

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

22ISE454.1	Understand the difference between open-source software and commercial software.
22ISE454.2	Understand the policies, licensing procedures and ethics of FOSS.
22ISE454.3	Analyze the role and future of open-source software in the industry.
22ISE454.4	Recognize the applications, benefits and features of Open-Source Technologies.
22ISE454.5	Analyse Open-Source Technologies.
22ISE454.6	Understand open-source philosophy, methodology and ecosystem.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE454.1	3	2	2	2	3	-	-	-	-	-	-	2	2	2
22ISE454.2	3	2	2	2	3	-	-	-	-	-	-	2	2	2
22ISE454.3	3	2	3	2	3	-	-	-	-	-	-	2	2	2
22ISE454.4	3	2	3	2	3	-	-	-	-	-	-	2	2	2
22ISE454.5	3	2	2	2	3	-	-	-	-	-	-	2	2	2
22ISE454.6	3	3	2	2	3	-	-	-	-	-	-	2	2	2

MODULE-1	**INTRODUCTIONTO OPEN-SOURCE**	**22ISE454.1**	**6 Hours**

Introduction – Open Source –Principles, Standards Requirements, Successes –
Free Software – FOSS – Internet Application Projects.

Laboratory Component: 1. Learn the following open-source operating system: Linux, Android. 2. Learn the installation. 3. Identify the unique features of these OS.			**3 Hours**
MODULE-2	**OPEN-SOURCEPRINCIPLESAND METHODOLOGY:**	**22ISE454.2**	**6 Hours**
Open source – Initiatives, Principles, Methodologies, Philosophy, Platform, Freedom, OSSD, Licenses –Copy right			
Laboratory Component: 1. Identify any open-source software and create report about its licensing model. 2. Hands on with Libre Office. Learn it from practical view-point. 3. Hands on with GIMP Photo Editing Tool.			**3 Hours**
MODULE-3	**CASE STUDIES**	**22ISE454.3, 22ISE454.4**	**6 Hours**
Case Studies – Apache, BSD, Linux, Mozilla (Firefox), Wikipedia.			
Laboratory Component: 1. Contributing to Wikipedia: Create your user account on wikipedia 2. Identify any topic of your choice and contribute the missing information to Wikipedia. 3. Install any LINUX distribution Eg- Ubuntu, Fedora. Customize the desktop by changing the default options, like background, themes etc.			**3 Hours**
MODULE-4	**OPEN-SOURCE PROJECTS**	**22ISE454.5**	**6 Hours**
Open-Source projects: Starting and maintaining own Open-Source Project, Open-Source Hardware, Open-Source Design, Open-source Teaching, Open-source media.			
Laboratory Component: Github 1. Create and publish your own open-source project: Write any simple program using your choice of programming language 2. Create a repository on Github and save versions of your project. 3. Using GitHub to Collaborate: Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi- developer projects.			**3 Hours**
MODULE-5	**UNDERSTANDING OPEN-SOURCE ECOSYSTEM**	**22ISE454.6**	**6 Hours**
Understanding Open-Source Ecosystem: Open-Source Operating Systems: GNU/Linux, Android, Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker.			
Laboratory Component: 1. Virtualization: Create and use virtual machines. 2. Containerization: Install and configure the containerization technology: docker 3. Create and use containers using it.			**3 Hours**

CIE Assessment Pattern (50 Marks – Theory and Lab)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment	Lab
		25	05	20
L1	Remember	5	-	-
L2	Understand	10	-	5
L3	Apply	5	5	10
L4	Analyze	5	-	5
L5	Evaluate	-	-	-
L6	Create	-	-	-

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	10
L2	**Understand**	20
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	-
L6	**Create**	-

Suggested Learning Resources:

Text Books:

1. "Open-Source Technology", Kailash Vadera&Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. "Open-Source Technology and Policy", Fadi P. Deek and James A. M. McHugh, Cambridge University Press, 2008

Reference Books:

1. Unix Concepts and Applications by Sumitabha Das, Tata McGraw Hill Education, 2006
2. The official Ubuntu Book, 8th Edition .
3. "Perspectives on Free and Open-Source Software", Clay Shirky and Michael Cusumano, MIT press.
4. "Understanding Open Source and Free Software Licensing", Andrew M. St. Laurent, O"Reilly Media.

Web links and Video Lectures (e-Resources):

- https://www.coursera.org/learn/open-source-software-development-methods
- Open-Source Initiative: https://opensource.org/5
- The Linux Foundation: http://www.linuxfoundation.org/
- The Linux Documentation Project: http://www.tldp.org/2

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

- Video demonstration of latest trends in FOSS
- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare PPT and Present in class
  - Organizing Group wise discussions on issues
  - Seminars

VISUAL PROGRAMMING TECHNIQUES

Course Code	**22ISE461**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**02**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**3 Hours**

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

22ISE461.1	Design the object-oriented paradigm and represent the problem using VB.
22ISE461.2	Analyze the object-oriented concepts and their implementations.
22ISE461.3	Apply the object-oriented concepts to design and visualize programs using VB.
22ISE461.4	Apply and outline the applications using object-oriented features.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2
22ISE461.1	3	3	2	2	3	-	-	-	-	-	-	3	2	2
22ISE461.2	3	3	2	3	3	-	-	-	-	-	-	3	2	2
22ISE461.3	3	3	2	3	3	-	-	-	-	-	-	3	2	2
22ISE461.4	3	3	2	3	3	-	-	-	-	-	-	3	2	2

Pgm. No.	List of Programs	Hours	COs
	Prerequisite Programs		
	• Before starting the lab, it's essential to grasp the concept of visual programming. • Familiarize yourself with VPLs like Scratch, Blockly, mBlock, and others.	2	
	PART-A		
1	Write a simple program to construct a simple Arithmetic Calculator.	2	22ISE461.1
2	VB.Net Program To calculate the area of a circle for a given radius using the console application VB.Net Program To calculate the area of a circle for a given radius using the console application Write a visual basic program to calculate the area of a circle for a given radius.	2	22ISE461.1
3	Write a simple program using loops and decision-making statements to generate a Fibonacci series.	2	22ISE461.1
4	Write a simple program using loops and decision-making statements to Find the sum of N numbers	2	22ISE461.1
5	Write a simple program using loops and decision-making statements to display the numbers/symbols in triangle format.	2	22ISE461.2
6	Write a program to create a menu and MDI Forms.	2	22ISE461.2
	PART-B		
7	Write a program to create a simple input screen with four basic controls to read input and write it to a file	2	22ISE461.2
8	Write a program to display files in a directory using DriveListBox, DirListBox, and FileListBox control and open, edit, and save text files using Rich text box control.	2	22ISE461.2
9	Write a program to illustrate Common Dialog Control and to open, edit, and save text file	2	22ISE461.3
10	Write a program to develop windows based installation file with a Student Registration form and Login form using database access	2	22ISE461.3
11	Develop a program to Insert, update, and delete a Record in the database using ADO	2	22ISE461.4
12	Write a program to implement a Personal Information System using MDI and Standard ADODC controls and reports.	2	22ISE461.4
	PART-C **Beyond Syllabus Virtual Lab Content** **(To be done during Lab but not to be included for CIE or SEE)**		
	https://cse22-iiith.vlabs.ac.in/exp/hopfield-models/index.html		

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	-
L3	Apply	05	10
L4	Analyze	05	10
L5	Evaluate	10	10
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	-
L3	Apply	10
L4	Analyze	20
L5	Evaluate	20
L6	Create	-

Suggested Learning Resources:

Text Book:

1) Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House Pvt. Ltd., Chennai

Reference Book:

1) Gary Cornell, "Visual Basic 6 from the Ground Up", McGraw-Hill Education,1998
   Text Book:
2) Julia Case Bradley and Anita C. Millspaugh, "Programming in Visual Basic 6.0", Tata McGraw-Hill Edition, 2011.

GOOGLE WORKSPACE LABORATORY			
Course Code	**22ISE462**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

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

22ISE462.1	Understand the basics of information theory and channel capacity.
22ISE462.2	Apply different source coding techniques
22ISE462.3	Understand the notation and concepts of error control coding.
22ISE462.4	Apply linear block codes for error detection and correction.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE462.1	3	3	3	3	3	-	-	-	1	1	-	2	3	3
22ISE462.2	3	3	3	3	3	-	-	-	1	1	-	2	3	3
22ISE462.3	3	3	3	3	3	-	-	-	1	1	-	2	3	3
22ISE462.4	3	3	3	3	3	-	-	-	1	1	-	2	3	3

Program No.	List of Programs	Hours	COs
1.	a) Create a Test domain for demonstrating Sign-Up, Sign-in and Profile Setting using Google Workspace. b) Demonstrating the Basic and Advance calendar settings that's includes the integrating, Sharing and Updating Using Google Calendar.	2	22ISE462.1
2.	Demonstrating the following feature using Google Docs a) Get started with Google Docs b) Open and Create a new doc c) Collaboration Docs in the Cloud d) Version history Google Docs e) Simple Editing Options f) Google Docs Addons g) Advanced Editing Option -Word Count Tracker h) Document Formatter and Translation Assistant	2	22ISE462.2
3.	Demonstrating the following feature using Google Sheets a) Get started with Google Docs b) Open and Create a new Sheet c) Basic Editing Option in Google Sheets d) Basic Formulas in Google Sheets e) Advanced Editing Option	2	22ISE462.2
4.	Demonstrating the following feature using Google Slides a) Create Google Slides b) Adding Content to Slides and Insert More Content Options c) Customize Buttons and Options d) Slides Share and collaborate e) Format Options Slides f) Slides View Options and Slide Transitions	2	22ISE462.2
5.	Demonstrating the following feature using Google form a) Sections, Previewing, Linear Scale, Multiple Choice Grid, DOB, Moving Questions b) Go to section based on Answer c) Upload Files into a Google Form d) Designs for your Forms e) Adding Images and Videos & Importing Questions f) Getting Responses g) Google Forms Addons	2	22ISE462.2
6.	Demonstrating the following feature using Google Site a) Create Update Layout of Page b) Change your Sites Theme and Style c) Add Pages to Sites d) Google Sites Navigation e) Edit and Update f) Announcement banner g) Site Sharing and Collab	2	22ISE462.2

PART-B			
7.	Demonstrating the following feature using Google Drive a) Organise your Google Drive b) Managing Workspaces c) Uploading Files and Folders d) Search and Cloud Search e) Google Drive for Desktop f) Collaboration with Google Drive g) Shared Drives	2	22ISE462.3
8.	Efficient Email Management with Gmail a) Setting up a Google account b) Gmail account setup and customization c) Creating, formatting, and attaching files to emails d) Inbox organization, archiving, and marking emails e) Labels, filters, and folder management f) Managing contacts and tasks in Gmail g) Scheduling Emails	2	22ISE462.3
9.	Google Classroom a) Creating and managing classes in Google Classroom, b) Assignments, Grading, Feedback, conducting exams, quizzes, sharing materials. c) Overview of other Google workspace productivity tools: d) Google Calendar, Google Keep, Google Meet etc	2	22ISE462.3
10.	Use version control systems command to clone, commit, push, fetch, pull, checkout, reset, and delete repositories.	2	22ISE462.3
11.	Develop a Hello World application using Google AppEngine in Eclipse.		22ISE462.4
12.	Create a hello world app and other simple web applications using python / java. Use GAElauncher to launch the web applications.	2	22ISE462.4

PART-C

Beyond Syllabus Virtual Lab Content

(To be done during Lab but not to be included for CIE or SEE)

1. Install Oracle Virtual box and create two VMs on yours laptop/ Desktop.
   Oracle VM VirtualBox - Downloads | Oracle Technology Network | Oracle

2. Find the procedure to transfer the files from one VM to VM. https://carleton.ca/scs/tech-support/virtual-machines/transferring-files-to-and-from-virtualmachines/#:~:text=Dragging%20and%20Dropping%20Files%20in%20VirtualBox,If%20you%20only&text=On%20the%20top%20bar%20of,the%20guest%20to%20the%20host.

3. Develop a Windows Azure Hello World application 87 https://learn.microsoft.com/en-us/azure/developer/java/toolkit-for-eclipse/create-hello-world-webapp

4. Launch GUI application inside Docker Container and access them from the Docker Host system. https://medium.com/nerd-for-tech/running-gui-based-applications-inside-a-docker-container645399ca2ef0

CIE Assessment Pattern (50 Marks –Lab)

RBT Levels		Marks Distribution	
		Test (s)	Weekly Assignment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	10	10
L4	Analyze	10	5
L5	Evaluate	-	10
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Mark Distribution (50)
L1	Remember	-
L2	Understand	-
L3	Apply	10
L4	Analyze	20
L5	Evaluate	20
L6	Create	-

Suggested Learning Resources:

Reference Books:

1) "Effect of Using Google Workspace in Self-Regulated English Learning of Flipped Classroom." PhD diss., 2022.
2) Thuan, P. D. (2022). Employment of Google Tools in English Language Education: A Review. British Journal of Multidisciplinary and Advanced Studies, 3(2), 70-77.
3) Sunyaev, A., & Schneider, S. (2013). Cloud services certification. Communications of the ACM, 56(2), 33- 36.

FILE STRUCTURE

Course Code	**22ISE463**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE463.1	Implement operations related to files
22ISE463.2	Apply the concepts of file system to produce the given application
22ISE463.3	Evaluate performance of various file systems on given parameters.
22ISE463.4	Demonstration on minimizing seek time

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE463.1	3	3	2	2	-	-	-	-	-	-	-	2	3	2
22ISE463.2	3	3	2	2	-	-	-	-	-	-	-	2	3	2
22ISE463.3	3	3	2	2	-	-	-	-	-	-	-	2	2	2
22ISE463.4	3	3	2	2	-	-	-	-	-	-	-	2	3	2

Pgm. No.	List of Programs	Hours	COs
	Prerequisite Programs		
	• Basic File handling operation(eg: fopen, fclose etc) • File location • File creation and opening modes	2	NA
	PART-A		
1	Write a program to read series of names, one per line, from standard input and write these names spelled in reverse order to the standard output using I/O redirection and pipes	2	22ISE463.1
2	Write a program to read series of names, one per line, using an input file specified by the user instead of the standard input and using an output file specified by the user instead of the standard output.	2	22ISE463.1
3	Write a program to read and write student objects with fixed-length records and thefields delimited by "|". Implement pack ( ), unpack ( )	2	22ISE463.2
4	Write a program to read and write student objects with fixed-length records and thefields delimited by "|". Implement modify ( ) and search ( ) methods.	2	22ISE463.2
5	Write a program to read and write student objects with Variable - Length records using any suitable record structure. Implement pack ( ), unpack ( )	2	22ISE463.2
6	Write a program to read and write student objects with Variable - Length records using any suitable record structure. Implement modify ( ) and search ( ) methods	2	22ISE463.2
	PART-B		
7	Write a program to write student objects with Variable - Length records using any suitable record structure and to read from this file a student record using RRN.	2	22ISE463.3
8	Write a program to implement simple index on primary key for a file of student objects. Implement add ( ), search ( ), delete ( ) using the index.	2	22ISE463.3
9	Write a program to read two lists of names and then match the names in the two lists using Consequential Match based on a single loop. Output the names common to both the lists.	2	22ISE463.3
10	Write a program to read k Lists of names and merge them using k-way merge algorithm with k = 8.	2	22ISE463.4
11	Write a program to store and retrieve student data from file using hashing.	2	22ISE463.4
12	Write a program to store and retrieve student data from file using extended hashing.	2	22ISE463.4

PART-C

Beyond Syllabus Virtual Lab Content

1. Write a program to implement B-Tree for a given set of integers and its operations insert ( ) and search ( ). Display the tree.
   https://www.geeksforgeeks.org/insert-operation-in-b-tree/
2. Write a program to implement B+ tree for a given set of integers and its operations insert ( ), and search ( ). Display the tree.
   https://www.geeksforgeeks.org/insert-operation-in-b-tree/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	-	5
L3	Apply	5	10
L4	Analyze	5	5
L5	Evaluate	10	10
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	10
L4	Analyze	20
L5	Evaluate	10
L6	Create	-

Suggested Learning Resources:

Reference Books:

1) File Structures: An Object-Oriented Approach with C++: United States Edition by Michael J. Folk, Bill Zoellick, Greg Riccardi

IOT PROGRAMMING

Course Code	**22ISE464**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**2**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE464.1	Understand functionalities of various single board embedded platforms fundamentals
22ISE464.2	Understand interfacing IoT devices with Arduino
22ISE464.3	Apply Arduino interfacing to create simple application
22ISE464.4	Implement interfacing of various sensors with Arduino.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ISE464.1	3	1	1	-	3	-	-	-	-	-	-	3	3	3

22ISE464.2	3	1	1	-	3	-	-	-	-	-	-	3	3	3
22ISE464.3	3	3	3	3	3	-	-	-	-	-	-	3	3	3
22ISE464.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3

Exp. No.	**List of Experiments**	**Hours**	**COs**
	PART-A		
1	To interface LED / Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED / Buzzer for 1 sec after every 2 seconds.	2	22ISE464.1
2	To interface Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED at sensor detection.	2	22ISE464.1
3	To interface smoke sensor with Arduino/Raspberry Pi and write a program to turn on alarm when smoke is detected.	2	22ISE464.1
4	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.	2	22ISE464.2
5	To interface TCS3200 Color Sensor with Arduino to detect the colors and display the same.	2	22ISE464.2
6	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smart phone using Bluetooth.	2	22ISE464.2
	PART-B		
7	To interface ultrasonic sensor with Arduino/Raspberry Pi and write a program to display the distance of the obstacle.	2	22ISE464.3
8	To interface float sensor to detect water level in over head tanks and warn the overflow using Arduino/Raspberry PI with an LED	2	22ISE464.3
9	To interface ADXL335 accelerometer with Arduino/RaspberryPI to detect the various orientation and display it on serial monitor.	2	22ISE464.3
10	Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, GreenOn, WhiteOn) for each hand movement (use Ultrasonic sensor).	2	22ISE464.3
11	To interface soil moisture sensor to display the quality of soil moisture values using Arduino/RaspberryPI	2	22ISE464.3
12	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to cloud.	2	22ISE464.4
	PART-C		

Beyond Syllabus Virtual Lab Content
(To be done during Lab but not to be included for CIE or SEE)

1. Develop a native application that uses GPS location information. https://gr-solution.blogspot.com/2015/12/develop-native-application-that-uses.html
2. Develop a mobile application to send an email. https://www.geeksforgeeks.org/how-to-send-an-email-from-your-android-app/
3. Develop a simple application with one Edit Text so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice. https://www.geeksforgeeks.org/edittext-widget-in-android-using-java-with-examples/

CIE Assessment Pattern (50 Marks – Lab)

RBT Levels		Test (s)	Weekly Assessment
		20	30
L1	Remember	-	-
L2	Understand	5	10
L3	Apply	10	10
L4	Analyze	5	10
L5	Evaluate	-	-
L6	Create	-	-

SEE Assessment Pattern (50 Marks – Lab)

RBT Levels		Exam Marks Distribution (50)
L1	Remember	-
L2	Understand	10
L3	Apply	20
L4	Analyze	20
L5	Evaluate	-
L6	Create	-

Suggested Learning Resources:

Reference Books

1) Dawn Griffiths and David Griffiths, "Head First Android Development: A Brain-Friendly Guide",Publisher: O'Reilly Media, Inc., 2017, ISBN- 97814919740562

2) Erik Hellman,"Android Programming: Pushing the Limits", Publisher: Wiley, 2013 ISBN: 978-1-118-71737-0

3) Pradeep Kothari, " Android Application Development Black Book"Publisher: Dreamtech Press, 2014, ISBN:9789351194095

SOCIAL CONNECT AND RESPONSIBILITY

Course Code	**22SCK47**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**--**
Hrs / Week	**02**	**Total Marks**	**50**
Credits	**01**	**Exam Hours**	**02**

Course outcomes:

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

22SCK47.1	Communicate and connect to the surrounding
22SCK47.2	Understand the needs and problems of the community and involve them in problem –solving
22SCK47.3	Develop among themselves a sense of social & civic responsibility and utilize their knowledge in finding practical solutions to individual and community problems
22SCK47.4	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22SCK47.1	-	-	-	-	-	3	2	-	2	3	-	1
22SCK47.2	-	-	-	-	-	3	2	-	2	3	-	1
22SCK47.3	-	-	-	-	-	3	2	-	2	3	-	1
22SCK47.4	-	-	-	-	-	3	2	-	2	3	-	1

MODULE-1	PLANTATION AND ADOPTION OF A TREE	22SCK47.1, 22SCK47.2	3 Hours
Plantation of a tree that will be adopted for three years by a group of B. Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - – Objectives, Visit, case study, report, outcomes.			
MODULE-2	**HERITAGE WALK AND CRAFTS CORNER**	**22SCK47.2, 22SCK47.3**	**3 Hours**
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- Objectives, Visit, case study, report, outcomes.			
MODULE-3	**ORGANIC FARMING AND WASTE MANAGEMENT**	**22SCK47.3, 22SCK47.4**	**3 Hours**
Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus – Objectives, Visit, case study, report, outcomes.			
MODULE-4	**WATER CONSERVATION**	**22SCK47.3, 22SCK47.4**	**3 Hours**
Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.			
MODULE-5	**FOOD WALK**	**22SCK47.1, 22SCK47.4**	**3 Hours**
City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.			

CIE Assessment Pattern (50 Marks – Activity based) –

- **Each module is evaluated as given below and 100 marks in scaled down to 50 as final marks.**

CIE component for each module	Marks
Field Visit, Plan, Discussion	10
Commencement of activities and its progress	20
Case study-based Assessment Individual performance with report	20
Module wise study & its consolidation 5*5 = 25	25
Video based seminar for 10 minutes by each student at the end of semester with Report. Activities 1 to 5, 5*5 = 25	25
Total	**100**

- Implementation strategies of the project (NSS work).
- Individual student has to submit a final report which should be signed by NSS Officer, the HOD and Principal.
- Finally, the consolidated marks sheet and the reports should be available in the department. .

Activity-Based Learning / Practical Based learning

- Platform to connect to others and share the stories with others:
  - Jamming session
  - Open mic
  - Poetry
- Share the experience of Social Connect.
- Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

Pedagogy:

- The students will be divided into groups. Each group will be handled by faculty mentor.
- A total of 40 - 50 hrs engagement in the semester
- Faculty mentor will design the activities (particularly Jamming sessions, open mic and poetry)
- The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.
- The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-longactivities conducted by faculty mentors.
- Students should present the progress of the activities as per the schedule in the prescribed practical session in the field.
- There should be positive progress in the vertical order for the benefit of society in general through activities.

Plan of Action:

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty mentor for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

- Practice Session Description:
    - Lecture session in field to start activities
    - Students Presentation on Ideas
    - Commencement of activity and its progress
    - Execution of Activity
    - Case study-based Assessment, Individual performance
    - Sector/ Team wise study and its consolidation
    - Video based seminar for 10 minutes by each student at the end of semester with Report.

Sl No	Topic	Groupsize	Location	Activity execution	Reporting	Evaluation of the Topic
1.	**Plantation and adoption of a tree**	May be individual or team (3-5)	Farmers land/ parks / Villages / roadside/ community area / College campus	Site selection / Proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus
2.	**Heritage walk and crafts corner**	May be individual or team (3-5)	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations /Government Schemes officers/ campus	Site selection /Proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus

3.	**Organic farming and waste management**	May be individual or team (3-5)	Farmers land / parks /Villages visits / roadside/ communityarea / College campus	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus
4.	**Water conservation:** Conservation techniques	May be individual or team (3-5)	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers / campus	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus
5.	**Food walk:** Practices in society	May be individual or team (3-5)	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus

MINI PROJECT - I			
Course Code	**22ISE48**	**CIE Marks**	**50**
L:T:P:S	**0:0:1:0**	**SEE Marks**	**50**
Hrs / Week	**0**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**

Course outcomes:

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

22ISE48.1	Analyze the Real-world problem through survey of existing problems
22ISE48.2	Design the modules for solving the problems identified
22ISE48.3	Implement the design modules with suitable programming language
22ISE48.4	Test and present the working modules at different levels, and preparing report by the entire team members

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
22ISE48.1	3	3	3	2	3	-	1	1	3	1	3	2	3	3
22ISE48.2	3	3	3	2	3	-	1	1	3	1	3	2	3	3
22ISE48.3	3	3	3	2	3	-	1	1	3	1	3	2	3	3
22ISE48.4	3	3	3	2	3	-	2	1	3	1	3	2	3	3

Mapping of Course Outcomes to Program Specific Outcomes:

Use C, C++, Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated ondesktop/laptop as a stand-alone or web based application.

Note :

- Every student should do mini project in a team consists of maximum 2 members in the areas suggestedby the department expert committee
- Minimum 2 reviews will be conducted by the department expert committee to know the progress of themini project work
- In each review student should give presentation on the work carried out and show the relevant models/output
- A mini project report should be submitted to the department at the end of the mini project work
- Plagiarism check for the report : Similarity index of the report should not exceed more than 30%.

CIE Assessment Pattern (50 Marks – Theory) –

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	-
L2	**Understand**	-
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	15
L6	**Create**	15

SEE Assessment Pattern (50 Marks – Theory)

RBT Levels		Exam Marks Distribution (50)
L1	**Remember**	-
L2	**Understand**	-
L3	**Apply**	10
L4	**Analyze**	10
L5	**Evaluate**	15
L6	**Create**	15

NATIONAL SERVICE SCHEME (NSS)			
Course Code	**22NSS30, 22NSS40, 22NSS50, 22NSS60**	**CIE Marks (each Semester)**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4 = 200**
Credits	**00**	**Exam Hours**	**02**
Course outcomes: At the end of the course, the student will be able to:			
22NSS40.1	Understand the importance of his / her responsibilities towards society.		
22NSS40.2	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.		
22NSS40.3	Evaluate the existing system and to propose practical solutions for the same for sustainable development. Implement government or self-driven projects effectively in the field.		
22NSS40.4	Develop capacity to meet emergencies and natural disasters & practice national integration		

	and social harmony in general.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22NSS40.1	-	-	-	-	-	3	3	-	2	-	-	1
22NSS40.2	-	-	-	-	-	3	3	-	2	-	-	1
22NSS40.3	-	-	-	-	-	3	3	-	2	-	-	1
22NSS40.4	-	-	-	-	-	3	3	-	2	-	-	1

Semester/ Course Code	CONTENT	COs	HOURS
3RD 22NSS30	**1.** Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing **2.** Waste management–Public, Private and Govt organization, 5R's. **3.** Setting of the information imparting club for women leading to contribution in social and economic issues.	22NSS30.1, 22NSS30.2, 22NSS30.3, 22NSS30.4	30 HRS
4TH 22NSS40	**1.** Water conservation techniques – Role of different stakeholders– Implementation. **2.** Preparing an actionable business proposal for enhancing the village income and approach forimplementation. **3.** Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	22NSS40.1, 22NSS40.2, 22NSS40.3, 22NSS40.4	30 HRS
5TH 22NSS50	**1.** Developing Sustainable Water management system for rural areas and implementationapproaches. **2.** Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill developmentprograms etc. **3.** Spreading public awareness under rural outreach programs. (minimum 5 programs).	22NSS50.1, 22NSS50.2, 22NSS50.3, 22NSS50.4	30 HRS
6TH 22NSS60	**1.** Organize National integration and social harmony events / workshops / seminars. (Minimum TWO programs). **2.** Govt. school Rejuvenation and helping them to achieve good infrastructure.	22NSS60.1, 22NSS60.2, 22NSS60.3, 22NSS60.4	30 HRS

CIE Assessment Pattern (50 Marks – Activity based) –

CIE component for every semester	Marks
Presentation - 1 Selection of topic, PHASE - 1	10
Commencement of activity and its progress - PHASE - 2	10
Case study-based Assessment Individual performance	10
Sector wise study and its consolidation	10
Video based seminar for 10 minutes by each student at the end of semester with Report.	10
Total marks for the course in each semester	**50**

- Implementation strategies of the project (NSS work).
- The last report should be signed by NSS Officer, the HOD and principal.
- At last report should be evaluated by the NSS officer of the institute.
- Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.

Suggested Learning Resources:

Reference 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.

Pre-requisites to take this Course:

1. Students should have a service-oriented mindset and social concern.
2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.
3. Students should be ready to sacrifice some of the time and wishes to achieve service-oriented targets on time.

Pedagogy:

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last, in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.
- State the need for NSS activities and its present relevance in the society and provide real-life examples.
- Support and guide the students for self-planned activities.
- NSS coordinator will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills.

Plan of Action:

- Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.
- Practice Session Description:
    - Lecture session by NSS Officer
    - Students Presentation on Topics
    - Presentation - 1, Selection of topic, PHASE – 1
    - Commencement of activity and its progress - PHASE – 2
    - Execution of Activity
    - Case study-based Assessment, Individual performance
    - Sector/ Team wise study and its consolidation
    - Video based seminar for 10 minutes by each student at the end of semester with Report.

Sl No	Topic	Groupsize	Location	Activity execution	Reporting	Evaluation of the Topic
1.	Organic farming, IndianAgriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land/Villages/ roadside / Community area / College campus	Site selection /proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
2.	Waste management– Public, Private and Govt organization, 5 R's.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
3.	Setting of the information imparting club for women leading to contributionin social and economic issues.	May be individual or team	Women empowerment groups/ Consulting NGOs & Govt Teams / College campus	Group selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
4.	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

6.	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	Local government / private/ aided schools/Government Schemes officers	School selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
7.	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	site selection/proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
8.	Contribution to any national level initiative of Government of India.For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme,Skill development programs etc.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/pro per consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
9.	Spreading public awareness under ruraloutreach programs. (minimum5 programs)	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Group selection/pro per consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer
10.	Organize National integration and socialharmony events / workshops / seminars. (Minimum 02 programs).	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

11.	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages/ City Areas /Grama panchayat/ public associations/ Government Schemes officers/ campus	Place selection/proper consultation/ Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by NSS officer

PHYSICAL EDUCATION (PE) (SPORTS AND ATHLETICS)			
Course Code	**22PED30, 22PED40, 22PED50, 22PED60**	**CIE Marks (each semester)**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4= 200**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

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

22PED40.1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
22PED40.2	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle
22PED40.3	Perform in the selected sports or athletics of student's choice and participate in the competition at regional/state / national / international levels.
22PED40.4	Understand the roles and responsibilities of organization and administration of sports and games

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
22PED40.1	-	-	-	-	-	2	-	3	3	-	-	2
22PED40.2	-	-	-	-	-	2	-	3	3	-	-	2
22PED40.3	-	-	-	-	-	2	-	3	3	-	-	2
22PED40.4	-	-	-	-	-	2	-	3	3	-	-	2

Semester	**CONTENT**	**COs**	**HOURS**
3RD 22PED30	**Module 1: Orientation** F. Lifestyle, G. Fitness H. Food & Nutrition I. Health & Wellness J. Pre-Fitness test.	22PED30.1, 22PED30.2	5 HRS
	Module 2: General Fitness & Components of Fitness G. Warming up (Free Hand exercises) H. Strength – Push-up / Pull-ups I. Speed – 30 Mtr Dash J. Agility – Shuttle Run K. Flexibility – Sit and Reach L. Cardiovascular Endurance – Harvard step Test	22PED30.2, 22PED30.3	15 HRS
	Module 3: Recreational Activities E. Postural deformities. F. Stress management.	22PED30.3, 22PED30.4	10 HRS

	G. Aerobics. H. Traditional Games.		
4TH 22PED40	**Module 1: Ethics and Moral Values** C. Ethics in Sports D. Moral Values in Sports and Games	22PED40.1, 22PED40.2	5 HRS
	Module 2: Specific Games (Anyone to be selected by the student) G. Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. H. Throwball – Service, Receive, Spin attack, Net Drop & Jump throw. I. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. J. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up. K. Table Tennis – Service (Fore Hand & Back Hand), Receive (Fore Hand & Back Hand), Smash. L. Athletics (Track / Field Events) – Any event as per availability of Ground.	22PED40.3	20 HRS
	Module 3: Role of Organization and administration	22PED40.4	5 HRS
5TH 22PED50	**Fitness Components:** Meaning and Importance, Fit India Movement, Definition of fitness, Components of fitness, Benefits of fitness, Types of fitness and Fitness tips. **Practical Components:** Speed, Strength, Endurance, Flexibility, and Agility **Athletics**: 4. Track -Sprints: • Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block. • Acceleration with proper running techniques. • Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. 5. Jumps- Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick)and Landing 6. Throws- Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique) **Handball OR Ball Badminton** **Handball:** B. Fundamental Skills 7. Catching, Throwing and Ball control, 8. Goal Throws: Jumpshot, Centershot, Diveshot, Reverseshot. 9. Dribbling: High and low. 10. Attack and counter attack, simple counter attack, counter attack from two wings and center. 11. Blocking, Goal Keeping and Defensive skills. 12. Game practice with application of Rules and Regulations. C. Rules and their interpretations and duties of officials	22PED50.1, 22PED50.2, 22PED50.3, 22PED50.4	Total 30 Hrs/ Semester 2 Hrs/week

	Ball badminton: C. Fundamental Skills 5. Basic Knowledge: Various parts of the Racket and Grip. 6. Service: Short service, Long service, Long-high service. 7. Shots: Overhead shot, Defensive clearshot, Attacking clearshot, Dropshot, Netshot, Smash. 8. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials.		
6TH 22PED60	**Athletics**: 4. Track -110 Mtrs and 400Mtrs: • Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Over the Hurdles • Crouch start (its variations)use of Starting Block. • Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. 5. Jumps- High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing. 6. Throws- Discus Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle). **Football OR Hockey** **Football:** A. Fundamental Skills 1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. 10. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. 11. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. 12. Heading: In standing, running and jumping condition. 13. Throw-in: Standing throw-in and Running throw-in. 14. Feinting: With the lower limb and upper part of the body. 15. Tackling: Simple Tackling, Slide Tackling. 16. Goal Keeping: Collection of Ball, Ball clearance-kicking, throwing and deflecting. 17. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials. **Hockey:** A. Fundamental Skills 1. Passing: Short pass, Longpass, pushpass, hit 2. Trapping. 3. Dribbling and Dozing 9. Penalty stroke practice. 10. Penalty corner practice.	22PED60.1, 22PED60.2, 22PED60.3, 22PED60.4	Total 30 Hrs/ Semester 2 Hrs/week

	11. Tackling: Simple Tackling, Slide Tackling. 12. Goal Keeping, Ball clearance- kicking, and deflecting. 13. Game practice with application of Rules and Regulations. B. Rules and their interpretation and duties of officials		

CIE Assessment Pattern (50 Marks – Practical) –

CIE to be evaluated every semester end based on practical demonstration of Sports and Athletics activities learnt in the semester.

CIE	Marks
Participation of student in all the modules	10
Quizzes – 2, each of 7.5 marks	15
Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	25
Total	**50**

Suggested Learning Resources:

Reference Books:

12. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
13. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
14. Petipus, et.al., Athlete's Guide to Career Planning, Human Kinetics.
15. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
16. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
17. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
18. Saha, A.K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
19. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
20. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
21. Dubey H.C., Basketball, Discovery Publishing House, New Delhi.
22. Rachana Jain, Teach Yourself Basketball, Sports Publication.
15. Jack Nagle, Power Pattern Offences for Winning basketball, Parker Publishing Co., New York.
16. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
17. SallyKus, Coaching Volleyball Successfully, Human Kinetics.

YOGA

Course Code	**22YOG30, 22YOG40, 22YOG50, 22YOG60**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs / Week	**2**	**Total Marks**	**50 x 4 = 200**
Credits	**00**	**Exam Hours**	**02**

Course outcomes:

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

22YOG40.1	Understanding the origin, history, aim and objectives of Yoga
22YOG40.2	Become familiar with an authentic foundation of Yogic practices
22YOG40.3	Practice different Yogic methods such as Suryanamaskara, Pranayama and some of the Shat
22YOG40.4	Use the teachings of Patanjali in daily life.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22YOG40.1	-	-	-	-	-	3	-	-	-	-	-	1
22YOG40.2	-	-	-	-	-	3	-	-	-	-	-	1
22YOG40.3	-	-	-	-	-	3	-	-	-	-	-	1

22YOG40.4	-	-	-	-	-	3	-	-	-	-	-	1

Semester / Course Code	**CONTENT**	**COs**	**HOURS**
3rd 22YOG30	**Introduction of Yoga:** Aim and Objectives of yoga, Prayer: Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, importance of prayer **Brief introduction of yogic practices for common man:** Yogic practices for common man to promote positive health **Rules and regulations:** Rules to be followed during yogic practices by practitioner **Misconceptions of yoga:** Yoga its misconceptions, Difference between yogic and non-yogic practices. **Suryanamaskara:** 3. Suryanamaskar prayer and its meaning, Need, importance and b of Suryanamaskar. 4. Suryanamaskar 12 count,2rounds **Different types of Asanas**: 5. Sitting: Padmasana, Vajrasana, Sukhasana 6. Standing: Vrikshana, Trikonasana, Ardhakati Chakrasana 7. Prone line: Bhujangasana, Shalabhasana 8. Supineline: Utthitadvipadasana, Ardhahalasana, Halasana	22YOG30.1, 22YOG30.2, 22YOG30.3, 22YOG30.4	Total 32 Hrs/ Semester 2 Hrs/week
4TH 22YOG40	**Suryanamaskara:** Suryanamaskar 12 count,4rounds **Brief introduction and importance of:** **Kapalabhati:** Revision of Kapalabhati -40strokes/min3rounds **Different types of Asanas**: 5. Sitting: Paschimottanasana, Ardha Ushtrasana, Vakrasana, Aakarna Dhanurasana 6. Standing: Parshva Chakrasana, Urdhva Hastothanasana, Hastapadasana 7. Prone line: Dhanurasana 8. Supine line: Karna Peedasana, Sarvangasana, Chakraasana **Patanjali's Ashtanga Yoga**: Asana, Pranayama **Pranayama:** Chandra Bhedana, Nadishodhana, Surya Bhedana	22YOG40.1, 22YOG40.2, 22YOG40.3, 22YOG40.4	Total 32 Hrs/ Semester 2 Hrs/week
5TH 22YOG50	**Kapalabhati:** Revision of Kapalabhati - 60strokes/min3rounds **Brief introduction and importance of:** **Different types of Asanas**: 5. Sitting: Yogamudra in Padmasana, Vibhakta Paschimottanasana, Yogamudra in Vajrasana 6. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 7. Prone line: Padangushtha Dhanurasana, Poorna Bhujangasana / Rajakapotasana 8. Supine line: Navasana/Noukasana, Pavanamuktasana, Sarvanga **Patanjali's Ashtanga Yoga**: Pratyahara, Dharana **Pranayama:** Ujjayi, Sheetali, Sheektari	22YOG50.1, 22YOG50.2, 22YOG50.3, 22YOG50.4	Total 32 Hrs/ Semester 2 Hrs/week

6TH 22YOG60	**Kapalabhati:** Revision of Kapalabhati – 80 strokes/min3rounds **Brief introduction and importance of:** **Different types of Asanas**: 5. Sitting: Bakasana, Hanumanasana, Ekapada Rajakapotasana 6. Standing: Parivritta Trikonasana, Utkatasana, Parshvakonasana 7. Supine line: Setubandhasana, Shavasanaa (Relaxation posture) 8. Balancing: Sheershasana **Patanjali's AshtangaYoga**: Dhyana (Meditation), Samadhi **Pranayama:** Bhastrika, Bhramari, Ujjai **Shat Kriyas:** Jalaneti and sutraneti, Sheetkarma Kapalabhati	22YOG60.1, 22YOG60.2, 22YOG60.3, 22YOG60.4	Total 32 Hrs/ Semester 2 Hrs/week

CIE Assessment Pattern (50 Marks – Practical)

CIE to be evaluated every semester based on practical demonstration of Yogasana learnt in the semester and internal tests (objective type)

CIE	Marks
Avg of Test 1 and Test 2	25
Demonstration of Yogasana	25
Total	**50**

Suggested Learning Resources:

Reference Books:

4. Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
5. Tiwari, O P: Asana Why and How
6. Ajitkumar: Yoga Pravesha (Kannada)
7. Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha (Bihar School of yoga, Munger)
8. Swami Satyananda Saraswati: Surya Namaskar (Bihar School of yoga, Munger)
9. Nagendra H R: The art and science of Pranayama
10. Tiruka: Shatkriyegalu (Kannada)
11. Iyengar B K S: Yoga Pradipika (Kannada)
12. Iyengar B K S: Light on Yoga (English)

Web links and Video Lectures (e-Resources):

- https://youtu.be/KB-TYlgd1wE
- https://youtu.be/aa-TG0Wg1Ls

BASIC APPLIED MATHEMATICS-II

(Common to all Branches)

Course Code	**22DMAT41**	**CIE Marks**	**50**
L:T:P:S	**0:0:0:0**	**SEE Marks**	**--**
Hrs. / Week	**2**	**Total Marks**	**50**
Credits	**00**	**Exam Hours**	**--**

Course outcomes:

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

22DMAT41.1	Gain knowledge of basic operations of vectors
22DMAT41.2	Use curl and divergence of a vector function in three dimensions
22DMAT41.3	Develop the ability to solve higher order Linear differential equations
22DMAT41.4	Know the basic concepts of Laplace transform to solve the Periodic functions and also solve initial and boundary value problems using Laplace transform method.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22DMAT41.1	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.2	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.3	3	3	-	-	-	-	-	-	-	-	-	-
22DMAT41.4	3	3	-	-	-	-	-	-	-	-	-	-

MODULE-1	**VECTORS**	**22DMAT41.1**	**8 Hours**
Definition of scalar and vector, Vector addition, Subtraction and Multiplication-Dot product, Cross product, Scalar triple product. Orthogonal, Co-planar and Angle between vectors-Problems.			
Text Book	Text Book 1: 3.1, 3.5, 3.6, 3.9, Text Book 2: 7.1, 9.2, 9.3, 9.4.		
MODULE-2	**VECTOR DIFFERENTIATION**	**22DMAT41.2**	**8 Hours**
Vector differential operator-Gradient of a scalar function, Divergence of a vector function, Curl of a vector function-Problems. Solenoidal and irrotational vector fields-Problems.			
Text Book	Text Book 1: 8.5, 8.6, 8.7, Text Book 2: 9.7, 9.8, 9.9.		
MODULE-3	**LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS**	**22DMAT41.3**	**8 Hours**
Solution of initial and boundary value problems, Inverse differential operator techniques for the functions-e^{ax}, $\sin(ax + b)$ and $\cos(ax + b)$.			
Text Book	Text Book 1: 13.3, 13.4, 13.5, 13.6,		
MODULE-4	**LAPLACE TRANSFORM**	**22DMAT41.4**	**8 Hours**
Definition and Laplace transforms of elementary functions-Problems. Properties of Laplace transforms (Shifting property-without proof), Periodic functions (without proof)-problems.			
Text Book	Text Book 1: 21.3, 21.4, 21.5, Text Book 2: 6.1.		
MODULE-5	**INVERSE LAPLACE TRANSFORM**	**22DMAT41.4**	**8 Hours**
Inverse Laplace Transform by partial fractions-Problems. Solution of linear differential equations using Laplace Transforms-Problems.			
Text Book	Text Book 1: 21.12, 21.15, Text Book 2: 6.4.		

CIE Assessment Pattern (50 X 2=100 Marks – Theory)

RBT Levels		Marks Distribution		
		Test (s)	Qualitative Assessment (s)	MCQ's
		25	**15**	**10**
L1	**Remember**	5	5	-
L2	**Understand**	5	5	-
L3	**Apply**	10	5	10
L4	**Analyze**	2.5	-	-
L5	**Evaluate**	2.5	-	-
L6	**Create**	-	-	-

Suggested Learning Resources:

Text Books:

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, Reprint 2016, ISBN: 9788126554232.

Reference Books:

1) Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
2) B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited,

Fourth Edition, 2017, ISBN: 9780070634190.
3) H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
4) N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Web links and Video Lectures (e-Resources):

1)https://youtu.be/SaNDPSk1UVM?si=FRxMnRi1btCUIscK
2)https://youtu.be/HxrLu-qRJKc?si=pKc9XOCllBx-H4Wp
3)https://youtu.be/ma1QmE1SH3I?si=Hoo3_cjiIds203os
4)https://youtu.be/TKBXey91Gc4?si=JjZfQvJxdxN8I6YQ
5)https://youtu.be/1THkFmuIPXM?si=pc9VvmZ-9cQe_Wr_
6)https://youtu.be/m7jH0jfRf2I?si=OOEWttfQhieJ9wih
7)https://youtu.be/qFnoRfZknBY?si=BeMrhMF3LML4hBGa
8)https://youtu.be/n9XP6pljtw8?si=3gU-XKgt5JIZe9LE

Activity-Based Learning (Suggested Activities in Class)/Practical Based Learning:

- Contents related activities (Activity-based discussions)
  - For active participation of students, instruct the students to prepare Algorithms/Flowcharts/Programming Codes
  - Organizing Group wise discussions on related topics
  - Seminars

APPENDIX A

Assessment Pattern

1. Assignment
2. Group Discussions
3. Case Studies
4. Practical Orientation on Design Thinking , Creativity & Innovation
5. Participatory & Industry-Integrated Learning
6. Practical activities/Problem Solving exercises
7. Class Presentations
8. Analysis of Industry/Technical/Business Reports
9. Reports on Industrial Visits
10. Industrial/Social/Rural Projects
11. Participation in external Seminars/Workshop
12. Online/Offline Quizzes

APPENDIX B

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes. There are three educational Outcomes as defined by the National Board of Accreditation:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes

APPENDIX C

The Graduate Attributes of NBA

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

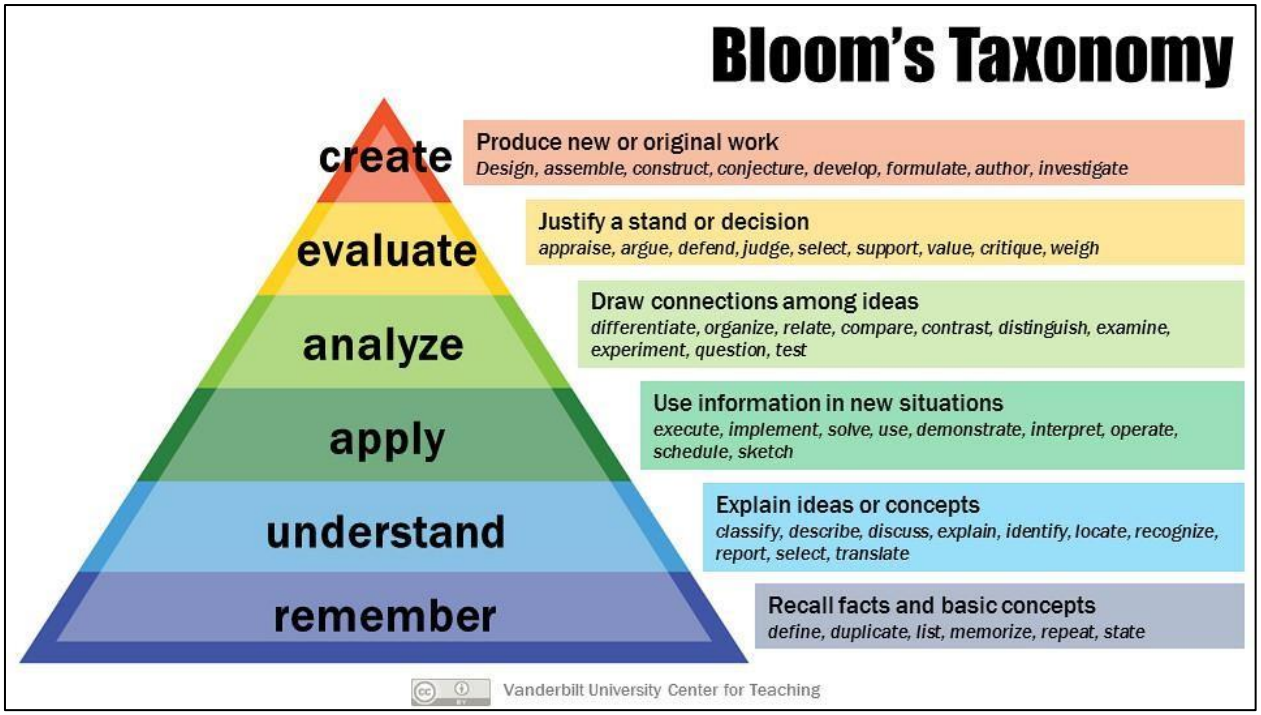
Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

APPENDIX D

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.


Bloom's Taxonomy
create
evaluate
analyze
apply
understand
remember
Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate
Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh
Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test
Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate
Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state
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