NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

SCHEME AND SYLLABUS

BATCH: 2019-23

CREDITS: 175

NEW HORIZON COLLEGE OF ENGINEERING

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The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA

Academic Year 2020-21

ISE – Information Science & Engineering

Third and Fourth Semester

Scheme and Syllabus

CONTENTS

VISION

To evolve as a centre of academic excellence and advanced research in information science and engineering discipline and to endeavour the computational competence of students for their dream career achievement and enhancing the managerial and technical skills.

MISSION

To inculcate students with profound understanding of fundamentals related to discipline, attitudes, skills and their application in solving real world problems, with an inclination towards societal issues and research.

Program Education objectives (PEOs)

PEO1	To excel in their professional career with expertise in providing solutions to Information Technology problems.
PEO2	To pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO3	To exhibit adaptive and agile skills in the core area of Information Science & Engineering to meet the technical and managerial challenges.
PEO4	To demonstrate interpersonal skills, professional ethics to work in a team to make a positive impact on society.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To prepare the students with academic and industry exposure by empowering and equipping them with necessary domain knowledge.	3	2	2	2
To prepare the students for global career in information technology with relevant technical and soft skills.	3	2	2	2
To encourage students to participate in co-curricular and extracurricular activities leading to the enhancement of their social and professional skills.	2	2	3	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 related to algorithms, system software, multimedia, web design, big data analytics and networking or 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 product for business success.

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.

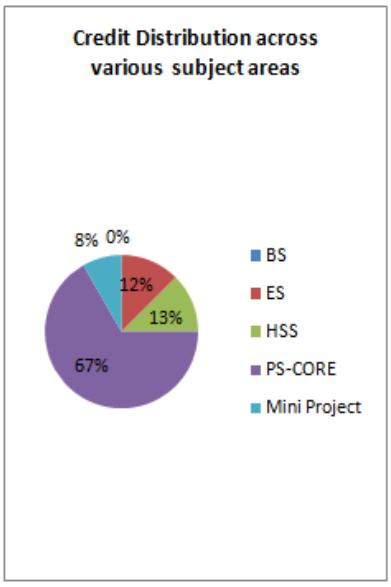
Mapping of POs with PEOs

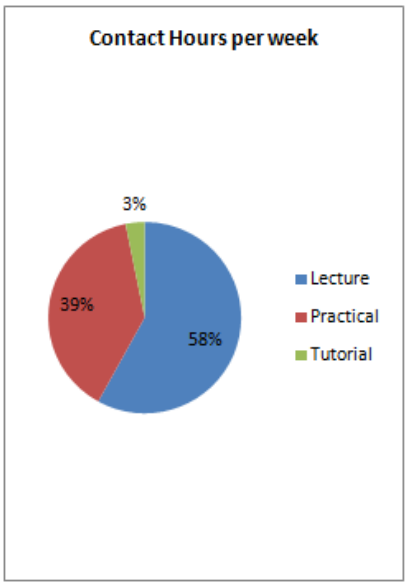
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	2	3	-	-	-	3	-	3	-
PEO2	3	3	3	2	3	-	-	-	3	-	3	-
PEO3	3	3	3	2	3	-	-	-	3	-	3	-
PEO4	3	3	3	2	3	-	-	-	3	-	3	-

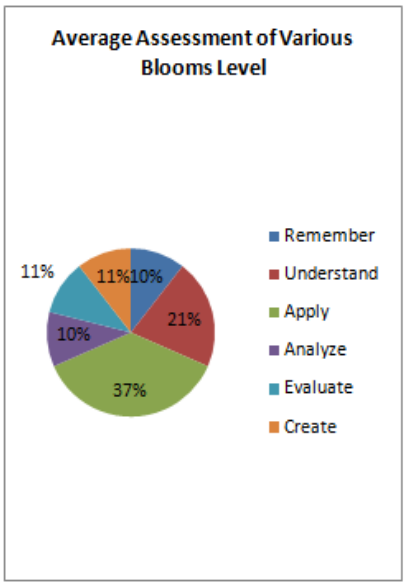
Correlation: 3- High, 2-Medium, 1-Low

New Horizon College of Engineering
Department of Information Science and Engineering
Third Semester B.E Program–Scheme AY: 2020-21

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	19ISE31	Applied Mathematics-III	MAT	2	1	0	3	4	50	50	100
2.	20HSS321	Economics for Engineers	HSS	2	0	0	2	2	25	25	50
3.	20HSS324/ 20HSS325	Aadalitha Kannada / VyavaharikaKannada	HSS	1	0	0	1	2	25	25	50
4.	19ISE33	Digital Logic Design	ISE	3	0	0	3	3	50	50	100
5.	19ISE34	Data Structures using C	ISE	3	0	0	3	3	50	50	100
6.	19ISE35	Computer Organization	ISE	3	0	0	3	3	50	50	100
7.	19ISE36	Python Programming	ISE	3	0	0	3	3	50	50	100
8.	19ISL37	Digital Logic Design lab	ISE	0	0	1	1	2	25	25	50
9.	19ISL38	Data Structures Using C lab	ISE	0	0	1.5	1.5	3	25	25	50
10.	19ISL39	Python Programming lab	ISE	0	0	1.5	1.5	3	25	25	50
11.	19ISE391	Mini Project	ISE	-	-	2	2	-	25	25	50
Total							**24**	**28**	**400**	**400**	**800**

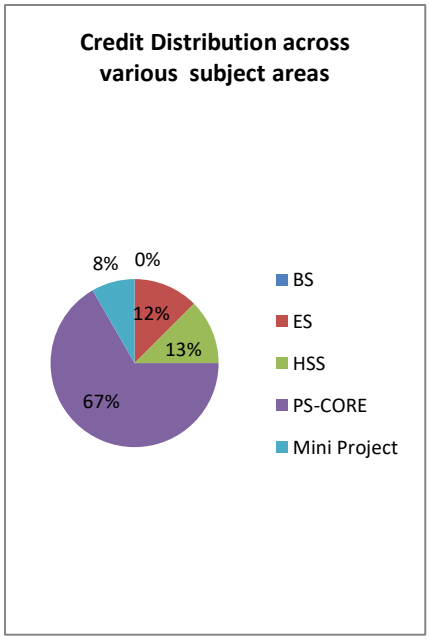


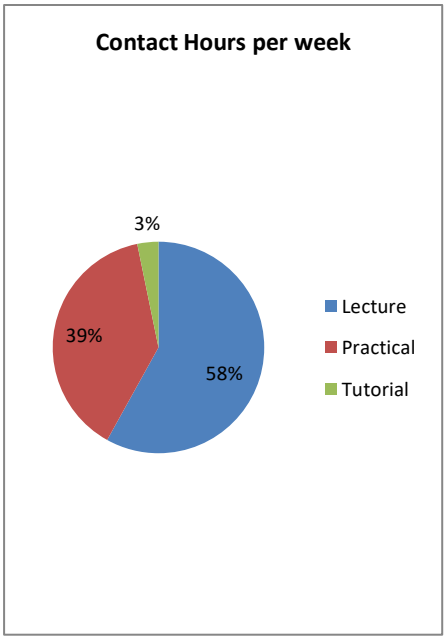


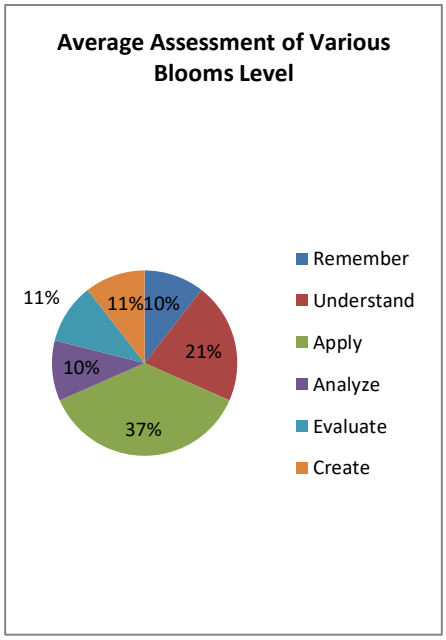


New Horizon College of Engineering
Department of Information Science and Engineering
Fourth Semester B.E Program-Scheme AY: 2020-21

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	19ISE41	Discrete Mathematics And Graph Theory	MAT	2	1	0	3	4	50	50	100
2.	19HSS422	Life Skills for Engineers	HSS	3	0	0	3	3	50	50	100
3.	19HSS423	Environmental Science and Awareness	HSS	0	0	0	0	2	25	25	50
4.	19ISE43	Database Management Systems	ISE	3	0	0	3	3	50	50	100
5.	19ISE44	Oops with Java	ISE	3	0	0	3	3	50	50	100
6.	19ISE45	Operating Systems	ISE	3	0	0	3	3	50	50	100
7.	19ISL46	Database Management Systems Lab	ISE	0	0	2	2	4	25	25	50
8.	19ISL47	Oops with Java lab	ISE	0	0	1.5	1.5	3	25	25	50
9.	19ISL48	Operating Systems lab	ISE	0	0	1.5	1.5	3	25	25	50
10.	19ISE49	Mini Project	ISE	-	-	2	2	-	25	25	50
Total							**22**	**28**	**375**	**375**	**750**







THIRD SEMESTER

(SYLLABUS)

APPLIED MATHEMATICS – III

Course Code : 19CSE31/19ISE31 **Credits : 03**
L:T:P : 2:1:0 **CIE Marks : 50**
Exam Hours : 03 **SEE Marks : 50**

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

CO1	Use appropriate numerical methods to solve algebraic equations and transcendental equations
CO2	Solve initial value problems using appropriate numerical methods and also Evaluate definite integrals numerically
CO3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data and obtain the extremal of a functional.
CO4	Gain ability to use probability distributions to analyze and solve real time problems
CO5	Apply the concept of sampling distribution to solve engineering problems
CO6	Use the concepts to analyze 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
CO1	3	3	3	2	2	-	-	-	1	1	-	2
CO2	3	3	3	2	2	-	-	-	1	1	-	2
CO3	3	3	3	2	2	-	-	-	1	1	-	2
CO4	3	3	3	2	2	-	-	-	1	1	-	2
CO5	3	3	3	2	2	-	-	-	1	1	-	2
CO6	3	3	3	2	2				1	1		2

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**Co's**
1	**Numerical Methods-1:** 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 and Lagrange's formulae for unequal intervals (without proofs)-Problems.	**9L + 2T**	**CO1**
2	**Numerical Methods 2:** Numerical solution of ordinary differential equations of first order and o first degree: Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor and corrector methods-Problems. Numerical integration: Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule (without proofs)-Problems. **Applications:** Application of numerical integration to velocity of a	**9L + 2T**	**CO2**

	particle and volume of solids.		
3	**Statistical Methods and Calculus of Variation:** Fitting of the curves of the form $y = a + bx$, $y = a + bx + cx^2$, $y = ae^{bx}$, $y = ax^b$, and $y = ab^x$ by the method of least square-Problems.Correlation and Regression lines-Problems. Variation ofa function and a functional, Variational problems, Euler's equation and Isoperimetric problems. **Applications:** Minimal surface of revolution and Hanging cable.	**9L + 2T**	**CO3**
4	**Probability distributions:** Random variables (discrete and continuous), probability density functions. Discrete Probability distributions: Binomial and Poisson distributions-Problems. Continuous Probability distributions: Exponential and Normal distributions-Problems. **Joint Probability distributions:** Mathematical expectation, correlation, covariance (discrete random variables only)-Problems.	**9L + 2T**	**CO4**
5	**Sampling Theory:** Sampling, Sampling distributions, test of hypothesis of large samples for means and proportions, confidence limits for means, Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples.	**9L + 2T**	**CO5, CO6**

TEXT BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10thEdition, 2014, ISBN: 978-81-265-5423-2.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

REFERENCE BOOKS:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012,ISBN: 81-219-0345-9.
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd.,9th Edition, 2014, ISBN: 978-81-318-0832-0.

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	5	-
Understand	5	5	-

Apply	5	5	10
Analyze	5	-	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks).

Bloom's Category	Questions (50 Marks)
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

ECONOMICS FOR ENGINEERS

Course Code:20HSS321 **Credits:02**
L: P: T:2:0:0 **CIEMraks : 25**
ExamHour:02 **SEEMarks : 25**

Course Outcomes: On completion of the course, the student will be able to:

CO1	Understanding the knowledge of economics and its importance in business decisions.
CO2	Application of micro economic concept in business.
CO3	Analyze different cost elements in terms of a project.
CO4	Evaluation of a project using various methods of capital budgeting.
CO5	Understand the process of accounting transactions.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	3	1	3	2	2	1	1	3	2
CO2	1	2	3	3	1	3	2	2	1	1	3	2
CO3	1	2	3	3	1	3	2	2	1	1	3	2
CO4	1	2	3	3	1	3	2	2	1	1	3	2
CO5	1	2	3	3	1	3	2	2	1	1	3	2

Module No.	Contents of Module	Hours	Cos
1	Introduction to Economics: Role of Engineer as an Economist, Types and problem of economies, Basics of economics (GDP, National income, inflation, business cycle, fiscal and monetary policies, balance of payment).	5	1
2	Basic concepts of Microeconomics: concept of Demand & Elasticity of Demand. Concept of Supply & Elasticity of Supply, Meaning of Production and factors of production, Production Possibility Curve, Law of variable proportions and returns to scale. Relevance of Depreciation towards industry, Depreciation computing methods.	5	2
3	Concepts of cost of production: different types of cost; accounting cost, sunk cost, marginal cost and opportunity cost. Break even analysis, Make or Buy decision. Cost estimation, Elements of cost as Direct Material Costs, Direct Labor Costs, Fixed Over-Heads, Factory cost, Administrative Over-Heads.	5	3
4	Capital budgeting: Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI. . Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams, Personal Loans and EMI Payment. Present worth, Future worth.	8	4
5	Book Keeping and Accounts: Journal, Ledger, Trialbalance,Asset Types, profit & loss account, balance sheet.	7	5

TEXT BOOKS:

1. RiggsJ.L,EngineeringEconomy,TMH,2012edition
2. JainT.R.,EconomicsforEngineers,VKPublications,2008 Edition
3. IMPANDEY,FinacialManagement,VikasPub.House, 2018 Edition
4. DNDwivedi,MangerialEconomics,VikasPub.House, 2018 Edition
5. Dr.A.R Sainath,Sasikala Devi,Engineering Economics and Financial Accounting,Charulatha Publications,2015 edition

REFERENCE BOOKS:

1. Thuesen H.G, Engineering Economy.PHI,1984
2. Prasanna Chandra, FinancialMangement,TMH,2007
3. Singh Seema, Economics for Engineers, IKInternational,2014
4. Chopra P. N, Principle of Economics, KalyaniPublishers,2012
5. Dewett K K, Modern Economic Theory, S.Chand,2006

Assessment pattern

CIE - Continuous Internal Evaluation (25 Marks, Theory)

Bloom's Category	**Test**	**Assignment**
Marks (out of 25)	**15**	**10**
Remember	5	-
Understand	5	-
Apply	5	-
Analyze	-	5
Evaluate	-	5
Create	-	-

SEE – Semester Ending Examination (25 Marks)

Bloom's Category	**SEE Theory (25)**
Remember	10
Understand	5
Apply	5
Analyze	5
Evaluate	-
Create	-

ಆಡಳಿತ ಕನ್ನಡ

(Kannada for administration)

Course Code : 20HSS324/424	**Credits : 01**
L: T: P : 1:0:0	**CIE Marks : 25**
Exam Hours : 2	**SEE Marks : 25**

ಆಡಳಿತ ಕನ್ನಡ ಅಧ್ಯಯನದ ಕಲಿಕಾಂಶಗಳು

C01 ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ

C02 ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು

C03 ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು

C04 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವಹಿಸಿಕೊಳ್ಳುವರು

CO – PO Mapping:

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

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ –1 ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ

ಅಧ್ಯಾಯ –2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ

ಅಧ್ಯಾಯ –3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

ಅಧ್ಯಾಯ –4 ಪತ್ರ ವ್ಯವಹಾರ

ಅಧ್ಯಾಯ –5 ಆಡಳಿತ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸೈಸ್ ರೈಟಿಂಗ್),ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ

ಅಧ್ಯಾಯ –8 ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ

ಅಧ್ಯಾಯ –9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

ಅಧ್ಯಾಯ –10 ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ /ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದ ಲೇಖಕರು

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರೋ. ವಿ . ಕೇಶವಮೂರ್ತಿ, ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ, ವಿ.ತಾ.ವಿ.ಬೆಳಗಾವಿ

ಪರೀಕ್ಷೆಯ ವಿಧಾನ:

ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ (Continuous Internal Evaluation) : 25 ಅಂಕಗಳು

ಸೆಮಿಸ್ಟರ್ ಪರೀಕ್ಷೆ (Semester End Examination) : 25 ಅಂಕಗಳು

Blooms Category	CIE (25)	SEE (25)
Remember	12	12
Understand	13	13

Vyavaharika Kannada
(Kannada for use)

Course Code	**: 20HSS325/425**	**Credits**	**01**
L: T: P	**: 1:0:0**	**CIE Marks**	**25**
Exam Hours	**: 2**	**SEE Marks**	**25**

Course Outcome: On completion of the course student will be able to:

CO1 Understand Kannada Language.

CO2 Communicate in Kannada Language

CO3 Read simple Kannadawords

CO4 Pronounce Kannada words correctly

CO – PO Mapping:

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

Syllabus

Chapter – 1: Vyavaharika Kannada – Parichaya (Introducton to Vyavaharika Kannada)

Chapter – 2: Kannada Aksharamale haagu uchharane (Kannada Alphabets and Pronunciation)

Chapter – 3: Sambhashanegaagi Kananda Padagalu (Kannada Vocabulary forCommunication)

Chapter – 4: Kannada in Conversations (Sambhashaneyalli Kannada)

Chapter – 5: Activities in Kannada. (Kannada Sambhashanegaagi Chatuvatikegalu)

Text Book:

Vyavaharika Kannada by Dr. L. Thimmesh, Prof. V. Keshavamurthy, published by: VTU, Belagavi

Continuous Internal Evaluation & Semester End Examination : (25 marks Each)

Bloom's Category	CIE(25)	SEE(25)
Remember	12	12
Understand	13	13

DIGITAL LOGIC DESIGN

Course Code :19ISE33		**Credits**	**: 03**
L:T:P:3:0:0	**CIE Marks**		**:50**
Exam Hours : 3	**SEE marks**		**:50**

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

CO1	Understand the working of logic Gates and simplify Boolean function using Karnaugh maps and Quine Mc-Clusky method and implement functions with combinatorial circuits.
CO2	Analyze and design modular combinatorial logic circuits
CO3	Implementation of arithmetic logic circuits
CO4	Understand the Bi- stable elements like flip-flop and use its functionality to analyze and design the sequential circuits and its applications
CO5	Apply the concepts of state and state transition for the analysis and design of sequential circuits.
CO6	Implement the logical circuits using HDL.

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1	1	1	1	1	1	2
CO2	3	3	3	2	1	1	1	1	1	1	1	2
CO3	3	3	3	2	1	1	1	1	1	1	1	2
CO4	3	3	3	2	1	1	1	1	1	1	1	2
CO5	3	3	3	2	1	1	1	1	1	1	1	2
CO6	3	3	3	2	1	1	1	1	1	1	1	2

Module No	Module Contents	Hours	CO's
1	**Digital Logic and Combinational Logic Circuits**: Overview of Basic Gates and Universal Logic Gates, AND-OR-Invert Gates, Positive and Negative Logic, Introduction to HDL Combinational Logic Circuits: Boolean Laws and Theorems, Sum-of-products Method, Truth Table to Karnaugh Map, Pairs, Quads, and Octets, Karnaugh Simplifications, Don't Care Conditions, Product-of-sums Method, Product-of-sums Simplification, Simplification by Quine-McClusky Method.	9	CO1, CO6
2	**Data-Processing Circuits**:Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD-to-Decimal Decoders, Seven-segment Decoders, Encoders, EX-OR gates, Parity Generators and Checkers, Magnitude comparators (1 and 2 bit), Design of multiple output circuits using PLDs.HDL Implementation of Data Processing Circuits	9	CO2, CO6

3	**Arithmetic Circuits:** Binary Addition, Binary Subtraction,Unsigned Binary Numbers, Sign-Magnitude Numbers, 2's Complement Representation, 2's Complement Arithmetic, Arithmetic Building Blocks,The Adder-Subtractor, Arithmetic Logic Unit, Binary Multiplication and Division, Arithmetic Circuits using HDL	9	CO3, CO6
4	**Sequential Circuit Elements**: Latches, types of Flip-flops, Flip-flop excitation tables, Registers, type of Shift Registers, Universal shift Registers, Applications of Shift Registers –Ring Counter, Johnson Counter, Sequence generator, Verilog implementation of Flip-flops and Registers.	9	CO4, CO6
5	**Analysis of Sequential Circuits**: Counters-Asynchronous and Synchronous Counters, Counter Design as Synthesis Problem, Design of Synchronous Sequential Circuits: Moore Model, Mealy Model, State Reduction Techniques, Verilog implementation of counters.	9	CO5, CO6

TEXT BOOKS:

1. Digital Principles and Applications, Donald P Leach and Albert Paul Malvino, 8th Edition, 2014, Tata McGraw Hill.
2. Digital Logic Applications and Design John M Yarbrough Cengage Learning 2011
3. Digital Principles and Design Donald D Givone McGraw Hill Education 1 st Edition, 2002
4. Logic and computer design Fundamentals M. Morries Mano and Charles Kime Pearson Learning 4 th Edition, 2014

REFERENCE BOOKS:

1. Digital Principles and design, Donald D. Givone, 2003, Tata McGraw Hill.
2. Digital Design: with an Introduction to Verilog HDL, M Morris Mano and ichael D. Ciletti, 5th Edition, 2013, Pearson Education.
3. Integrated Electronics – Analog and Digital Circuits and Systems, Jacob Millman, Christos Halkias and Chetan D Parikh, 2nd Edition, 2011, Tata McGraw Hill.

CIE- Continuous Internal Evaluation: Theory (50 Marks)

Bloom's Category (Marks out of 50)	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	-	-	-
Understand	10	-	5
Apply	10	10	5
Analyze	5	5	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination: Theory (50Marks)

Bloom's Category Marks (out of 50)	Marks
Remember	-
Understand	20
Apply	20
Analyze	10
Evaluate	-
Create	-

DATA STRUCTURES USING C

Course Code : 19ISE34 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand the fundamentals of data structures and their applications essential for programming/problem solving.
CO2	Analyze the operational aspects of linear data structures: stacks, queues in Problem solving.
CO3	Select an appropriate data structure for a specified application.
CO4	Understand and implement the concept of linked list data structure in Problem solving.
CO5	Analyze the operational aspects of non-linear data structures: Trees, Graphs in Problem solving.
CO6	Analyze various searching and sorting algorithms.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1	1	-	-	1	-	2
CO2	3	3	3	2	1	1	1	-	-	1	-	2
CO3	3	3	3	2	1	1	1	-	-	1	-	2
CO4	3	3	3	2	1	1	1	-	-	1	-	2
CO5	3	3	3	2	1	1	1	-	-	1	-	2
CO6	3	3	3	2	1	1	1	-	-	1	-	2

Module No.	Module Contents	Hours	CO's
1	**Basic Concepts**: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Arrays and String operations, Dynamic Arrays, Sparse Matrix.	9	CO1
2	**STACKS AND QUEUES:**Stacks, Applications of stacks: Recursion, Evaluation of Expressions, Factorial, Tower of Hanoi. Multiple Stacks. Queues: Definition, Queue representation, Primitive operations on queue, array representation of queues, Circular queue, Priority queue, Double ended queue, Applications of queues.	9	CO2, CO3
3	**Linked Lists:**Dynamic memory allocation revisited – malloc, calloc, realloc, free, Introduction to linked list, Representation of linked list in memory, primitive operations on linked list, searching a linked list, circular linked list, doubly linked list, header linked list, Linked representation of stack,Linked representation of queue.	9	CO3, CO4
4	**TREES:** Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Heaps. Binary Search Trees, Selection Trees, Forests, Representation of Disjoint Sets, Counting Binary Trees, **Graphs**: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search.	9	CO5
5	**Searching** - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods. **Sorting**-Insertion Sort, Selection Sort, Quick sort, Merge sort, Comparison of Sorting methods.	9	CO6

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Gilberg&Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning,2014 .
2. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2 nd Ed, McGraw Hill, 2013
4. A M Tenenbaum, Data Structures using C, PHI, 1989

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co-Curricular (10 Marks)
Remember	5	-	-	-
Understand	5	-	2.5	-
Apply	10	5	2.5	-
Analyze	5	-	-	-
Evaluate	-	5	-	-
Create	-	-	-	10

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Marks
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

COMPUTER ORGANIZATION

Course Code : 19ISE35 **Credits : 03**
L: T: P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Gain the Technical knowledge of how computers are constructed out of a set of functional units and how the functional units operate, interact, and communicate
CO2	Evaluate the merits and pitfalls in computer performance measurements.
CO3	Analyze the memory hierarchy and its impact on computer cost/ performance
CO4	Gain the Technical knowledge on representation of data at the machine level and how computations are performed at the machine level.
CO5	Analyze internal structure of a processor and how the control signals are generated in sequence
CO6	Analyze the various ways in which input, output operations are performed.

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	2	-	-	-	-	-	-	1
CO2	3	1	2	1	-	-	-	-	-	-	-	2
CO3	2	3	2	2	1	1	-	-	-	-	1	3
CO4	3	3	3	1	1	-	-	-	-	-	-	3
CO5	3	1	2	1	2	-	1	-	-	-	-	3
CO6	3	3	2	3	1	-	-	1	-	-	2	3

Module No.	Module Contents	Hours	CO's
1	**Introduction**: Functional Units, Basic Operational Concepts, Numbers, Arithmetic operations and characters, Memory locations and addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing modes, Stacks, Subroutines.	9	CO1, CO2
2	**Input/output organization**: Accessing I/O devices, Interrupts, Bus structure, bus operation, Arbitration	9	CO6
3	**Computer Arithmetic:** Addition subtraction of signed numbers, Design of fast adders, Multiplication of unsigned and signed numbers, Fast multiplication, Integer Division, Floating point numbers and operations	9	CO4
4	**Computer Memory System:** Characteristics of Memory System, The Memory hierarchy, Elements of cache design: Cache addresses ,Cache size, Mapping function, replacement algorithms, Performance considerations, Semiconductor main memory: Organization, DRAM and SRAM, types of ROM	9	CO2, CO3
5	**Basic Processing Unit:** Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, control signals, hardwired control, CISC style processors	9	CO5

TEXT BOOKS:

1. Computer Organization and Embedded systems , Carl Hamacher, ZvonksVranesic, SafeaZaky, McGraw Hill, Sixth Edition, 2012.
2. Computer Organization and Architecture, William Stallings, Pearson/PHI, Eighth edition, 2013

REFERENCE BOOKS:

1. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Elsevier, Fifth Edition, 2012.

2. Structured Computer Organization, Andrew S. Tanenbaum, PHI/Pearson, Sixth Edition 2013.
3. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication, 2013.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests** (25 Marks)	**Assignments** (15 Marks)	**Quizzes** (10 Marks)
Remember	10	5	5
Understand	5	5	5
Apply	5	5	-
Analyze	5	-	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	**Tests**
Remember	20
Understand	10
Apply	10
Analyze	10
Evaluate	-
Create	-

PYTHON PROGRAMMING

Course Code : 19ISE36 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand the benefits of python programming over other languages and program using python language.
CO2	Develop high order functions, file handling modules in Python language.
CO3	Implement new data structures in python to handle real world data.
CO4	Model the real world entities as classes and objects using python object oriented programming concepts.
CO5	Apply exception handling and gain efficient testing, debugging skills in python.
CO6	Develop File Processing applications based on python programming libraries.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1

CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Module No.	Module Contents	Hours	CO's
1	**Introduction to Python:** The basic elements of Python,The first Program, Objects, Expression, Numerical Types, Variables, Keywords and Assignments, multiple Assignments, Operators and Operands, Order of operations, Decision making, Loop control structures, Input data handling	9	CO1
2	**Functions andScoping :** Functions and Scoping, Function calls, Type conversion, Type coercion, Math functions, Functions as Objects ,Composition ,Variables and parameters are local, global, Recursion, Modules, Files Handling, Directories	9	CO2
3	**Sequence Data Types:** Tuples, Set, Lists, List Comprehension, Strings, Dictionaries.	9	CO3
4	**Classes and Objects:** Encapsulation,Classes and objects, Encapsulation, Inheritance, Polymorphism.	9	CO4, CO5
5	**Exceptions and assertions:** Handling exceptions, Exceptions as a control flow mechanism, Assertions. **Applications:**Web Scrapping, Working with Excel Spreadsheets, Working with PDF & Word documents,Working with CSV and JSON data	9	CO6

TEXT BOOKS:

1. John V Guttag, "Introduction to Computation and Programming Using Python", 2015,PrenticeHall of India
2. Mark Lutz, "Learning Python", 2015, 5th Edition, O'Reilly publication,2016
3. Charles R. Severance, "Python for Everybody", Creativecommons 2016.

REFERENCE BOOKS:

1. Wesley J. Chun, "Core Python Programming", ,2nd Edition, Prentice Hall,2013
2. Allen Downey, Jeffrey Elkner and Chris Meyers, "How to think like a Computer Scientist,Learning with Python",Green Tea Press, 2014
3. "The Python Tutorial", http://docs.python.org/release/3.0.1/tutorial/
4. Automate the Boring Stuff with Python, https://automatetheboringstuff.com/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	-	5
Apply	10	10	5
Analyze	-	-	-

Evaluate	-	-	-
Create	-	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

DIGITAL LOGIC DESIGN - LABORATORY

Course Code : 19ISL37 **Credits : 1**
L:T:P : 0:0:1 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Analyze and design modular combinatorial logic circuits.
CO2	Realize the Flip flops and verify the truth table
CO3	Design of sequential circuits
CO4	Implement the logical circuits using HDL.

Mapping of Course Outcomes to Program Outcomes

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

Experiment No.	Experiment
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	Perform n bit addition / subtraction using 4 bit full adder IC.
3	Realize JK, D and T Flip-Flops and verify its truth table
4	Design and implement Ring counter and Johnson counter using 4-bit shift register and demonstrate its working.
5	Design and implement a mod-n (n<8) synchronous up or down counter using J-K Flip-Flop ICs and demonstrate its working.
PART-B	
6	Simulate and verify the working of 8:1 multiplexer using Verilog code.
7	Simulate and verify the working of n bit adder/subtractor using Verilog code.
8	Simulate and verify the working of the JK,D and T Flip flop using Verilog code.
9	Simulate and verify the working of Ring and Johnson Counter using Verilog code.
10	Simulate and verify mod 8 synchronous up or down counter using Verilog code.

Note:
For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
  - Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	**Tests(25 marks)**
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	**Tests**
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

DATA STRUCTURES USING C - LABORATORY

Course Code	**: 19ISL38**	**Credits**	**: 1.5**
L:T:P	**: 0:0:1.5**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

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

CO1	Analyze the operational aspects of linear data structures: stacks, queues in Problem solving.
CO2	Implement the concept of linked list data structure in Problem solving.
CO3	Analyze the operational aspects of non-linear data structures: Trees, Graphs in Problem solving.
CO4	Apply various searching and sorting algorithms.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
	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	Design, Develop and Implement a Program in C for the following operations on Strings. a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP) b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR. Support the program with functions for each of the above operations. Don't use Built-in functions.

3	Design, Develop and Implement a Program in C to create a structure to store the name, account number and balance of customers (more than 10) and store theirinformation. 1 - Write a function to print the names of all the customers having balance lessthan$200. . 2 - Write a function to add $100 in the balance of all the customers having more than $1000 in their balance and then print the incremented value of their balance.
4	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
5	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.
6	Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Postfix expression with single digit operands and operators: +, -, *, /, %, ^. b. Solving Tower of Hanoi problem with n disks.
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 Circular QUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations
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, PhNo a. Create a SLL of N Students Data by using front insertion. b. Display the status of SLL and count the number 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

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, PhNo a. Create a DLL of 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
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.
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 Inorder, Preorder and Post Order c. Search the BST for a given element (KEY) and report the appropriate message d. Exit
12	Construct a dictionary of key-value pairs using Tree and search for a value matching a key.

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
  - Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests(25 Marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

PYTHON PROGRAMMING LABORATORY

Course Code	**: 19ISL39**	**Credits**	**: 1.5**
L:T:P	**: 0:0:1.5**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

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

CO1	Develop high order functions, file handling modules in Python language.
CO2	Implement new data structures in python to handle real world data.
CO3	Model the real world entities as classes and objects using python object oriented programming concepts.
CO4	Develop File Processing applications based on python programming libraries.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
	PART-A
1	a. Design and Implement a Python program to accept 3 digits from the user and print all possible combination from digits. b. Create a Python program to take two command line inputs and compute the GCD and LCM of these two numbers.
2	a. Create a Python program to find the sum of natural numbers up to n using recursive function b. Design and Develop a Python Program to Create a Dictionary with Key as First Character and Value as Words Starting with that Character.
3	a. A list rotation consists of taking the last element and moving it to the front. Forinstance, if we rotate the list [1,2,3,4,5], we get [5,1,2,3,4]. If we rotate it again, we get [4,5,1,2,3]. Write a Python function *rotatelist(ls,k)* that takes a list ls and a positive integer k and returns the list ls after k rotations. If k is not positive, your functionshould return ls unchanged. Note that your function should not change ls itself, and should return the rotated list. Here are some examples to show how your function shouldwork. >>>rotatelist([1,2,3,4,5],1) #output is [5, 1, 2, 3, 4] >>>rotatelist([1,2,3,4,5],3) #output is [3, 4, 5, 1, 2]

	>>>rotatelist([1,2,3,4,5],12) #output is [4, 5, 1, 2, 3] b. Design and implement a python code that accepts two string from user and displays the characters which are present in both the strings. Use Set sequence type to achieve the same.
4	a. Implement a Python program to count the numbers of characters in the string and store them in a dictionary data structure b. Develop a Python program print to first 10 lines and last 10 lines in a file.
5	a. Design a python program to compute the number of characters, words and lines in a file.Also Print the most frequent words read from the file. **b.** Apply import,from, * and other module related concepts to create a module called "calc" consists of 4 function that should return sum, division, multiplication and subtraction. Create another module caller "user",import the calc module and illustrate the use of all the functions of calc module.
6	Design & Implement the program in python to demonstrate sending Email and Text messages over the web.
PART-B	
7	Design and Develop a Python Program to Append, Delete and Display Elements of a List Using Classes and Objects.
8	Design and Implement a Python Program to perform addition, subtraction, multiplication of two complex numbers using binary operators overloading.
9	Demonstrate the concept of Method Resolution order in multiple inheritance Python Program.
10	Create a Python 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 create 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".
11.	Design & Implement the program in python to Manipulate images
12	Design & Implement the program in python to handle the events in an Application

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%

- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

MINI PROJECT

Course Code : 19ISE391 **Credits : 2**
CIE Marks : 25 **SEE Marks : 25**
Exam Hours : 3

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

CO1	Analyze the Real world problem through survey of existing problems
CO2	Design the modules for solving the problems identified
CO3	Implement the design modules with suitable programming language
CO4	Test the working modules at different levels

Mapping of Course Outcomes to Program Outcomes:

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

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

Note :

- Every student should do individual mini project in the areas suggested by the department expert committee
- Minimum 2 reviews will be conducted by the department expert committee to know the progress of the mini project work
- In each review student should give presentation on the work carried out and show the relevant models
- 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 25%

FOURTH SEMESTER

(SYLLABUS)

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Code: 19CSE41/19ISE41 **Credits: 03**
L: T: P: S: 2:1:0:0 **CIE Marks: 50**
Exam Hours : 03 **SEE Marks: 50**

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

CO1	Verify the correctness of an argument using propositional and predicate logic and truth tables.
CO2	Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.
CO3	Solve problems involving relations and functions.
CO4	Apply Pigeon hole principle to solve real life problems
CO5	Ability to represent and apply graph theory in solving computer science problems.
CO6	Illustrate the fundamental concepts of trees, connectivity and planarity graphs

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	3	1	-	-	-	1	3	-	2
CO2	3	3	2	3	1	-	-	-	1	3	-	2
CO3	3	3	2	3	1	-	-	-	1	3	-	2
CO4	3	3	2	3	1	-	-	-	1	3	-	2
CO5	3	3	2	3	1	-	-	-	1	3	-	2
CO6	3	3	2	3	1	-	-	-	1	3	-	2

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**CO's**
1	**Mathematical Logic:** Basic Connectives and Truth Tables, Tautology and Contradiction, Logic Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, Quantifiers Definition and the use of Quantifiers in logical implication.	**9L + 2T**	**CO1**
2	**Properties of the Integers**: The Well Ordering Principle, Mathematical Induction, Fundamental Principles of Counting: The Rules of Sum and Product, Permutations, Combinations, The Binomial Theorem.	**9L + 2T**	**CO2**
3	**Relations and Functions**: 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	**9L + 2T**	**CO3, CO4**
4	**Graph Theory:** Graphs-Definitions and examples, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, graph isomorphism, Euler graphs, Hamiltonian paths and cycles. Trees, Properties of trees, Distance and centers in tree, Rooted and binary trees.	**9L + 2T**	**CO5**

5	**Trees, Connectivity and Planarity**: Spanning trees , Fundamental circuits, Spanning trees in a weighted graph, cut sets, Properties of cut set, All cut sets, Fundamental circuits and cut sets, Connectivity and separability, Network flows, 1-Isomorphism, 2-Isomorphism, Combinational and geometric graphs, Planar graphs, Different representation of a planar graph.	**9L + 2T**	**CO6**

TEXT BOOKS:

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004.
2. Narsingh Deo, Graph Theory: With Application to Engineering and Computer Science, Prentice Hall of India**,** 2003.

REFERENCE BOOKS:

1. Basavaraj S. Anami and Venakanna S. Madalli, Discrete Mathematics – A Concept based approach, Universities Press, 2016.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
3. D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson,2004.
4. Thomas Koshy, Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	5	-
Understand	5	5	-
Apply	5	5	10
Analyze	5	-	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks).

Bloom's Category	Questions (50 Marks)
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

LIFE SKILLS FOR ENGINEERS

Course Code : 19HSS422 | **Credits : 03**
L: P: T: : 3:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

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

CO1	Set personal and professional goals
CO2	Develop his critical thinking skills and practise creativity.
CO3	Demonstratean understanding of personal and professional responsibility
CO4	Apply the concepts of personality development and grooming in real life
CO5	Understand self and work with groups
CO6	Articulate and convey his ideas and thoughts with clarity and focus

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	3	3	3	2	3
CO2	-	-	-	-	-	2	-	3	3	3	2	3
CO3	-	-	-	-	-	2	-	3	3	3	2	3
CO4	-	-	-	-	-	2	-	3	3	3	2	3
CO5	-	-	-	-	-	2	-	3	3	3	2	3
CO6	-	-	-	-	-	2	-	3	3	3	2	3

Module No.	Module Contents	Hours	COs
1	Goal Setting: Importance of Goals: Creating SMART goals; Critical Thinking and Problem Solving, Six Thinking Hats, Multiple Intelligences and Mind Mapping	6	CO1, CO2
2	Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career and life, Developing a 'Credible Character Impression about self', Self-Motivation, Developing healthy Self-esteem, Leadership	8	CO3
3	Personality Development and Grooming: Expectations from the industry, building personal presence, corporate grooming, corporate etiquettes, Personal branding and image management	6	CO4
4	Self-Awareness and Self-Management: Emotional Intelligence, Knowing your own self- understanding personality, perception, values and attitude. Interpersonal skills - Knowing others, working well with others, developing the right attitude for work, being proactive and positive.	8	CO5

5	Articulation and Group Discussion: Ideas generation, expressing thoughts in a logical flow, presenting views in a group	8	CO6

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

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**Self-Study**	**Peer Evaluation**
Marks (out of 50)	**10**	**15**	**15**	**10**
Remember	-	-	-	-
Understand	-	-	-	-
Apply	5	5	-	5
Analyze	-	-	5	-
Evaluate	-	-	-	
Create	5	10	10	5

SEE- Semester End Examination (50 Marks)

NOTE: Being a Life skills course we felt it would be suitable to do the final assessment through a structured group discussion which will provide an opportunity to test students in all levels of Bloom's Taxonomy.

Bloom's Category	**Group Discussion**
Remember	**5**
Understand	**10**
Apply	**10**
Analyse	**10**
Evaluate	**5**
Create	**10**

ENVIRONMENTAL SCIENCE AND AWARENESS

Course Code : 19HSS423 **Credits :** 0

L : T : P : 0:0:0 **CIE Marks :** 25

Exam Hours : 02 Hrs **SEE Marks :** 25

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

CO1	Understand the concepts of environment, ecosystem, biodiversity and its interdependence on human life.
CO2	Develop an insight on types of natural resources and the concept of sustainable development.
CO3	Understand the different control measures of pollution and importance of waste management.
CO4	Think and apply technology as a solution for environment related concerns, keeping in view the different environmental acts and amendments.

Mapping of Course Outcomes to Program Outcomes:

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

Module No.	Content of Module	Hrs	COs
1	**Introduction to Environment, Ecosystem and biodiversity:** Environment - Components of Environment, Scope and importance of Environmental studies, Ecosystem: Types & Structure of Ecosystem, Energy flow in the ecosystem, Food chains – food webs & ecological pyramids. Biodiversity – Definition, Hot-spots of biodiversity, Threats to biodiversity, Conservation of biodiversity.	05	CO1
2	**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems. Role of an individual in conservation of natural resources. Water conservation, rain water harvesting. Balanced use of resources for sustainable lifestyle – strategies.	04	CO2
3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise pollution, Thermal Pollution and Nuclear hazards. Role of an individual in prevention of pollution - Waste management – urban and industrial wastes.	04	CO3

4	**Social Issues and Environment:** Environmental ethics – issues and possible solutions. Environment protection act – Air (prevention and Control of pollution) act & Water (prevention and Control of pollution) act. Role of government: Swatch Bharat Abhiyan, National Mission for Clean Ganga (NMCG), River rejuvenation, Role of Non-governmental Organizations (NGOs), Global warming and climate change.	04	CO3 CO4
5	**Human Population and Environment:** Population growth & explosion, Family welfare programme. Environment and human health, Human rights, Value education. Role of Technology in protecting environment and human health.	05	CO4

Text Books:

1. "Environmental Studies: Basic Concepts" by Ahluwalia, V. K. . The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016. ISBN: 817993571X, 9788179935712.
2. "Textbook of Environmental Studies for Undergraduate Courses of all branches of Higher Education" by Bharucha, Erach for UGC, New Delhi, 2004. ISBN: 8173715408, 9788173715402.

Reference Books:

1. Handbook of Environmental Engineering by Rao Surampalli, Tian C. Zhang, Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma; McGraw Hill Professional, 2018. ISBN: 125986023X, 9781259860232
2. Environmental Science and Engineering by P. Venugopala, Prentice Hall of India Pvt. Ltd, New Delhi, 2012 Edition. ISBN: 978-81-203-2893-8.
3. Environmental Science- WorkiFng with the earth by G Taylor Miller Jr, Brooks Cole Thompson Publications, 10 thEdition. ISBN: 10: 0534424082.
4. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of India Pvt. Ltd, 2005 Edition. ISBN: 8120327748, 9788120327740.

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's	Tests	Assignments	Quiz
Marks (out of 50)	**15**	**05**	**05**
Remember	5	2	2
Understand	5	2	2
Apply	5	1	1
Analyze	0	0	0
Evaluate	0	0	0
Create	0	0	0

SEE – Semester End Examination (25 Marks)

Bloom's Category	Tests
Remember	10
Understand	10
Apply	5
Analyze	0
Evaluate	0
Create	0

DATABASE MANAGEMENT SYSTEMS

Course Code : 19ISE43 **Credits: 03**
L: T: P : 3:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks: 50**

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

CO1	Understand the database concepts, different database models, and database management systems and design database schema.
CO2	Develop the ER structures for real world examples using the concept of Entity Relationship models with constraints and cardinalities.
CO3	Understand the concepts of Normalization and design database which possess no anomalies.
CO4	Apply the concepts of relational database theory to manage relational database management system.
CO5	Apply the concepts of triggers, embedded and dynamic SQL.
CO6	Implement database applications in SQL.

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	-	-	1	-	-	1	-	1
CO2	3	2	3	2	-	1	-	1	-	1	-	1
CO3	3	2	3	2	-	-	-	-	-	1	-	-
CO4	3	2	3	2	-	-	1	-	-	1	-	1
CO5	3	2	3	2	2	-	1	-	1	1	-	1
CO6	3	2	3	2	2	-	1	-	1	1	-	1

Module No.	Module Contents	Hours	CO's
1	**Introduction:** Introduction, An example, Characteristics of Database Approach. **Database Applications**: Need for data management, Advantages of using DBMS approach.**Data models & Database Architecture**:Data models, schemas and instances, Three-schema architecture and data independence, Centralized and client-server architectures.	9	CO1
2	**ER Diagrams**: Entity Types, Entity Sets, Attributes and Keys, Relationship types, Roles and Structural Constraints, Weak Entity Types, ER Diagrams.	9	CO2
3	**Relational Model**: ER to Relational Mapping, Constraints, Keys Dependencies.**Functional Dependencies**: Normalization First, Second, Third & Fourth Normal Forms,BCNF.	9	CO3
4	**Relational Algebra:** UpdateOperations, UnaryRelational Operations: SELECT and PROJECT, Relational AlgebraOperations from Set Theory, Binary Relational Operations: JOIN andDIVISION; Additional Relational Operations; Examples of Queries inRelational Algebra; Relational Database Design Using ER- to-RelationalMapping.	9	CO4
5	**Introduction to SQL**:Basic DDL , Data Constraints ,Triggers Database Security , AdvancedSQL - Embedded & Dynamic SQL , Views Basic queries in SQL, Morecomplex SQL Queries,Insert, Delete and Update statements in SQL.	9	CO5, CO6

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2010.
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database S y s t e m s" , Sixth Edition, Pearson / Addison - Wesley, 2010
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.

REFERENCES:

1. C.J. Date, A. Kannan, S. Swamynatham, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	5
Understand	5	5	5
Apply	10	5	5
Analyze	-	5	-
Evaluate	5	-	-
Create	-	-	-

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code : 19ISE44 **Credits : 03**
L:P:T : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Model the real world applications using Object Oriented Programming concepts.
CO2	Identify the importance of inheritance andinterface concepts
CO3	Analyze the importance of exception handling and learn the importance of string handling
CO4	Apply the concept of Multithreading in concurrent programming
CO5	Develop applications using collections framework for managing user defined types
CO6	Solve the real world problems using Object Oriented concepts and collection framework in Java.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Module	Module Contents	Hours	CO's

No.			
1	**Introduction to Java:** The Java Language, Java Development Kit (JDK); Java Buzzwords, Byte Code, JVM ,JRE and Java environment, Datatypes, 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	9	CO1
2	**Inheritance and Interfacing:** Inheritance, Method Overriding, Access specifiers, Abstract Classes, Final members, The Object Class, Interfaces, Package Fundamentals**.**	9	CO2
3	**String Manipulation:** Constructors, Length Operations, Character Extraction, Comparison, Searching, Modifying, StringBuffer, **Exception handling:** Fundamentals, Types, Using try, catch, throw, throws, finally, User Defined Exceptions.	9	CO3
4	**Multi Threading:** Thread Concept,Java Thread Model, The main method, Creating Threads, Thread Priorities, Synchronization	9	CO4
5	**Collection Framework:** Collections Overview, Collection Interfaces, Set, List, Map, Queue, Collection Classes, Type Wrappers, Accessing a collection using an Iterator,Sorting collections using utility methods equals() and hashCode contract in Java collections, overriding equals and hashCode methods in Java.	9	CO5 CO6

TEXT BOOKS

1. Herbert Schildt, "Java:The Complete Reference", 9th Edition, OraclePress,Tata McGraw Hill.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCES:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.
6. Y. Daniel Liang, " Introduction to JAVA Programming",7th Edition, Pearson Education,2007.

CIE- Continuous Internal Evaluation (50Marks)

Bloom's Category	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co-Curricular (10 Marks)

Remember	5	-	-	-
Understand	5	5	2.5	-
Apply	10	5	2.5	5
Analyze	5	-	2	-
Evaluate	-	-	-	-
Create	-	-	-	5

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	-
Create	5

OPERATING SYSTEMS

Course Code : 19ISE45 **Credits: 03**
L:P:T : 3:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand the concept of services provided by and the structure of an operating system.
CO2	Compare, implement and know when to apply various process scheduling algorithms
CO3	Ability to Learn and implement various operations on deadlock
CO4	Evaluate the efficiency aspect of using system resources and memory management schemes
CO5	Handle operations like disk scheduling and file operations.
CO6	Ability to handle files in UNIX

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	1	1	-	-	1	-	1
CO2	3	2	2	2	1	1	1	-	-	1	-	1
CO3	3	2	2	2	1	1	1	-	-	1	-	1
CO4	3	2	2	2	1	1	1	-	-	1	-	1
CO5	3	2	2	2	1	1	1	-	-	1	-	1
CO6	3	2	2	2	1	1	1	-	-	1	-	1

Module No	Module Contents	Hours	COs
1	**OPERATING SYSTEMS OVERVIEW:** What is an operating system; history operating system concepts, system calls ; operating system structure; operating system operations; process management; memory management; storage management; protection and security; system boot, Case studies-UNIX, SOLARIS threads management.	9	CO1
2	**PROCESS MANAGEMENT:** Process Concept, Process Scheduling, Scheduling algorithms, Preemptive strategies Non preemptive strategies, Operations on Processes, Inter process Communication; Threads Overview, Multithreading Models, process synchronization, critical section problem, semaphores, UNIX System calls.	9	CO2
3	**DEADLOCKS:** Deadlocks: system model; deadlock characterization; methods for handling deadlocks; deadlock prevention; deadlock avoidance; deadlock detection and recovery, file locking system in UNIX.	9	CO3
4	**STORAGE MANAGEMENT:** Memory management strategies ;swapping; contiguous memory allocation; paging; Page replacement, Allocation of frames; segmentation, Memory management in UNIX.	9	CO4
5	**I/O SYSTEMS:**File system storage-File concept, file system structure, Access methods, Directory structure, File-system mounting ;disk structure ;disk scheduling, sharing and protection, UNIX File I/O operations.	9	CO5, CO6

TEXT BOOKS:

1. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
2. Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 2nd edition.
3. Abraham Silberchatz, Peter B. Galv, Greg Gagne,"Operating System Concepts", 8th edition, John Wileyin
4. UNIX-Concepts &Applications,SUMITABHADAS,McGraw Hill,TATA McGraw Hill Edition ,4th edition, 26th reprint 2015.
5. Sumitabha Das., Unix Concepts and Applications., 4th Edition., Tata McGraw Hill

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw HillEducation", 1996.
3. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata
4. Matthew portnoy,"Virtualization Essentials", 2nd edition ,Wiley India pvt.ltd

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	5	5	5
Apply	10	10	5
Analyze	5	-	-
Evaluate	-	-	-
Create	-	-	-

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

DATABASE MANAGEMENT SYSTEMS LABORATORY

Course Code : 19ISL46 **Credits: 2**
L: T: P : 0:0:2 **CIE Marks: 25**
Exam Hours : 3 **SEE Marks: 25**

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

CO1	Develop the ER structures for real world examples using the concept of Entity Relationship models with constraints and cardinalities.
CO2	Apply the concepts of relational database theory to manage relational database management system.
CO3	Apply the concepts of triggers, embedded and dynamic SQL.
CO4	Implement database applications in SQL.

Mapping of Course Outcomes with Program Outcomes

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

Common set of operations to be carried out for all the experiments:

1. Creation of tables, insertion of values with Data Definition Commands (use constraints while creating tables) and exercises on Data Manipulation Commands.

2. Developing Queries using clauses SELECT, FROM, WHERE, GROUP BY, HAVING.
3. Developing Queries using clauses Aggregate functions COUNT, SUM, AVG, MAX and MIN.
4. Developing Queries (along with NESTED Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT Constraints. Creation and Manipulation of Views.
5. Creation of simple PL/SQL programs and usage of cursor and triggers.
6. Procedure implementation

List of Experiments are as follows:

Experiment No.	Experiment
PART-A	
1	Class marks management system
2	Accounting package for a shop
3	Database manager for Magazine and news paper agency
4	Ticket booking for performances
5	Personal accounts – Insurance ,loans etc
6	Doctors diary and Billing systems
7	Hostel accounting
PART-B	
8	Video tape library
9	History of cricket scores
10	Cable TV transmission manager
11	Personal library
12	Project management system
13	Placement data management
14	Students club management system

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Taxonomy	Lab (25 Marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 marks)

Bloom's Taxonomy	Lab
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY

Course Code : 19ISL47 **Credits : 1.5**
L:T:P : 0:0:1.5 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Design applications based on inheritance and interfacing concepts.
CO2	Develop solutions applying multithreading concepts in concurrent programming.
CO3	Develop applications using collections for managing user defined types
CO4	Apply the OOPS concepts to create solution to real world problems

Mapping of Course Outcomes to Program Outcomes:

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

List of programs:

Experiment No.	Experiment
PART-A	
1	Design and Implement a Java program that prints all real solutions to the quadratic equation ax2 + bx + c=0. Read in a, b, c from the user and use the quadratic formula. If the discriminant b2 – 4ac is negative, display a message stating that there are no real solutions.
2	The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent values is the sum of the two values preceding it. Implement a java program that uses both a. recursive function b. non recursive functions to print the nth value in the fibonacci sequence.
3	Design and implement an algorithm to accept an array of 5 positive integers. The algorithm must then find the smallest positive integer in the array which cannot be formed from the sum of 2 numbers in the array.
4	Develop a Java program to count the frequency of words, characters in the given line of text provided by user. Also display the words in the line in ascending order.
5	Design and Develop a simple Java program to find the longest substring without repeating characters in a given String. Accept the String through CommandLine argument.
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". Develop a Java program for the same.
PART-B	
7.	Design a class that can be used by a health care professional to keep track of 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 703 Next, 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.

8.	A library needs to develop an online application for two types of users/roles, Adults and children. Both of these users should be able to register an account. Any user who is less than 12 years of age will be registered as a child and they can borrow a "Kids" category book for 10 days, whereas an adult can borrow "Fiction" category books which need to be returned within 7 days. Develop Interfaces and classes for the categories mentioned above. 1. Create an interface LibraryUser with the following methods declared, • Method Name • registerAccount • requestBook 2. Create 2 classes "KidUsers" and "AdultUser" which implements the LibraryUser interface. 3. Both the classes should have two instance variables as specified below. • Instance variables Data type • age int • bookType String 4. The methods in the KidUser class should perform the following logic. registerAccount function: • if age < 12, a message displaying "You have successfully registered under a Kids Account" should be displayed in the console. • If(age>12), a message displaying, "Sorry, Age must be less than 12 to register as a kid" should be displayed in the console. • requestBook function: • if bookType is "Kids", a message displaying "Book Issued successfully, please return the book within 10 days" should be displayed in the console. • Else, a message displaying, "Oops, you are allowed to take only kids books" should be displayed in the console. 5. The methods in the AdultUser class should perform the following logic. registerAccount function: • if age > 12, a message displaying "You have successfully registered under an Adult Account" should be displayed in the console. • If age<12, a message displaying, "Sorry, Age must be greater than 12 to register as an adult" should be displayed in the console. • requestBook function: • if bookType is "Fiction", a message displaying "Book Issued successfully, please return the book within 7

	days" should be displayed in the console. • Else, a message displaying, "Oops, you are allowed to take only adult Fiction books" should be displayed in the console. 6. Create a class "LibraryInterfaceDemo.java" with a main method which performs the above functions.
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".
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. Use Thread handling Apis to perform the same.
11.	Create an Employee class with the related attributes and behaviors. Create one more class EmployeeDB which has the following methods. • booleanaddEmployee(Employee e) • booleandeleteEmployee(int eCode) • String showPaySlip(int eCode) • Employee[] listAll() Use an ArrayList which will be used to store the employees and use enumeration/iterator to process the employees. Write a Test Program to test that all functionalities are operational.
12.	Create a HashMap to create a Telephone book storing name and phone number. Write a program so that when a name is given, corresponding phone number should be given back

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	15

Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

OPERATING SYSTEMS - LAB

Course Code : 19ISL48 **Credits : 1.5**
L:T:P : 0:0:1.5 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Compare, implement and know when to apply various process scheduling algorithms
CO2	Ability to Learn and implement various operations on deadlock
CO3	Evaluate the efficiency aspect of using system resources and memory management schemes
CO4	Develop applications based on file handling in UNIX

Mapping of Course Outcomes to Program Outcomes

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

Experiment No.	Experiment
	PART-A
1	Design, Develop and Implement Basics of UNIX commands.
2	Design, Develop and Implement a Program to implement a shell.
3	Design, Develop and Implement a program to change current working

	directory and display the inode details for each file in the new directory
4	Design, Develop and Implement a Parent process – Child process Relationship.
5	Design, Develop and Implement a Program that creates a child process. Parent process writes data to pipe and child process reads the data from pipe and prints it on the screen.
6	Design, Develop and Implement a Program for Process system calls.
	PART-B
7	Design, Develop and Implementation of CPU scheduling by using a) Round Robin b) FCFS
8	Design, Develop and Implement Implementation of CPU scheduling by using a) Shortest job first b) Priority
9	Design, Develop and Implement File management system calls: a). create a file b). Copy one file to another c). Linking a file d). Delete a file.
10	Write a program that demonstrates how two processes can share a variable using semaphore
11	Design, Develop and Implement an Algorithm for Dead Lock Detection
12	Design, Develop and Implement a Program by using page replacement algorithms for virtual memory management

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	**Tests (25 Marks**
Remember	-
Understand	5
Apply	10
Analyze	5
Evaluate	-
Create	5

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	10
Analyze	5
Evaluate	-
Create	5

MINI PROJECT

Course Code : 19ISE49 **Credits : 2**
CIE Marks : 25 **SEE Marks : 25**
Exam Hours : 3

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

CO1	Analyze the Real world problem through survey of existing problems
CO2	Design the modules for solving the problems identified
CO3	Implement the design modules with suitable programming language
CO4	Test the working modules at different levels

Mapping of Course Outcomes to Program Outcomes:

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

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

Note :

- Every student should do individual mini project in the areas suggested by the department expert committee

- Minimum 2 reviews will be conducted by the department expert committee to know the progress of the mini project work
- In each review student should give presentation on the work carried out and show the relevant models
- 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 25%

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of aneducational 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 degreeprogram 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. Graduateattributes are separately listed in Appendix C

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

Mapping of Outcomes

APPENDIX B

The Graduate Attributes of NBA

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

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

Design/development of solutions: Design solutions for complex engineering problems anddesign 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 bystraightforward 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, andmodern 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 assesssocietal, 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 engineeringsolutions 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 andnorms of the engineering practice.

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

Communication: Communicate effectively on complex engineering activities with theengineering 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.

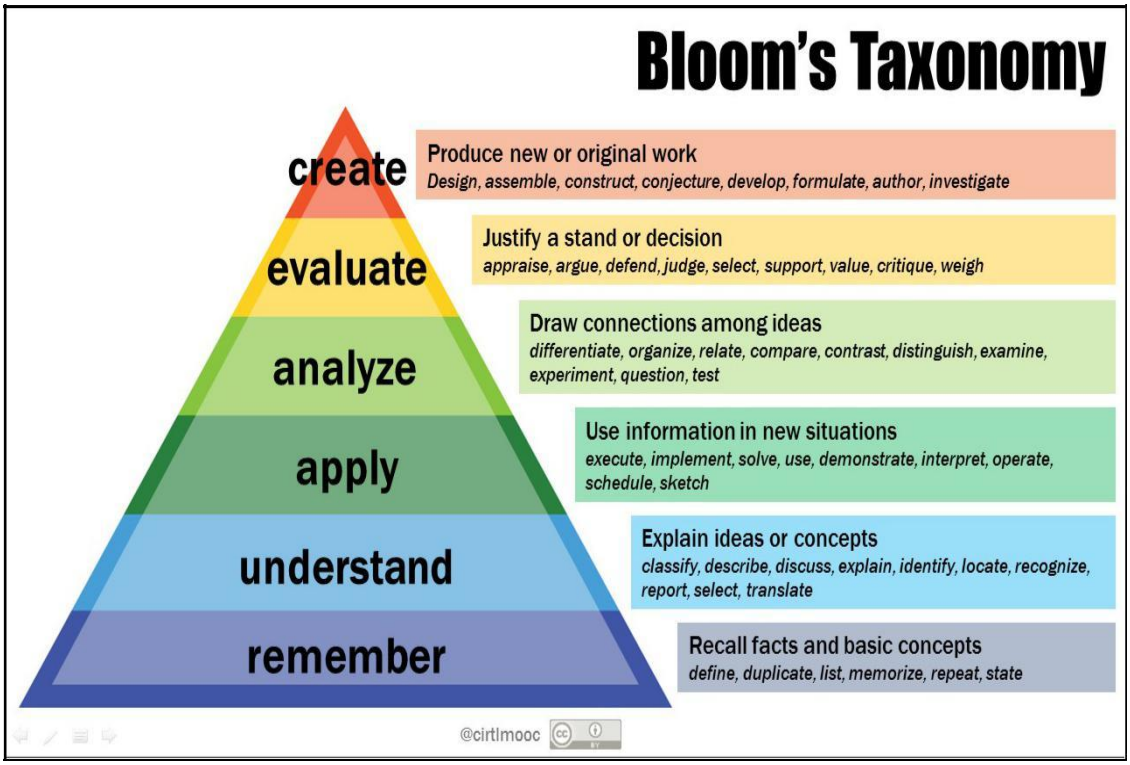
Project management and finance: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish differentlevels 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.



NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
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Academic Year 2021-22

ISE – Information Science & Engineering

Fifth and Sixth Semester

Scheme and Syllabus

VISION

To evolve as a centre of academic excellence and advanced research in information science and engineering discipline and to endeavour the computational competence of students for their dream career achievement and enhancing the managerial and technical skills.

MISSION

To inculcate students with profound understanding of fundamentals related to discipline, attitudes, skills and their application in solving real world problems, with an inclination towards societal issues and research.

Program Education objectives (PEOs)

PEO1	To excel in their professional career with expertise in providing solutions to Information Technology problems.
PEO2	To pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO3	To exhibit adaptive and agile skills in the core area of Information Science & Engineering to meet the technical and managerial challenges.
PEO4	To demonstrate interpersonal skills, professional ethics to work in a team to make a positive impact on society.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To prepare the students with academic and industry exposure by empowering and equipping them with necessary domain knowledge.	3	2	2	2
To prepare the students for global career in information technology with relevant technical and soft skills.	3	2	2	2
To encourage students to participate in co-curricular and extracurricular activities leading to the enhancement of their social and professional skills.	2	2	3	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 related to algorithms, system software, multimedia, web design, big data analytics and networking or 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 product for business success.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	2	3	-	-	-	3	-	3	-
PEO2	3	3	3	2	3	-	-	-	3	-	3	-
PEO3	3	3	3	2	3	-	-	-	3	-	3	-
PEO4	3	3	3	2	3	-	-	-	3	-	3	-

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

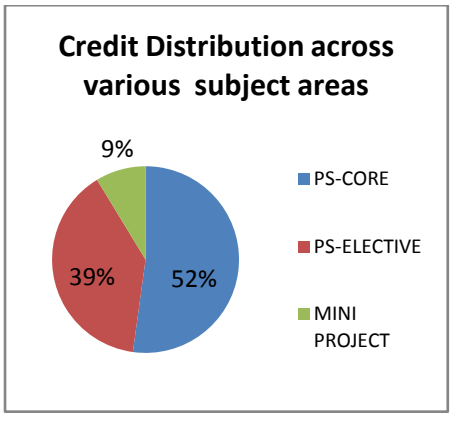
New Horizon College of Engineering

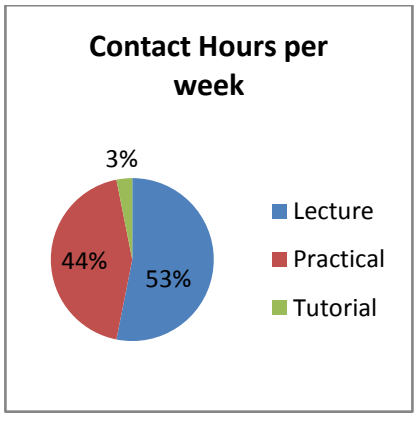
Department of Information Science and Engineering

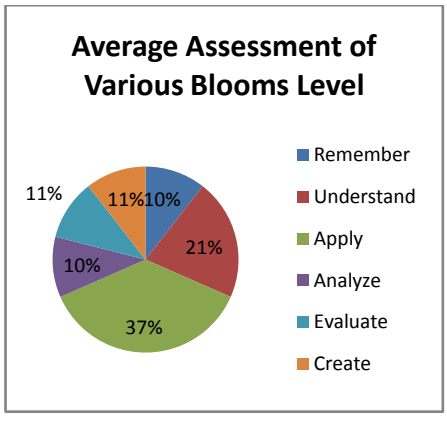
Fifth Semester B.E Program–Scheme AY: 2021-22

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	20ISE51	Web Internet Programming	ISE	3	0	0	3	3	50	50	100
2.	20ISE52	Design and Analysis of Algorithms	ISE	3	1	0	4	5	50	50	100
3.	20ISE53	Data Science	ISE	3	0	0	3	3	50	50	100
4.	20ISE54	Mobile Application Development	ISE	3	0	0	3	3	50	50	100
5.	20ISE55X	Professional Elective-1	ISE	3	0	0	3	3	50	50	100
6.	20ISL56	Design and Analysis of Algorithms Lab	ISE	0	0	2	2	4	25	25	50
7.	20ISL57	Data Science Lab	ISE	0	0	1.5	1.5	3	25	25	50
8.	20ISL58	Mobile Application Development Lab	ISE	0	0	1.5	1.5	3	25	25	50
9.	20ISE59	Mini Project	ISE	-	-	2	2	-	25	25	50
Total							**23**	**27**	**350**	**350**	**700**

Professional Elective - 1	
Course Code	**Course Name**
20ISE551	NOSQL
20ISE552	Internet of Things
20ISE553	Unix System Programming
20ISE554	Automata theory and formal languages
20ISE555	File Structures



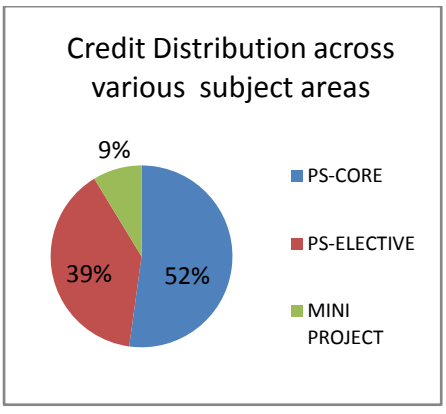


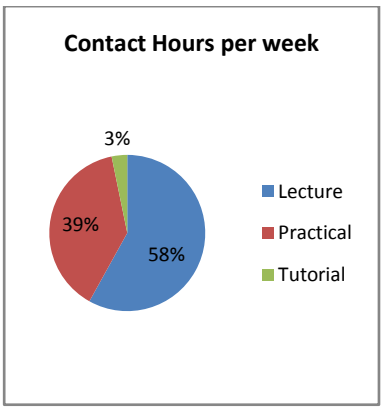


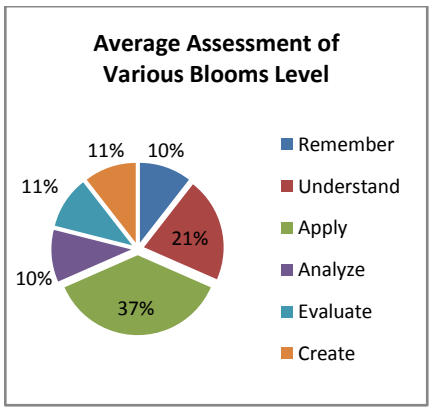
New Horizon College of Engineering
Department of Information Science and Engineering
Sixth Semester B.E Program-Scheme AY: 2021-22

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	20ISE61	Software Engineering & Project Management	ISE	3	0	0	3	3	50	50	100
2.	20ISE62	Advanced Java	ISE	3	0	0	3	3	50	50	100
3.	20ISE63	Machine Learning	ISE	3	0	0	3	3	50	50	100
4.	20ISE64X	Professional Elective-2	ISE	3	0	0	3	3	50	50	100
5.	20ISE65X	Professional Elective-3	ISE	3	0	0	3	3	50	50	100
6.	NHOPXX	Open Elective - 1	COE's	3	0	0	3	3	50	50	100
7.	20ISL66	Advanced Java Lab	ISE	0	0	1.5	1.5	3	25	25	50
8.	20ISL67	Machine Learning Lab	ISE	0	0	1.5	1.5	3	25	25	50
9.	20ISE68	Mini Project	ISE	-	-	2	2	-	25	25	50
Total							**23**	**24**	**375**	**375**	**750**

Professional Elective – 2		Professional Elective – 3	
Course Code	**Course Name**	**Course Code**	**Course Name**
20ISE641	Data Visualization	20ISE651	User Interface Design
20ISE642	System Modeling & Simulation	20ISE652	Virtual Reality
20ISE643	Object Oriented Modeling & Design	20ISE653	C# & .Net
20ISE644	Compiler Design	20ISE654	Computer Graphics using OpenGL
20ISE645	Operations Research	20ISE655	Soft Computing







FIFTH SEMESTER

(SYLLABUS)

WEB INTERNET PROGRAMMING

Course Code : 20ISE51 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks: 50**

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

CO1	Design web pages using XHTML and HTML5.
CO2	Apply Cascading Style Sheets to web pages.
CO3	Develop JavaScript programs to validate and create dynamic WebPages.
CO4	Develop server side programs using PHP and accessing database through PHP.
CO5	Describe the methods to handle data through the web and design XML document.
CO6	Inspect the management of state in web applications and JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	1	-	1	1	1	-	-	1
CO2	2	3	3	2	1	-	1	1	1	-	-	1
CO3	2	3	3	2	1	-	1	1	1	-	-	1
CO4	2	3	3	2	1	-	1	1	1	-	-	1
CO5	2	3	3	2	1	-	1	1	1	-	-	1
CO6	2	3	3	2	1	-	1	1	1	-	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	COs
1	**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, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements.	9	CO1 CO2
2	**HTML 5:** Detecting HTML 5 features – Canvas, video, local storage, web workers, offline applications, geo-location,input types. What does it all mean – doctype, root, headers, articles, dates and times, navigation and footers. Let's call it drawing surface - Simple shapes, canvas, Paths, texts, gradients and images. A Form of madness.	9	CO1
3	**JAVASCRIPT:** 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. **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.	9	CO3
4	**PHP Programming** Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.	9	CO4
5	**XML:** Introduction to XML, The Syntax of XML, Document structure, Document Type Definition (DTD),Displaying XML documents with CSS, XSLT style sheets. **Managing State**, Passing Information via Query Strings, Passing Information via the URL Path, Serialization, jQuery Foundations, AJAX, Animation, JSON.	9	CO5 CO6

Text Books:

1. Robert W. Sebesta,"Programming the World Wide Web", 8th Edition, Pearson Education, 2015.
2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India.
3. Mark Pilgrim,"HTML5: Up and Running:Dive into HTML5",1st EditionO'Reilly/Google Press Publishers & Distributors Pvt Ltd.

Reference Books:

1. Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web How to program", 5th Edition, Pearson Education / PHI, 2012.
2. Erik Bruchez, Danny Ayers, Eric Van Der Vlist, "Professional Web 2.0 Programming",1stEdition, Wiley India Pvt. Ltd, 2014.
3. Robin Nixon, "Learning PHP, MySQL &JavaScript with jQuery, CSS and HTML5", 4thEdition, O'Reilly Publications, 2015.

Web References:

1. https://www.w3schools.com
2. https://swayam.gov.in/nd1_noc20_cs52

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	**Tests (25 Marks)**	**Assignments (15 Marks)**	**Quizzes (10 Marks)**
Remember	5	-	5
Understand	10	5	5
Apply	5	5	-
Analyze	-	-	-
Evaluate	-	-	-
Create	5	5	-

SEE – Semester End Examination (50marks)

Bloom's Taxonomy	**Tests**
Remember	10
Understand	20
Apply	10
Analyze	-
Evaluate	-
Create	10

DESIGN AND ANALYSIS OF ALGORITHMS

Course Code	**: 20ISE52**	**Credits**	**: 04**
L:T:P	**: 3:1:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Analyze algorithms in terms of space and time complexity.
CO2	Analyze and solve problems using brute force, divide and conquer, decrease and conquer and transform and conquer techniques.
CO3	Analyze and solve problems using greedy, dynamic programming, backtracking and branch and bound approaches.
CO4	Compare different classes of computational complexity.
CO5	Use string matching and parallel algorithm.
CO6	Apply appropriate algorithm design techniquefor a given problem.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	-	-	-	-	-	3
CO2	3	3	3	3	2	-	-	-	-	-	-	3
CO3	3	3	3	3	2	-	-	-	-	-	-	3
CO4	3	3	3	3	2	-	-	-	-	-	-	3
CO5	3	3	3	3	2	-	-	-	-	-	-	3
CO6	3	3	3	3	2	2	-	-	-	-	-	3

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	COs
1	**Introduction:** Fundamentals of Algorithms, Problem Solving-Important Problem Types, Performance Analysis: Space complexity, Time complexity–Asymptotic notations and Basic efficiency classes: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ),Mathematical analysis for Recursive and Non-recursive algorithms. **Brute Force Approach:**General Method, Simple string matching	9	CO1
2	**Divide and Conquer:** General method-Recurrence equation for divide and conquer-Analysis of quick sort and merge sort	9	CO2, CO6

	algorithm- Advantages and disadvantages of divide and conquer approach. **Decrease and Conquer:**General Method, Topological sorting. **Transform and Conquer:**General Method, Heaps and Heap Sort		
3	**Greedy Approach:** General method,Prim's Algorithm,Kruskal's Algorithm,Single source shortest paths: Dijkstra's Algorithm,0/1 Knapsack problem. **Dynamic Programming:**General method, All pair shortest path problem, Longest common subsequence, Traveling salesperson problem	9	CO3, CO6
4	**Backtracking:**General method, N-Queens problem,Sum of subsets problem, Hamiltonian cycles. **Branch and Bound:**General method,Travelling Sales Person problem, Knapsack problem, LC Programme and Bound solution.	9	CO3, CO6
5	**NP Complete and NP-Hard problems:**Basic concepts-non-deterministic algorithms-P, NP, NP-Complete, and NP-Hard classes **String matching algorithm:**KMP String matching algorithm-Boyer Moore String matching algorithm **Parallel algorithms:**PRAM models, Prefix computation, Odd even merge sort, Sorting on a mesh.	9	CO4, CO5

TEXT BOOKS:

1. Anany Levitin , "Introduction to the Design and Analysis of Algorithms,3rd Edition,Pearson, 2012
2. Ellis Horowitz, Satraj Sahni and Rajasekaran, "Computer Algorithms/C++", 2nd Edition, Universities Press, 2014
3. Cormen T.H., Leiserson C.E., Rivest R.L., Stein C, "Introduction to Algorithms", 3rd Edition, , PHI Publications, 2010

REFERENCE BOOKS:

1. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford (Higher Education).

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	-	-	-
Understand	5	-	5
Apply	10	10	5
Analyze	5	5	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	10
Apply	20
Analyze	10
Evaluate	10
Create	-

DATA SCIENCE

Course Code : 20ISE53 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand the probability, statistics and linear algebra concepts essential for data science.
CO2	Model the real world dataset and apply algebric and geometric view for the data.
CO3	Apply linear regression & multiple linear regression for model building and prediction.
CO4	Develop the classification models using classification algorithms.
CO5	Develop the clustering models using clustering algorithms.
CO6	Model the real world dataset and apply optimization techniques.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	-	3	2	2	1	2
CO2	3	3	3	3	2	2	-	3	2	2	1	2
CO3	3	3	3	3	2	2	-	3	2	2	1	2
CO4	3	3	3	3	2	2	-	3	2	2	1	2
CO5	3	3	3	3	2	2	-	3	2	2	1	2
CO6	3	3	3	3	2	2	-	3	2	2	1	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	COs
1	**Foundations of Data Science :** Introduction to Data Science,Data mining and Datawarehousing,Descriptive Analytics, Probability Theory, Probability distribution, Confidence Interval ,Hypothesis Testing,	9	CO1
2	**Data Preprocessing :**Types of Data, Sampling Theory, Feature selection, Dimentionality reduction techniques: Algebric view, vectors,rank , null space, pseudo inverse, Geometric View, Projections, Eigen value decomposition, Pricipal component Analysis(PCA)	9	CO2
3	**Linear Regression:**Simple Linear Regression - Steps in Building a Regression Model,Model Diagnostics,Multiple Linear Regression - Developing Multiple Linear Regression Model , Multi collinearity, Residual analysis,Detecting Influencers	9	CO3
4	**Classification:** Logistic regression, Naiive Bayes, K Nearest Neighbor, Decision Trees, Random Forest	9	CO4
5	**Clustering, Optimization:** K Means, Hierarchical clustering, Optimization for Data Science	9	CO5,CO6

TEXT BOOKS:

1. U Dinesh Kumar, “Busuness Analytics :The Science of Data Driven decission making”,First Edition, Wiley Publishers, 2017
2. Manaranjan Pradhan, U Dinesh Kumar, “Machine Learning using Python”, First Edition, Wiley Publishers, 2019
3. Gilbert Strang, “Introduction to Linear Algebra, Fifth Edition”, Wellesley-Cambridge Press and SIAM, 2016
4. Jiawei Han , Micheline Kamber , Jian Pei Professor, “Data Mining: Concepts and Techniques”, Third Edition, Morgan Kaufmann Series,2011

REFERENCE BOOKS:

1. Bruce M King, Edward W Minium , “Statistical Reasoning in the Behavioral Sciences”, 5th Edition, Wiley Publishers, 2018
2. Douglas C. Montgomery, Douglas C. Montgomery, George C. Runger, “Applied Statistics and Probability for Engineers”,6th Edition, Wiley Publishers, 2016
3. McKinney W. “Python for data analysis: Data wrangling with Pandas, NumPy, and IPython.” O'Reilly Media, Inc., 2012
4. EMC Education Services , “Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, John Wiley & Sons, Inc.

WEB RESOURCES:

1. https://machinelearningmastery.com/
2. https://towardsdatascience.com/data-science/home
3. https://mastersindatascience.com/resources/top-100-data-science-resources/
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. https://swayam.gov.in/nd1_noc20_cs46/preview

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	5	5	5
Apply	5	5	5
Analyze	5	-	-
Evaluate	-	-	-
Create	5	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	-
Create	5

MOBILE APPLICATION DEVELOPMENT

Course Code	**: 20ISE54**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
CO2	Understand how to work with various mobile application development frameworks.
CO3	Apply the basic and important design concepts and issues of development of mobile applications.
CO4	Analyze the capabilities and limitations of mobile devices.
CO5	Develop the skills in designing and building mobile applications using android platform.
CO6	Build mobile applications using multimedia graphics and animations.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**INTRODUCTION TO ANDROID OPERATING SYSTEM:** Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Android tools, Android Applicationcomponents – Android Manifest file,Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes	9	CO1

2	**ANDROID UI ARCHITECTURE & UI WIDGETS** Fundamental Android UI design Layouts, Drawable resources, UIwidgets, Notification, Toasts, Menu, Dialogs, Building dynamic UI with fragments.	9	CO2
3	**INTENTS AND BROADCASTS:** Intent, Native Actions, using Intent to dial a number or to send SMS. Broadcast Receivers - Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity. Notifications – Creating and Displaying notifications, Displaying Toasts	9	CO3, CO5
4	**DATA STORAGE, SERVICES & CONTENT PROVIDERS:** Saving Data, Interacting with other Apps, Apps with content sharing, Shared Preferences, Preferences activity, Files access, SQLite database, Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication.	9	CO4
5	**ADVANCED APPLICATIONS:** Building apps with Multimedia, Building apps with Graphics & Animations, Building apps with Sensors, Bluetooth, Camera, Telephony Services, Building apps with Location Based Services and Google maps.	9	CO6

Text Books:

1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developerfundamentals-course-concepts/details (Download pdf file from the above link)
2. Reto Meier , "Professional Android2 Application Development", Wiley India Pvt.ltd, 1st Edition;2012
3. Phillips, Stewart, Hardy and Marsicano, "Android Programming", 2nd edition -Big Nerd Ranch Guide;2015
4. James C Sheusi , "Android Application Development for Java Programmers", , Cengage Learning, 2013

Reference Books:

1. Mark Murphy, "BeginningAndroid3" , Apress Springer India Pvt Ltd, 1st Edition; 2011
2. EricHellman, "AndroidProgramming–Pushing the limits" , Wiley, 2013
3. Wei-Meng Lee , "Beginning Android 4 Application Development",Wiley India (Wrox), 2013

WEB RESOURCES:

1. https://developer.android.com/studio/intro
2. https://www.tutorialspoint.com/android/index.htm
3. https://www.javatpoint.com/android-tutorial

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	5	-	5
Apply	5	10	5
Analyze	-	-	-
Evaluate	5	-	-
Create	5	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	-
Evaluate	10
Create	10

NOSQL

Course Code : 20ISE551 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).
CO2	Illustrate the Application and Integration of Databases.
CO3	Apply the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
CO4	Understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
CO5	Understanding of the detailed architecture, define objects, load data, query data and performance Key-Value Databases.
CO6	Understanding of the detailed architecture, define objects, load data, query data and performance Graph NoSQL databases.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**Introduction:**Overview, and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.	9	CO1
2	**NoSQL Key/Value databases using MongoDB**: Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.	9	CO2
3	**Column- oriented NoSQL databases using Cassandra**: Column-oriented NoSQL databases using Apache Cassandra, Architecture of Cassandra, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use.	9	CO3
4	**NoSQL Key/Value databases:** Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships	9	CO4

	among Data, Multioperation Transactions, Query by Data, Operations by Sets.		
5	**Graph NoSQL databases**:NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.	9	CO5, CO6

TEXT BOOKS:

1. R. Elmasri S. B. Navathe, "Fundamentals of Database Systems", Addison Wesley, 2018.
2. Raghu Ramakrishnan, "Database Management Systems" , Mcgraw-Hill,4th edition,2018.

REFERENCE BOOKS:

1. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2018.
2. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management,6th Edition,2018.

WEB RESOURCES:

1. "Introduction to NOSQL",https://www.simplilearn.com/introduction-to-nosql-databases-tutorial-video.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	-	5
Apply	10	10	5
Analyze	-	-	-
Evaluate	-	-	-
Create	-	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

INTERNET OF THINGS

Course Code	**: 20ISE552**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Understand IoT concepts, underlying technologies and migration of M2M to IoT.
CO2	Understand the M2M fundamentals and data management
CO3	Analyze the various features of IoT standard protocols and platforms
CO4	Implement programs using Raspberry pi model
CO5	Understand the interface concepts with networks
CO6	Design and Develop real world IoT application using system like Raspberry pi.

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2	3	2	1	1	2	2	2	2
CO2	3	3	2	2	3	2	1	1	2	2	2	2
CO3	3	3	2	2	3	2	1	1	2	2	2	2
CO4	3	3	2	2	3	2	1	1	2	2	2	2
CO5	3	3	2	2	3	2	1	1	2	2	2	2
CO6	3	3	2	2	3	2	1	1	2	2	2	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	**PSO1**	**PSO2**
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No	**Module Contents**	**Hours**	**Cos**
1	**Introduction to IoT:** IoT Overview, Definition, Hardware and Software, market perspective, Introduction to M2M, The Vision- From M2M to IoT, M2M towards IoT-the global context, A use case example, Architecture Reference Model- IoT reference Model	9	CO1
2	**M2M and IoT Technology Fundamentals-** Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.	9	CO2

3	**IoT Protocols and Platforms:** 6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, RESTAPI,OP-CUA **Platforms:** Microsoft Azure, Google cloud, Think Speak, IBM Watson , Adafrui	9	CO3
4	**IoT Programming :**Introduction to Raspberry PI, Rasbian OS, interfacing analog and digital devices, enabling network connectivity ,Connecting with web Server	9	CO4, CO5
5	**Applications of IoT:** Home Automation, Automated Street light, Environment Monitoring, Soil Monitoring, Smart city-Transport, Water supply, Garbage collection, Parking.	9	CO6

TEXT BOOKS:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Matt Richardson and Shawn Wallace, "Getting Started with Raspberry Pi",O'Reilly (SPD), 2014.
3. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", Wiley publication, 2nd Edition, 2012.

REFERENCE BOOKS:

1. Vijay Madisetti and Arshdeep Bahga "Internet of Things (A Hands-on-Approach)", , 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
3. Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, "Internet of Things: Architectures, Protocols and Standards", Wiley, Nov 2018
4. Colin Dow, "Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python", 1st edition, Packt Publishing,2018
5. Abdulrahman Yarali , "IoT: Platforms, Connectivity, Applications and Services ",Nova Science Publishers Inc ,Apr 2018

WEB RESOURCES:

1. "Raspberry pi", https://www.raspberrypi.org/
2. IoT protocols,https://www.postscapes.com/internet-of-things-protocols/
3. IoT Platforms, https://www.javatpoint.com/iot-tutorial

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	-	-	-
Understand	10	-	5
Apply	5	10	5
Analyze	5	5	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	20
Apply	10
Analyze	10
Evaluate	10
Create	-

UNIX SYSTEM PROGRAMMING

Course Code : 20ISE553 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand UNIX architecture and basics of UNIX files.
CO2	Understand importance of Unix and POSIX standards.
CO3	Use UNIX APIs for file manipulation.
CO4	Illustrate the concept of Unix process control including process creation, process environment and process relationship.
CO5	Apply Unix API for signal handling and daemon process control.
CO6	Illustrate the client/server paradigm of computing with IPC mechanism: PIPES, FIFOs, Message Queues, Semaphores and shared memory using their APIs

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	2	-	1	-	1	1	2
CO2	3	2	2	-	2	2	-	1	-	1	1	2
CO3	3	2	2	-	2	2	-	1	-	1	1	2
CO4	3	2	2	-	2	2	-	1	-	1	1	2
CO5	3	2	2	-	2	2	-	1	-	1	1	2
CO6	3	2	2	-	2	2	-	1	-	1	1	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	Introduction: Unix Components/Architecture. Features of Unix. The UNIX Environment and UNIX Structure, Posix and Single Unix specification. General features of Unix commands/ command structure. Command arguments and options. Basic Unix commands such as echo, printf, ls, who, date, passwd, cal, Combining commands. Meaning of Internal and external commands. The type command: knowing the type of a command and locating it.The root login. Becoming the super user: su command.	9	CO1
2	Introduction: UNIX and ANSI Standards: The ANSI C Standard, The UNIX and POSIX Development Environment, API Common Characteristics. UNIX Files and APIs: File Types, The UNIX and POSIX File System, Attributes, Inodes, API to Files, UNIX Kernel Support, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.	9	CO2,CO3
3	UNIX Processes and Process Control: The Environment of a UNIX Process, Memory Layout of a C Program, Memory Allocation, Environment Variables, setjmp, longjmp, getrlimit,setrlimit Functions, UNIX Kernel Support for Processes. Process Control:Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions	9	CO4
4	Signals and Daemon Processes: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules	9	CO5

5	InterprocessCommunication : Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, Message Queues, Semaphores. Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, Client-Server Connection Functions.	9	CO6

TEXT BOOKS:

1. Sumitabha Das, "Unix Concepts and Applications", Tata McGraw Hill, 4th Edition
2. Terrence Chan, "Unix System Programming Using C++", PHI, 1999.
3. W.Richard Stevens, Stephen A.Rago, "Advanced Programming in the UNIX Environment", Pearson Education / PHI, 3rd Edition,2005

REFERENCE BOOKS:

1. M.G. Venkatesh Murthy,"UNIX & Shell Programming", Pearson Education.
2. Richard Blum , Christine Bresnahan, "Linux Command Line and Shell Scripting Bible", Wiley,2nd Edition,2014.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	10	5
Apply	10	5	5
Analyze	-	-	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

AUTOMATA THEORY AND FORMAL LANGUAGES

Course Code : 20ISE554 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks:50**
Exam Hours : 3 **SEE Marks:50**

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

CO1	Acquire a fundamental understanding of the core concepts in automata theory, construct Deterministic Finite Automata (DFA) and Non-deterministic Finite Automata (NFA) and ability to transform between equivalent finite automata.
CO2	Construct Epsilon-NFA and transform between equivalent finite automata also understand the power and the limitations of regular expressions and design regular expressions.
CO3	Compute transformation between finite automata and regular expressions and to minimize the DFA with equivalence technique.
CO4	Describe and construct Context Free Grammar and Pushdown Automata, transformation between them.
CO5	Construct and analyze the use and properties of Turing machines performing simple tasks, with recent trends and applications in the area of finite state machines.
CO6	Comprehend and manipulate the different concepts in automata theory and formal languages.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	-	-	-	1	-	-
CO2	3	2	2	3	1	-	-	-	-	1	-	-
CO3	3	2	2	3	1	-	-	-	-	1	-	-
CO4	3	2	2	3	1	-	-	-	-	1	-	-
CO5	3	2	2	3	1	-	-	-	-	1	-	-
CO6	3	2	2	3	1	-	-	-	-	1	-	-

Mapping of CO v/s PSO:

	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1
CO6	2	1

Module No.	Module Contents	Hours	COs
1	**Introduction to Finite Automata:** Prerequisites- Set Theory concepts; Introduction to Finite Automata; The central concepts of Automata theory- Alphabets, Strings, Languages; Deterministic finite automata (DFA)- Definition & problems; Non-deterministic finite automata (NFA) - Definition & problems; Conversion from NFA to DFA- Subset Construction Method & Lazy Evaluation Method; An Application of finite automata.	9	C01, CO6
2	**Finite Automata and Regular Expressions (1):**Finite automata with Epsilon-transitions (Epsilon –NFA) – Definition, Epsilon Closure, Conversion from Epsilon-NFA to DFA; Differences between DFA, NFA, Epsilon-NFA; Moore and Mealy machines, Simulators for Finite Automata. **Regular expressions-**Definition, Operators of Regular Expressions, Building Regular Expressions, Properties of Regular Expressions, Applications of Regular Expressions.	9	CO2, CO6
3	**Finite Automata and Regular Expressions (2):**Converting Regular Expressions to Automata– Theorem & problems; Converting DFA to Regular Expressions–Kleene's Theorem & problems, State Elimination method; Equivalence and minimization of automata, Pumping Lemma and related problems.	9	CO3, CO6
4	**Context Free Grammar (CFG) and Pushdown Automata(PDA):** Definition of Grammar, Chomsky Hierarchy and problems; Derivations- Leftmost and Rightmost, Parse trees, Ambiguity in grammars; Definition of Pushdown automata; Construction of PDA;Equivalence of PDA's and CFG's – From CFG to PDA, From PDA to CFG.	9	CO4, CO6
5	**Turing Machines:** The Turing machine model, definition, Types,Techniques for Turing Machineconstruction. **Recent Trends and Applications:** Matrix Grammar, Programmed Grammar, Random Context Grammar,Lindermayer Systems, A glance on DNA computing and Membrane Computing	9	C05, CO6

TEXT BOOKS:

1. Elaine Rich: " Automata, Computability and Complexity", 1st Edition, Perason Education, 2012/2013.
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson Education,2007.

REFERENCES:

1. Kavi Mahesh, "Theory of Computation-A Problem Solving Approach", Wiley India Pvt. Ltd.
2. Michael Sipser, "Introduction to the Theory of Computation", 3rd Edition, Tata McGraw Hill Publishing Company Limited,2013.
3. K.L.P. Mishra, "Theory of Computer Science, Automata, Languages, and Computation", 3rd Edition, PHI, 2007.
4. John C Martin, "Introduction to Languages and Automata Theory", 3rd Edition, Tata McGraw- Hill,2007.

CIE - Continuous Internal Evaluation (50Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	-	5
Apply	10	10	5
Analyze	-	-	-
Evaluate	-	-	-
Create	-	5	-

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

FILE STRUCTURES

Course Code	**: 20ISE555**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Understand the fundamental concepts of file processing operations and storage structures.
CO2	Choose appropriate file structure for storage representation and performance.
CO3	Apply object orientation concepts to manipulate records.
CO4	Apply concepts of sorting and merging on multiple files.
CO5	Analyze the sequential and indexing file accessing techniques with appropriate data structures.
CO6	Illustrate the usage of hashing techniques to organize file structures.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	2	2	-	-	2	-	1
CO2	3	3	3	2	2	2	2	-	-	2	-	1
CO3	3	3	3	2	2	2	2	-	-	2	-	1
CO4	3	3	3	2	2	2	2	-	-	2	-	1
CO5	3	3	3	2	2	2	2	-	-	2	-	1
CO6	3	3	3	2	2	2	2	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**Introduction to File Processing Operations:** Physical Files and Logical Files, File operations:-Opening, Closing, Reading and Writing, Seeking Special Characters in Files, The Unix Directory Structure, Physical Devices and Logical Files. **Secondary Storage and System Software**: Disks, Introduction to CD-ROM, Physical Organization of CD-ROM, CD-ROM Strengths and Weaknesses; Storage as a Hierarchy, A Journey of a Byte, Buffer Management, I/O in UNIX.	9	CO1

2	F**undamental File structure Concepts**: Field and Record Organization, Using Classes to Manipulate Buffers, Using Inheritance for Record Buffer Classes, Managing Fixed Length and Fixed Field Buffers. A Simple Index for Entry-Sequenced File, Entry-Sequenced Files of Data Objects, Indexes that are too large to hold in Memory, Indexing to provide access by Multiple keys, Retrieval Using Combinations of Secondary Keys.	9	CO2, CO3
3	**Multilevel Indexing and B-Trees**: Introduction: The Invention of B-Tree, Statement of the Problem, Indexing with Binary Search Trees, Multilevel Indexing, B-trees: Example of Creating a B-Tree, B-Tree Methods Search, Insert.	9	CO4
4	**Indexed Sequential File Access and Prefix B + Trees:** Indexed Sequential Access, Maintaining a Sequence Set, Adding a Simple Index to the Sequence Set, The Content of the Index: Separators Instead of Keys, The Simple Prefix B+ Tree and its maintenance, Index Set Block Size, Internal Structure of Index Set Blocks: A Variable-order B- Tree, Loading a Simple Prefix B+ Trees, B-Trees, B+ Trees and Simple Prefix B+ Trees in Perspective.	9	CO5
5	**Hashing:** Introduction, A Simple Hashing Algorithm, Hashing Functions and Record Distribution, How much Extra Memory should be used?, Collision resolution by progressive overflow, Buckets, Making deletions, Other collision resolution techniques, Patterns of record access.	9	CO6

TEXT BOOKS:

1. Michael J. Folk, Bill Zoellick, Greg Riccardi, "File Structures-An Object Oriented Approach with C++",3rd Edition, Pearson Education, 1998.
2. K.R. Venugopal, K.G. Srinivas, P.M. Krishnaraj, "File Structures Using C++", Tata McGraw-Hill, 2008.

REFERENCE BOOKS:

1. Mary E.S. Loomis, "Data Management and File Structures", Second Edition, PHI,2012.
2. Alan L. Tharp, "File Organization and Processing", Wiley India Edition,2008.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	5	5
Apply	10	5	5
Analyze	-	5	-
Evaluate	-	-	-
Create	-		-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

DESIGN AND ANALYSIS OF ALGORITHMS LAB

Course Code : 20ISL56 **Credits : 2**
L: T:P : 0:0:2 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Analyze algorithms in terms of space and time complexity.
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.
CO3	Implement problems using greedy, dynamic programming and backtracking approaches.
CO4	Use different string-matching algorithms.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
PART-A	
1	Implement and analyze quick sort algorithm.
2	Implement and analyze merge sort algorithm
3	Implement the following graph traversal techniques using decrease and conquer approach: a. Breadth First Search method. b. Depth First Search method.
4	Implement and analyze topological sorting in a given directed graph.
5	Implement and analyze Kruskal`s algorithm and find minimum cost spanning tree of a given connected undirected graph.
6	Implement and analyze Prim`s algorithm and find minimum cost spanning tree of a given connected undirected graph.
7	Implement and analyze Dijkstra's algorithm to find the shortest path from a given source.
PART-B	
8	Implement and analyze Floyd Warshall`s algorithm to find the shortest path between all pairs of vertices in a given weighted connected graph.
9	Implement travelling salesman problem using dynamic programming.
10	Implement 0/1 Knapsack problem.
11	Implement N-Queens problem using backtracking.
12	Implement sum of subset problem using backtracking.
13	Implement and compare Simple string matching and KMP string matching algorithm.
14	Implement prefix computation algorithm by using multiple threads or processes.

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution: Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	-
Analyze	5
Evaluate	-
Create	15

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	-
Analyze	5
Evaluate	-
Create	15

DATA SCIENCE LAB

Course Code	**: 20ISL57**	**Credits**	**: 1.5**
L:T:P	**: 0:0:1.5**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

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

CO1	Understand basic operations of NumPy,pandas and Matplotlib
CO2	Implement Regression models for the sample datasets
CO3	Develop classification models and optimize the performance
CO4	Develop clustering models and apply on suitable datasets

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
	PART-A
1	Using pandas in python demonstrate the following operations for the sample dataset given, i) Indexing of Dataframe ii) Grouping and aggregating iii) Adding and removing attributes iv) Joining dataframes v) Filtering the data vi) Handling Missing values
2	Using pandas and Matplotlib demonstrate the following operations for the sample dataset given, i) Bar chart and Histogram ii) Comparing Distribution iii) Box plot and mention quartiles iv) Correlation using pairplot and heatmap
3	Using Numpy,pandas and Matplotlib demonstrate the following operations for the sample dataset given, i) Central tendency

	ii) Dispersion and Distribution iii) ANOVA iv) Hypothesis testing
4	Develop a program to implement Simple Linear Regression model and evaluate the model by verifying the performance
5	Develop a program to implement Multiple Linear Regression model and evaluate the model by verifying the performance
6	Develop a program to implement Logistic Regression and indicate the class label for the test dataset
PART-B	
7	Develop a program to implement Naive Bayes classifier model and analyze the model using confusion matrix
8	Develop a program to implement Decision Tree model and analyze the model using confusion matrix
9	Develop a program to implement Random Forest classifier model and analyze the model using confusion matrix
10	Develop a program to implement KNN classifier model and analyse the model using confusion matrix
11.	Develop a program to implement K Means clustering model for the given value of K, where K is number of clusters
12	Develop a program to implement Hierarchical clustering model for the given value of N, where N is number of clusters

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	5
Analyze	5
Evaluate	-
Create	10

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	5
Analyze	5
Evaluate	-
Create	10

MOBILE APPLICATION DEVELOPMENT LAB

Course Code :20ISL58 **Credits : 1.5**
L:T:P : 0:0:1.5 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Design and develop a Mobile App for smart phones
CO2	Design User Interface and develop activity for Android App
CO3	Design and implement Database Application and Content providers
CO4	Create Android App with SMS camera and Location based services

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
PART - A	
1.	Using Android SDK develop an activity which displays the below message. Hello world android app
2.	Design and implement a single screen app that displays information about a small business.eg. Restaurant, Book shop etc. . Your design must include: o Business name o Photo of business o Contact information
3.	Design and develop a Mobile App for smart phones The Easy Unit Converter using Android.
4.	Design and develop a Mobile App for smart phones Currency Converter.
5.	Design an app for Tourist spot: With three activities, Welcome page, Display attractions of tourist spot and Webpage of the tourist spot
6.	Design an android app play music in background
PART - B	
7.	Design and develop a Mobile App for smart phones The Expense Manager using Android. The application should store all the expenses in a file
8.	Design and develop Health Monitoring App using Android. The app will store the blood pressure, blood group and glucose level of patient in SQLite database
9.	Develop an android app to display Map of your college locality
10.	Develop an android app to alert SMS to one given phone number.
11.	Design and develop Health Monitoring App using Android. The app will store the 3 Internal test marks and its average of a student in SQLite database
12.	Design an app for Attendance Management System

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	-
Apply	15
Analyze	5
Evaluate	-
Create	5

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	-
Apply	15
Analyze	5
Evaluate	-
Create	5

MINI PROJECT

Course Code : 20ISE59 **Credits : 2**
L:T:P : 0:0:2 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Analyze the Real world problem through survey of existing problems
CO2	Design the modules for solving the problems identified
CO3	Implement the design modules with suitable programming language
CO4	Test the working modules at different levels

Mapping of Course Outcomes to Program Outcomes:

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

Note :

- Mini project should be developed using the techniques learned in the course 20ISE51 - Web Internet Programming
- Every student should do individual mini project in the areas suggested by the department expert committee
- Minimum 2 reviews will be conducted by the department expert committee to know the progress of the mini project work
- In each review student should give presentation on the work carried out and show the relevant models
- 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%

SIXTH SEMESTER

(SYLLABUS)

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

Course Code	**: 20ISE61**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	To understand the phases in a software project.
CO2	To understand fundamental concepts of requirements engineering and Analysis Modelling.
CO3	To understand the various software design and coding methodologies.
CO4	To learn and apply various testing and maintenance measures.
CO5	To learn and apply various project management activities.
CO6	To analyse various project management activities.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1	-	1	-	-	-	-	-
CO2	2	2	1	2	1	-	3	-	-	-	1	-
CO3	2	2	3	2	2	1	2	-	2	-	-	3
CO4	2	2	3	3	3	-	2	-	1	1	-	-
CO5	1	2	1	2	3	-	--	-	-	-	-	-
CO6	1	2	1	2	2	-	2	-	1	1	-	-

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	1	3
CO3	2	3
CO4	2	1
CO5	2	2
CO6	1	2

Module No.	Module Contents	Hours	COs
1	**Introduction:** Software Engineering; Software Processes: Life Cycle Models, Unified process; Agile Process Model development; Extreme Programming;	9	CO1
2	**Requirements:** Software Requirements, Feasibility study, Requirements elicitation and analysis; Requirements Specification, validation and management.	9	CO2
3	**Software Design:** Data Design, Architectural Design; Component Level Design, User Interface Design, Object Oriented Design, Software Design Notations.	9	CO3,CO4
4	**Software Coding:** Features of Software Code, Coding	9	CO5

	Guidelines, Coding Methodology, Programming Practice, Code verification Techniques, Coding Tools, Code Documentation **Software Testing:** Software Testing basics, Test Plan, Levels of Software Testing, Testing Techniques, Debugging.		
5	**Configuration Management:** Configuration Management Planning; Change management; **Project Management:** Project planning; Project scheduling; Risk management, Management activities.	9	CO6

TEXT BOOKS:

1. Roger S Pressman: Software Engineering – A Practitioner's Approach, McGraw Hill, seventh edition, 2018.
2. Ian Somerville: Software Engineering, Pearson Education, edition, 2017

REFERENCE BOOKS:

1. PankajJalote: An Integrated Approach to Software Engineering, Wiley India, 2009.
2. Hans Van Vliet: Software Engineering: Principles and Practices, Wiley India, 2018.
3. Richard Fairley: Software Engineering Concepts, McGraw Hill , 2018.

WEB RESOURCES:

1. https://www.tutorialspoint.com/software_engineering/index.htm
2. https://www.computerscience.org/careers/software-engineer/
3. https://www.javatpoint.com/software-engineering-tutorial
4. https://www.guru99.com/what-is-software-engineering.html
5. https://www.geeksforgeeks.org/software-engineering/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	-	-	-
Understand	5	7.5	5
Apply	5	-	-
Analyze	10	7.5	-
Evaluate	5	-	5
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	10
Apply	10
Analyze	20
Evaluate	10
Create	-

ADVANCED JAVA

Course Code	**: 20ISE62**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Analyze the importance of event based programming in Java.
CO2	Make use of JDBC to access database through Java Programs
CO3	Apply servlet technologies to build server side applications.
CO4	Develop JSP based server side solutions.
CO5	Interpret the importance of frameworks in software development
CO6	Develop enterprise applications on Spring frameworks providing reliable solution to real world challenges.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**Introduction to Event Handling:** Event-Driven Programming in Java, Swing Controls and UI elements, Event- Handling Process, The Delegation Model of Event Handling, Swing Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling.	9	CO1
2	**Working with JDBC :** Exploring web architecture models, Exploring the MVC architecture, Introducing JDBC, Exploring JDBC Drivers, Describing JDBC APIs, Exploring JDBC processes with java.sql package	9	CO2

3	**Working with servlets**: MVC Design Pattern, Http protocol, and html introduction, Exploring the features of java servlets, Exploring the servlets API, Servlets life cycle, Working with the Http servlets request and Http servlets response interfaces, Exploring request delegation and request scope, session tracking,	9	CO3
4	**Working with Java server pages:** Introducing JSP, Listing advantages of JSP over java servlets, Exploring the architecture of a JSP page, Describing the life cycle of a JSP page, Working with JSP basic tags and implicit objects, Working with the action tags in JSP	9	CO4
5	**Spring Framework**: Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect-oriented Programming with Spring (AOP), Spring Model View Controller (MVC), Spring & Web Services	9	CO5, CO6

TEXT BOOKS:

1. Herbert Schildt, "JAVA the Complete Reference", 9th Edition, Tata McGraw Hill, 2017(print).
2. Jim Keogh, "J2EE-The Complete Reference", McGraw Hill, 2017.

REFERENCE BOOKS:

1. Y. Daniel Liang, "Introduction to JAVA Programming", 7th Edition, Pearson Education, 2007.
2. Stephanie Bodoff et al, "The J2EE Tutorial", 2nd Edition, Pearson Education,2004.
3. Uttam K Roy, "Advanced JAVA programming", Oxford University press, 2015.

WEB RESOURCES:

1. https://spring.io/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	5
Understand	5	5	5
Apply	5	5	-
Analyze	-	-	-
Evaluate	5	-	-
Create	5	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	-
Evaluate	10
Create	10

MACHINE LEARNING

Course Code	**: 20ISE63**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Recall the problems for machine learning and select the either supervised, unsupervised and reinforcement learning.
CO2	Apply Classification concepts for solving machine learning problems
CO3	Illustrate Artificial Neural Networks(ANN's)
CO4	Implementation of association rule mining in data mining
CO5	Evaluating Mathematical Models for Machine Learning algorithms
CO6	Illustrate Convolution Neural Networks and implementation for solving machine learning problems.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	-	1	2	2	1	2
CO2	3	3	3	3	2	2	-	1	2	2	1	2
CO3	3	3	3	3	2	2	-	1	2	2	1	2
CO4	3	3	3	3	2	2	-	1	2	2	1	2
CO5	3	3	3	3	2	2	-	1	2	2	1	2
CO6	3	3	3	3	2	2	-	1	2	2	1	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	COs
1	**Introduction**: Introduction to Machine Learning, Supervised Learning, Unsupervised Learning and Reinforcement Learning, Goals and Challenges of machine learning, Gradient (Steepest) Descent (OR) Learning Rule , LASSO and Ridge Regression,Prescriptive Analytics : Linear Programming model building	9	CO1

2	**Decision Trees:** Chi-Square Automatic Interaction Detectors (CHAID), Classification and Regression Tree (CART), C4.5. **Support Vector Machine**: Kernel Function and Kernel SVM.	9	CO2
3	**Association Rule Mining**: Apriori, FP – Growth, **Correlations**: Basic Concepts and Methods, Pattern Mining in Multilevel, Multidimensional Space, Sequential Pattern Mining.	9	CO3
4	**Artificial Neural Networks**: Introduction, Neural Network representation, Appropriate Problems, Perceptron, Back Propagation algorithm,Introduction to deep learning	9	CO4, CO5
5	**Convolutional Neural Networks (CNN)**:Convolutional, Pooling and Soft-Max Layers, Training CNNs, activation functions, initialization, Batch Normalization.	9	CO6

TEXT BOOKS:

1. Manaranjan Pradhan, U Dinesh Kumar, "Machine Learning using Python", Wiley, First Edition, 2020.
2. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, Indian Edition, 2017.
3. EthemAlpaydin, "Introduction to Machine Learning",MIT press,Second Edition, 2010.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer Series in Statistics, SecondEdition, 2017.
2. Dipanjan Sarkar,Raghav Bali ,Tushar Sharma, "Practical Machine Learning with Python-A Problem-Solver's Guide to Building Real-World Intelligent Systems",APress, First Edition, 2018.
3. Simon Haykin, "Neural Networks and Learning Machines", Pearson, Third Edition, 2016
4. Kevin P. Murphy , Francis Bach , "Machine Learning: A Probabilistic Perspective", Massachusets Institute of Technology,First Edition, 2012.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**Quizzes**	**Lab**
Marks (out of 50)	**25**	**15**	**10**	**25**
Remember	5	5	-	-
Understand	5	5	5	10
Apply	5	5	5	15
Analyze	5	-	-	-
Evaluate	5	-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	**Tests**	**Lab**
Remember	10	-
Understand	10	5
Apply	10	20
Analyze	10	-
Evaluate	10	-
Create	-	-

DATA VISUALIZATION

Course Code	**: 20ISE641**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Understand the Basic structure of python programming language.
CO2	Apply MapPlotLib and Seaborn library to various datasets and infer the insights through visualizations.
CO3	Apply Visual analytics techniques using tableau for Multidimensional datasets.
CO4	Identify and explore the concept and application of interaction techniques, colour, animation and mapping and cartography in Visualization of data.
CO5	Create the Interactive data related applications using Bokeh.
CO6	To effectively design and deliver the project presentations related to visualization tools.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	-	-	2	-	1
CO2	3	3	3	2	2	-	2	-	-	2	-	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1
CO4	3	3	3	2	2	-	2	-	-	2	-	1
CO5	3	3	3	2	2	-	2	-	-	2	-	1
CO6	3	3	3	2	2	-	2	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	Introduction to Data Visualization, Introduction to NumPy,pandas and Basic Plotting with MatPlotLib	9	CO1
2	Exploratory Data Analysis: Waffle Charts, Word Clouds, Introduction to Folium and Map Styles, Maps with Markers, Choropleth Maps	9	CO2

3	Seaborn - Strip plot,pair grid plot, violin plots, cluster map, heat map, facet grid, KDE plot, join plot, Seaborn and Regression Plots, pair plots. Getting Started & Introduction to Data Visualization – Tableu , Exploring and Navigating Tableau, Making Data Connections, Context of Data Visualization	9	CO3
4	Visual analytics : Introduction to Table Calculations, Calculated Fields, Quick Table Calculations, Custom Table Calculations, Filters, Parameters, Introduction to Mapping, Working with Geographic Data, Shapes, Colors and Sizes, Custom Mapping Techniques, Custom Geocoding, Dual Layer Mapping	9	CO4, CO5
5	Interactive Data Visualization With Bokeh: Case Study	9	CO6

TEXT BOOKS:

1. David Baldwin, “Mastering Tableau: Smart Business Intelligence techniques to get maximum insights from your data” , Packt Publications,2016
2. Kevin Jolly ,”Hands-On Data Visualization with Bokeh: Interactive web plotting for Python using Bokeh” , Packt Publications,2015
3. Srinivasa Rao Poladi , “Matplotlib 3.0 Cookbook: Over 150 recipes to create highly detailed interactive visualizations using Python” , Packt Publications,2017

REFERENCE BOOKS:

1. EfraimTurban , Jay E. Aronson , Ting-Peng Liang, “Decision Support Systems & Intelligent Systems”, 9th edition, Prentice Hall, 2016.
2. Data, data everywhere, “Special report on managing information, Economist”, February 27th, 2016.
3. Liberatore and Luo, “The Analytics Movement, Interfaces, Articles in Advance”

CIE- Continuous Internal Evaluation (50 Marks)

Bloom’s Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	-	5
Apply	10	10	5
Analyze	-	-	-
Evaluate	-	-	-
Create	-	5	-

SEE- Semester End Examination (50 Marks)

Bloom’s Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

SYSTEM MODELING AND SIMULATION

Course Code : 20ISE642 **Credits : 03**
L: T: P : 3:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks: 50**

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

CO1	Understand simulation needs, and to implement and test a variety of simulation models
CO2	Conceptualize real world situations related to systems development decisions
CO3	Discuss the simulation methods and select the suitable technique on the problems.
CO4	Generate and test random number variates and apply them to develop simulation models
CO5	Create a model prediction based upon new input and validate the output data.
CO6	Test validity of the model for various case studies like inventory, traffic flow networks, etc.

Mapping of Course Outcomes to Program Outcomes:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	1	1	1	1	2	2
CO2	3	2	1	2	2	1	1	1	1	1	2	2
CO3	3	2	1	2	2	1	1	1	1	1	2	2
CO4	3	2	1	2	2	1	1	1	1	1	2	2
CO5	3	2	1	2	2	1	1	1	1	1	2	2
CO6	3	2	1	2	2	1	1	1	1	1	2	2

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Mapping of CO v/s PSO:

COs	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1.	**Introduction:** Simulation, Advantages and disadvantages, Areas of Application, System environment, components of a system, Model of a system, types of models, steps in a simulation study, Simulation of Queuing systems and Simulation of Inventory System,	**9**	CO1
2.	**General Principles:** Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling. **Statistical Models in Simulation** : Review of terminology and concepts, Useful statistical models, Discrete distributions. Continuous distributions, Poisson process.	**9**	CO2 CO3
3.	**Queuing Theory:** Arrival pattern distributions, servicing times, queuing disciplines, Steady-state behavior of M/G/1 queue. **Random Numbers:** Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test.	**9**	CO4
4.	**Input Modeling:** Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models.	**9**	CO4 CO5
5.	**Output Analysis** – Types of Simulations with Respect to Output Analysis, Output analysis of terminating simulation, Output analysis of steady state simulations.	**9**	CO5 CO6

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: " Discrete-Event System Simulation ", 5th Edition, Pearson Education, 2010.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: " Discrete – Event Simulation: A First Course ", Pearson Education, 2006.
2. Averill M. Law: " Simulation Modeling and Analysis ", 4th Edition, Tata McGraw-Hill, 2007.
3. Geoffrey Gordon, " System Simulation ", Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-4.

CIE -Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests	Assignments	Quizzes
Marks (Out of 50)	25	15	10
Remember	-	-	-
Understand	10	-	5
Apply	10	7.5	5
Analyze	5	7.5	-
Evaluate	-	-	-
Create	-	-	-

SEE –Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	20
Apply	20
Analyze	10
Evaluate	-
Create	-

OBJECT ORIENTED MODELING & DESIGN

Course Code : 20ISE643 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand Object Oriented Modeling techniques.
CO2	Develop class models using class diagrams from the requirements specified for a particular problem.
CO3	Construct use case models, sequence models and activity models from the requirements specified for a particular problem.
CO4	Construct domain model using system conception.
CO5	Understand Reverse Engineering concepts.
CO6	Understand, analyze and compare different software architecture patterns.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	-	-	-	-	-	1	-	2
CO2	2	2	2	3	-	-	-	-	-	1	-	2
CO3	2	2	2	3	-	-	-	-	-	1	-	2
CO4	2	2	2	3	-	-	-	-	-	1	-	2
CO5	2	2	2	3	-	-	-	-	-	1	-	2
CO6	2	2	2	3	-	-	-	-	-	1	-	2

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PS02
CO1	2	3
C02	2	3
CO3	2	3
CO4	2	3
CO5	2	3
CO6	2	3

Module No.	Module Contents	No. of Hours	COs
1.	**INTRODUCTION, MODELING CONCEPTS AND CLASS MODELLING** : What is Object Orientation? What is OO development? OO themes; Modeling, Concepts -1: The three models, Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model, Advanced Class Modeling: Advanced object and class concepts; Association ends; Aggregation.	**9**	CO1, CO2
2.	**USECASE MODELLING AND DETAILED REQUIREMENTS:** Overview; Detailed object oriented Requirements	**9**	CO1, CO3

	definitions; System Processes-A use case/Scenario view; Identifying Input and outputs-The System sequence diagram; Identifying Object Behaviour-The state chart Diagram; Integrated Object-oriented Models.		
3.	**PROCESS OVERVIEW, SYSTEM CONCEPTION AND DOMAIN ANALYSIS**: Process Overview: Development stages; Development life Cycle; System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis.	**9**	CO1, CO4
4.	**ARCHITECTURAL MODELING** : Component, Deployment, Component diagrams and Deployment diagrams. Case Study : The Unified Library application. Legacy Systems: Reverse engineering; Building the class models; Building the state model; Reverse engineering tips; Wrapping; Maintenance.	**9**	CO5
5.	**DESIGN PATTERNS**: What is a pattern and what makes a pattern? Pattern categories; Pattern description. Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server. Management Patterns: View handler	**9**	CO6

TEXT BOOKS:

1. Michael Blaha, James Rumbaugh, "Object-Oriented Modeling and Design with UML", Pearson Education ,2nd Edition, 2007.
2. Frank Buschmann, 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.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	**Tests**	**Assignments**	**Quizzes**
Marks (Out of 50)	**25**	**15**	**10**
Remember	-		
Understand	5	-	-
Apply	10	10	5
Analyze	5	5	5
Evaluate	5	-	-
Create	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	10
Apply	20
Analyze	10
Evaluate	10
Create	-

COMPILER DESIGN

Course Code : 20ISE644 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks: 50**

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

CO1	Understand the basic concepts and application of Compiler Design
CO2	Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer
CO3	Understand and Implement a Parser-Top Down and Bottom Up Design
CO4	Understand strength of Grammar and Programming Language
CO5	Understand various Code optimization Techniques and Error Recovery mechanisms.
CO6	Comprehend and manipulate the different concepts in Compiler Design.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	-	-	-	1	-	-
CO2	3	2	2	3	1	-	-	-	-	1	-	-
CO3	3	2	2	3	1	-	-	-	-	1	-	-
CO4	3	2	2	3	1	-	-	-	-	1	-	-
CO5	3	2	2	3	1	-	-	-	-	1	-	-
CO6	3	2	2	3	1	-	-	-	-	1	-	-

Mapping of CO v/s PSO:

	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1
CO6	2	1

Module No.	Module Contents	Hours	COs
1	Introduction: Overview of the Translation Process, Difference between interpreter, assembler and compiler, Overview and use of linker and loader, Analysis of the Source Program, Language processors; Pass and phase, Bootstrapping, The structure of a Compiler, The science of building a Compiler; Types	9	CO1, CO6
2	Lexical Analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA.	9	CO2, CO6
3	Syntax Analysis: Introduction; Context-free Grammars; Writing a Grammar. Top-down Parsing :Recursive descent parsing, Non-recursive predictive parsing, LL(1) grammars, Bottom-up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators.	9	CO3, CO6
4	Syntax Directed Translation: Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes	9	CO4, CO6
5	Code Generation: Principal Sources of Optimization-DAG-Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms-Issues in Design of a Code Generator - The Target Language, Addresses in the Target Code,A Simple Code Generator Algorithm.	9	C05, CO6

TEXT BOOKS:

1. Aho, Lam, Sethi, and Ullman , “Compilers: Principles, Techniques and Tools” Pearson, 2nd Edition, 2014
2. Steven S Muchnick, “Advanced Compiler Design and Implementation”, Morgan Kaufmann Publishers,1998.

REFERENCES:

1. Allen I. Holub,”Compiler Design in C”, Prentice-Hall/Pearson, 2nd Edition.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests	Assignments	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
Remember	5	-	-
Understand	5	-	5
Apply	5	10	-
Analyze	5	-	5
Evaluate	5	5	-
Create	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

OPERATIONS RESEARCH

Course Code: 20ISE645 **Credits : 03**
L: T: P : 3:0:0 **CIE Marks : 50**
Exam Hours: 3 **SEE Marks : 50**

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

CO1	Realize the importance of Operations Research and explain the basic concepts.
CO2	Construct and Solve Linear Programming Problems for its optimal solutions by graphical method.
CO3	Apply the concept of Simplex method and its extensions to Solve Linear Programming Problems for its optimal solutions.
CO4	Solve specialized linear programming problems like assignment problems using various OR methods.
CO5	Solve the problem of transporting the products from origins to destinations with least transportation cost.
CO6	Analyze network technique namely PERT/CPM and optimal project duration and cost.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	3	3	3	3	3	3	3
CO2	3	3	3	3	-	3	3	3	3	3	3	3
CO3	3	3	3	3	-	3	3	3	3	3	3	3
CO4	3	3	3	3	-	3	3	3	3	3	3	3
CO5	3	3	3	3	-	3	3	3	3	3	3	3
CO6	3	3	3	3	-	3	3	3	3	3	3	3

Module No	Module Contents	Hours	COs
1	**INTRODUCTION & LINEAR MODEL-I :** Definition and Historical development of OR, Nature and Meaning of OR, Characteristics of OR, Phases of OR, Scope of OR. Introduction to Linear Model, Formulation of LPP problem, Graphical Solution, Slack and Surplus variables, standard form of LPP	9	CO1, CO2
2	**LINEAR MODEL-II:** Computational procedure of simplex method, Degeneracy problem, method to resolve degeneracy. Special cases: Alternative optimum solution, unbounded solution, Big-M method, Concept of duality	9	CO3

3	**ASSIGNMENT MODEL:** Introduction, Mathematical formulation of assignment problem, Hungarian method to solve assignment problems, unbalanced assignment problems, maximal assignment problem, restriction on assignments, travelling salesman problem, crew scheduling problem.	9	CO4
4	**TRANSPORTATION MODEL:** Introduction, Mathematical formulation of transportation problem, definitions, initial basic feasible solution, moving towards optimality, unbalanced transportation problem, degeneracy in transportation problem.	9	CO5
5	**NETWORK ANALYSIS:** Introduction to Project management, basic steps in PERT / CPM techniques, network diagram representations and rules, Time estimates and Critical Path in Network Analysis, Optimum duration and Minimum duration cost, Project Evaluation and Review Technique (PERT), Applications	9	CO6

TEXT Books:

1. S. D. Sharma, "OPERATIONS RESEARCH – Theory, Methods & Applications", , Seventeenth Review Edition 2014, Reprint 2015, Kedarnath Ram Nath Publisher

REFERENCE Books:

1. Frederick S Hillier, Gerald J Lieberman, Bodhibrata Nag and Preetam Basu "Introduction to OPERATIONS RESEARCH ", , Ninth Edition, Tenth Reprint , 2015, TATA McGraw Hill

2. Hamdy Taha, " Operations Research: An Introduction", Pearson Education Inc. (2009),

Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25Marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	5	7.5	5
Apply	5	-	5
Analyze	5	7.5	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

USER INTERFACE DESIGN

Course Code	**: 20ISE651**	**Credits**	**: 03**
L:T:P	**: 3:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Identify the basic user interface engineering definitions, concepts, principles and theories.
CO2	Recognize the importance of user interactions/interfaces, legal, ethical, and social issues.
CO3	Apply design principles, guidelines and heuristics to create a user-interaction strategy that solves a real-world problem.
CO4	Study the characteristics and components of windows.
CO5	Design a usable and compelling user-interface given a set of requirements and available technologies.
CO6	Perform various testing methods on UI.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	3	2	2	2	2	2	3	1	2
CO2	2	3	3	3	2	2	2	2	2	3	1	2
CO3	2	3	3	3	3	2	2	2	2	3	2	2
CO4	2	3	3	3	2	2	2	2	2	3	2	2
CO5	2	3	3	3	3	2	2	2	2	3	2	2
CO6	2	3	3	3	3	2	2	2	2	3	2	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	COs
1	**The User Interface-Introduction**: Overview, The importance of user interface, Defining the user interface, The importance of Good design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics, Principles of user interface design.	9	CO1, CO2

2	**The User Interface Design process**: Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Iterative design practices, Design rules, maximum usability, Principles, Standards and guidelines, design patterns, Programming Tools, Windowing systems, Interaction tool kit, User Interface management system. **Evaluating Interface Designs:** Expert Reviews, Usability Testing and Labs, Acceptance Tests, Evaluation During Active Use.	9	CO2, CO3
3	**Windows:** Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls.	9	CO4
4	**Menu Selection, Form Fillin, and Dialog Boxes:** Introduction, Task-Related Menu Organization, Single Menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry with Menus: Form Fillin, Dialog Boxes, and Alternatives, Audio Menus and Menus for small Displays.	9	CO5
5	**Information Search and Visualization:** Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Information Visualization. **Screen based controls**: Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests.	9	CO5, CO6

TEXT BOOKS:

1. Ben Shneiderman,"Designing the User Interface: Strategies for Effective Human-Computer Interaction", Pearson Education, 5th Edition 2017
2. Wilbent. O. Galitz "The Essential Guide to User Interface Design", Wiley& Sons, Third Edition 2007.
3. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale "Human Computer Interaction", Prentice Hall, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2012.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, "Research Methods in Human Computer Interaction", Wiley, 2010.
3. Ben Shneiderman, "Design the User Interface",Pearson Education, 5th Edition

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	5	-	5
Apply	5	7.5	5
Analyze	5	7.5	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	

VIRTUAL REALITY

Course Code : 20ISE652 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Explain fundamentals of Virtual Reality Systems.
CO2	Summarize the hardware and software of the Virtual Reality.
CO3	Analyze the applications of Virtual Reality.
CO4	Illustrate technology, underlying principles, its potential and limits.
CO5	To learn about the criteria for defining useful applications.
CO6	Explain process of creating virtual environments.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	2	1	0	1	1	0
CO2	2	2	1	1	1	1	1	0	2	0	1	0
CO3	2	3	1	2	1	2	1	2	1	1	0	1
CO4	2	2	1	2	1	2	1	0	0	0	1	0
CO5	2	2	1	2	1	2	1	0	0	0	1	0
CO6	2	3	1	2	1	2	1	2	1	1	0	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	2
CO2	2	2
CO3	2	1
CO4	1	1
CO5	2	1
CO6	1	2

Module No.	Module Contents	Hours	COs
1	Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. Input Devices: Three dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.	9	CO1
2	Output Devices: Graphics displays, sound displays & haptic feedback.	9	CO2
3	Modeling : Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management.	9	CO3
4	Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.	9	CO4, CO5
5	Applications: Medical, Military, Robotics applications.	9	CO6

TEXT BOOKS:

1. Samuel Greengard, Steven Jay Cohen, "Virtual Reality", Gilden Media, First Edition, 2019.
2. Gregory C. Burdea& Philippe Coiffet, "Virtual Reality Technology", Second Edition, John Wiley & Sons, 2006

REFERENCE BOOKS:

1. Jason Jerald, "The VR Book: Human-Centred Design for Virtual Reality", ACM Books, First Edition, 2015.
2. Tony Parisi, "Learning Virtual Reality", O'Reilly, First Edition, 2015.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	**25**	**15**	**10**
Remember	5	5	-
Understand	5	5	5
Apply	5	5	5
Analyze	5	-	-
Evaluate	5	-	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

C# & .NET

Course Code : 20ISE653 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Understand the technologies of the .NET framework
CO2	Understand the basic and object oriented concepts in C#.
CO3	Model the real world entities as classes and objects using C# object oriented programming concepts.
CO4	Apply exception handling and gain efficient testing, debugging skills C#.
CO5	Applying interfaces and Events in C# programming.
CO6	Develop Windows applications based on C# programming libraries and .NET framework.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	1	-	2	-	2
CO2	3	3	3	2	2	-	2	1	-	2	-	2
CO3	3	3	3	2	2	-	2	1	-	2	-	2
CO4	3	3	3	2	2	-	2	1	-	2	-	2
CO5	3	3	3	2	2	-	2	1	-	2	-	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**Introduction to .Net:** 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, Web Services, Web Forms, and Windows Forms, The .Net Languages.	9	CO1
2	**An Overview of C#:** Object Oriented Concepts, C# Program – Execution, Sample Programs, Command Line Arguments, Programming Examples, Multiple Main Methods. Literals, Variables and Data Types: Keywords, Identifiers, Literals, Variables, Data Types, Boxing and Unboxing. operators and expressions, branching and looping	9	CO2,CO3
3	**Structures and Enumerations:** Structures- Defining a Structure, Assigning Values to Members , Copying Structures , Structures with Methods , Nested Structures , Classes Vs Structures, Guidelines to use Structures; Enumerations- Enumerator Initialization, Enumerator Base Types, Enumerator Type Conversion. Classes and Objects: Classes, Constructors & Destructors, Member Initialization, 'this' Reference Variable, Nesting of Classes, Members, Properties.	9	CO3
4	**Exception Handling:** Exceptions – An Overview, Exception Handling Syntax, Multiple Catch Statements, The Exception Hierarchy, General Catch Handler, Using 'Finally', Nested Try Blocks, User Defined Exceptions, Operators – Checked and Unchecked.	9	CO4
5	**Interfaces, Delegates and Events:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Explicit Interface Implementation, Abstract Classes and Interfaces, Delegates, Multicast Delegates, Events. Developing Windows Applications, Developing Web Applications.	9	CO5,CO6

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata Mc Graw Hill, 2012. 2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 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. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	-
Understand	10	-	5
Apply	5	10	5
Analyze	-	-	-
Evaluate	-	-	-
Create	5	5	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	10
Analyze	-
Evaluate	-
Create	10

COMPUTER GRAPHICS USING OPENGL

Course Code : 20ISE654 **Credits : 03**
L:T:P : 3:0:0 **CIE Marks : 50**
Exam Hours : 3 **SEE Marks : 50**

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

CO1	Interpret the fundamental principles of computer graphics
CO2	Illustrate primitives and attributes for designing graphics
CO3	Analyze the two-dimensional graphics and their transformations
CO4	Analyze the three-dimensional graphics and their transformations
CO5	Implement illumination and color models using OpenGL
CO6	Design a Computer Animation with 2D and 3D effects

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	3	-	3	-	-	-	3
CO2	3	3	3	-	-	3	-	3	-	-	-	3
CO3	3	3	3	-	-	3	-	3	-	-	-	3
CO4	3	3	3	-	-	3	-	3	-	-	-	3
CO5	3	3	3	-	-	3	-	3	-	-	-	3
CO6	3	3	3	-	-	3	-	3	-	-	-	3

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-
CO6	3	-

Module No.	Module Contents	Hours	COs
1	**Introduction to Computer Graphics and OpenGL:** Input Devices,Hard-Copy Devices,Graphics Networks, Graphics on the Internet, Coordinate Representations,Graphics Functions,Software Standards **OpenGL:**Related Libraries, Header Files, Display-Window Management Using GLUT, A Complete OpenGL Program	9	CO1
2	**Attributes of Graphics Primitives:**OpenGL State Variables, Color and Grayscale, OpenGL Color Functions, Point Attributes, OpenGL Point-Attribute Functions,Line Attributes, OpenGL Line-Attribute Functions, Curve Attributes	9	CO2
3	**Two-Dimensional Geometric Transformations:**Basic GeometricTransformations, Matrix Representations andHomogeneous Coordinates, CompositeTransformations, , Raster Methods for GeometricTransformations,OpenGL Raster Transformations, OpenGL Functions forGeometricTransformations	9	CO3
4	**Three-Dimensional Geometric Transformations:**Translation, Rotation, Scaling, Composite Transformations,Affine Transformations, OpenGL Geometric-TransformationFunctions, OpenGL Geometric- TransformationProgramming Examples	9	CO4, CO5
5	**Computer Animation:**Design of Animation Sequences, Traditional Animation Techniques, General Computer-AnimationFunctions, Computer-Animation Languages, Key-Frame Systems, Motion Specifications,Character Animation, Periodic Motions, OpenGL Animation Procedures	9	CO6

TEXT BOOKS:

1. Hearn Baker Carithers, "Computer Graphics with OpenGL", Pearson New International Edition,2014
2. J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, "Computer Graphics – Principles and Practice", Second Edition in C, Pearson Education, 2003
3. F. S. Hill Jr., "Computer Graphics using OpenGL", Pearson Education, 2003.

REFERENCE BOOKS:

1. Xiang, Plastock,"Computer Graphics" , sham's outline series, 2nd edition, TMG,Jan 2015.
2. Kelvin Sung, Peter Shirley, stevenBaer ,"Interactive Computer Graphics, concepts and Applications", 1st Edition ,Cengage Learning,2010.
3. M MRaikar&Shreedhara K S ,"Computer Graphics using OpenGL",1st Edition,Cengage publication,2019.

WEB RESOURCES:

1. Welcome to OpenGL:https://learnopengl.com/
2. Basic OpenGL:http://www.opengl-tutorial.org/beginners-tutorials/
3. An Introduction on OpenGL with 2D Graphics : https://www3.ntu.edu.sg/home/ehchua/programming/opengl/cg_introduction.html
4. Getting started with OpenGL https://www.geeksforgeeks.org/getting-started-with opengl/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	5	-	5
Understand	10	-	5
Apply	5	5	-
Analyze	5	5	-
Evaluate	-	5	-
Create	-		-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	10
Analyze	10
Evaluate	-
Create	-

SOFT COMPUTING

Course Code : 20ISE655 | **Credits : 03**
L:T:P : 3:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

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

CO1	Learn about soft computing techniques and their applications.
CO2	Understand Neural Networks, architecture, functions and various algorithms involved.
CO3	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.
CO5	Apply Neural networks for Real world problems.
CO6	Analyze the genetic algorithms and their applications.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	2	1	-	2	-	1
CO2	3	3	3	2	2	-	2	1	-	2	-	1
CO3	3	3	3	2	2	-	2	1	-	2	-	1
CO4	3	3	3	2	2	-	2	1	-	2	-	1
CO5	3	3	3	2	2	-	2	1	-	2	-	1
CO6	3	3	3	2	2	-	2	1	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	**Introduction:** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.	9	CO1
2	**Neural Network:** Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network.	9	CO2

3	**Fuzzy Systems:** Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.	9	CO3
4	**Types of learning**: supervised and unsupervised learning laws. Learnig Laws : Hebb's rule, Delta rule, Widrow - Hoff (The Least-Mean-Square) learning rule, correlation learning rule, instar and outstar learning rules	9	CO4
5	**Genetic algorithm:** Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	9	CO5,CO6

TEXT BOOKS:

1. S.N. Sivanandam & S.N. Deepa, "Principles of Soft Computing", Wiley Publications, 2nd Edition, 2011.
2. Saroj Kaushik,Suntia Tiwari,"Soft Computing Fundamentals ,Techniques and Applications",1st Edition,Mc Graw Hill,2018.
3. S.Rajasekaran, G. A.Vijayalakshami ,"Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications" , PHI,2011.

REFERENCE BOOKS:

1. N.K.Bose, Ping Liang, "Neural Network fundamental with Graph, Algorithms & Applications" , TMH, 1st Edition, 1998.
2. Bart Kosko," Neural Network & Fuzzy System" , PHI Publication, 1st Edition, 2009.
3. Rich E, Knight K," Artificial Intelligence" , TMH, 3rd Edition, 2012.
4. George J Klir, Bo Yuan, "Fuzzy sets & Fuzzy Logic,Theory & Applications", PHI Publication, 1st Edition, 2009.
5. Martin T Hagen, "Neural Network Design" , Nelson Candad, 2nd Edition, 2008

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 Marks)	Quizzes (10 Marks)
Remember	10	-	-
Understand	10		5
Apply	5	5	5
Analyze	-	5	-
Evaluate	-	5	-
Create	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	20
Understand	20
Apply	10
Analyze	-
Evaluate	-
Create	-

ADVANCED JAVA LAB

Course Code : 20ISL66 **Credits : 1.5**
L:T:P : 0:0:1.5 **CIE Marks : 25**
Exam Hours : 3 **SEE Marks : 25**

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

CO1	Apply event handling mechanism in Java based GUI programming.
CO2	Illustrate database access and details for managing information using the JDBC API.
CO3	Describe how Servlets and JSP fit into Java-based web application architecture.
CO4	Demonstrate the usage of frameworks Spring in J2EE based application development.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
	PART-A
1	Design and create swing based program to display the coordinates of a mouse pointer in a label component.
2	Design and demonstrate loading of file in a Swing Component.

3	Design and develop a swing based application to count the number of times a specific button is clicked by the user, apply event handling mechanism.
4	Design, Develop and Implement a JDBC program using statement object to display the student information to the console. Assume suitable columns and rows for the Student table and JDBC drivers.
5	Design, Develop and Implement a menu driven JDBC based program using Prepared statement object to perform CRUD operations: insert a row into the student table, delete, update and display the updated data. Assume suitable columns for the Student table and JDBC drivers.
6	Design, Develop and Implement a JDBC based program using callable statement to execute a stored SQL procedure to display the USN of all students from student table. Assume suitable columns and rows for the Student table and JDBC drivers.
PART-B	
7	Write a servlet to show all the parameters sent to the servlet via either GET or POST. Note: consider all types of form fields.
8	Design and develop a user login page and authenticate the user in a JSP page using database. Assume user name and password to be the column of the USER database. Establish connectivity using JDBC drivers.
9	Create a HTML Page, which asks the user to enter a number in a textbox. On clicking the submit button, it places the request to a Servlet. The Servlet generates all Prime numbers which are less than the given number and adds them to an ArrayList and forwards the control to a JSP page. The JSP page iterates through the ArrayList and prints them in a tabular format. Apply RequestDispatcher methods to achieve the same.
10	Design a registration form with Student Name, USN, favourite Course elements. Apply usebean tag in JSP to receive and send the data to Student Java Bean and reply with successful registration and display the registered data.
11.	Demonstrate the concept of dependency injection in spring framework using a suitable web based application.
12	Design and develop a program to demonstrate the MVC pattern using spring framework. Implement the Model view Controller components to interact with spring framework.

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as ‘0’

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	5
Analyze	-
Evaluate	-
Create	15

MACHINE LEARNING LAB

Course Code : 20ISL67 | **Credits : 1.5**
L:T:P : 0:0:1.5 | **CIE Marks : 25**
Exam Hours : 3 | **SEE Marks : 25**

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

CO1	Demonstrate Supervised, Unsupervised Learning algorithms.
CO2	Implement Concept Learning, Supervised Learning Algorithms.
CO3	Model the Association Rule Mining algorithms with real world problems.
CO4	Illustrate Artificial Neural Networks and Convolutional Neural Networks to solve machine learning problems.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
	PART-A
1	Implement and demonstrate the Pricipal Component Analysis for dimentionality reduction. Read the training data set from a .CSV file.
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Document classifier using Naiive Bayes.
3	Develop a program to demonstrate the working of the decision tree based CHAID algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4	Develop a program to demonstrate the working of the decision tree based CART algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5	Develop a program to demonstrate the working of the decision tree based C4.5 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
6	Develop a program to construct Support Vector Machine considering a Sample Dataset.

PART-B	
7	Implement and demonstrate the Association Rule Mining
8	Implement and demonstrate the Association Rule Mining using Apriori Algorithm.
9	Implement and demonstrate the Association Rule Mining using FP-Growth Algorithm.
10	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
11.	Build a Convolutional Neural Networks and test the same using appropriate data sets.
12	Implement Q learning algorithm.

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution: Procedure write-up – 20%
  Conduction – 60%
  Viva – Voce – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (25 Marks

Bloom's Category	Tests (25 Marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

MINI PROJECT

Course Code	**: 20ISE68**	**Credits**	**: 2**
L:T:P	**:0:0:2**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

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

CO1	Analyze the Real world problem through survey of existing problems.
CO2	Design the modules for solving the problems identified.
CO3	Implement the design modules with suitable programming language.
CO4	Test the working modules at different levels.

Mapping of Course Outcomes to Program Outcomes:

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

Note :

- Every student should do individual mini project in the areas suggested by the department expert committee
- Minimum 2 reviews will be conducted by the department expert committee to know the progress of the mini project work
- In each review student should give presentation on the work carried out and show the relevant models
- 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%

APPENDIX A
Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of aneducational 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.

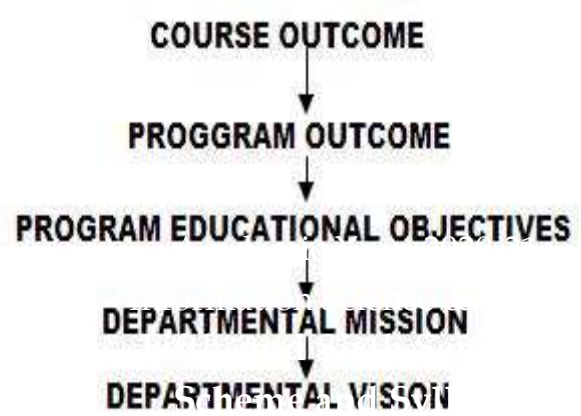
There are three educational Outcomes as defined by the National Board of Accreditation:

Program Educational Objectives: The Educational objectives of an engineering degreeprogram 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. Graduateattributes are separately listed in Appendix C

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

Mapping of Outcomes



APPENDIX B

The Graduate Attributes of NBA

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

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

Design/development of solutions: Design solutions for complex engineering problems anddesign 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 bystraightforward 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, andmodern 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 assesssocietal, 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 engineeringsolutions 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 andnorms of the engineering practice.

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

Communication: Communicate effectively on complex engineering activities with theengineering 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.

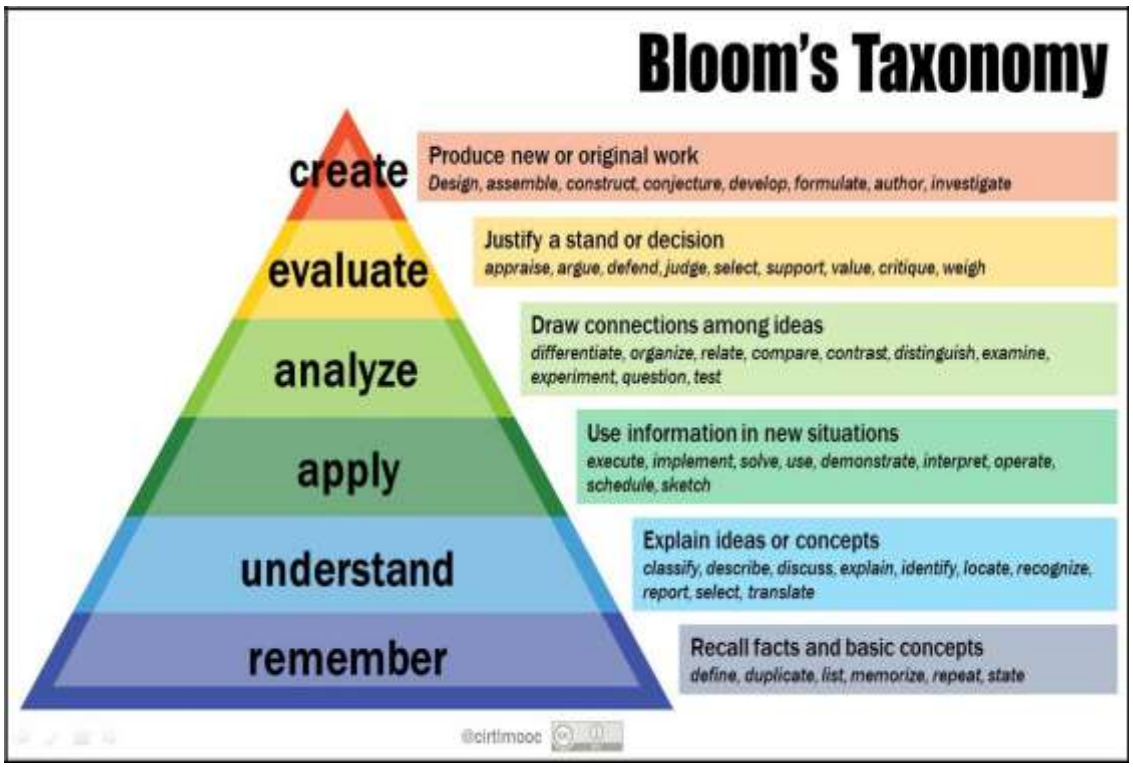
Project management and finance: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish differentlevels 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.



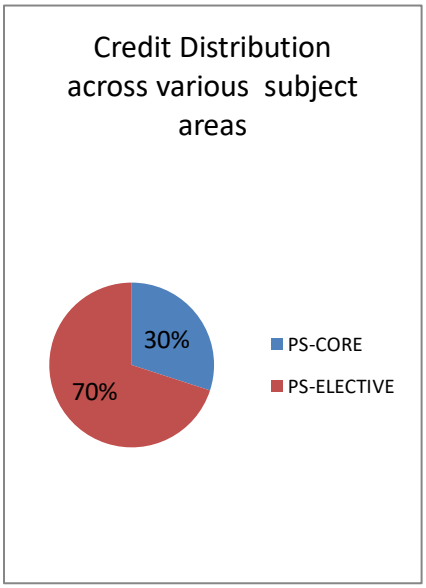
Academic Year 2022-23

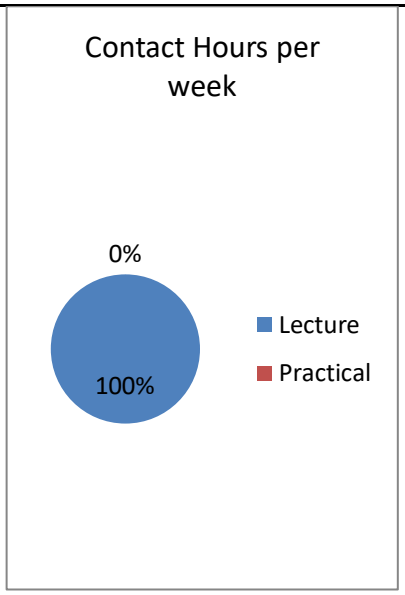
Scheme

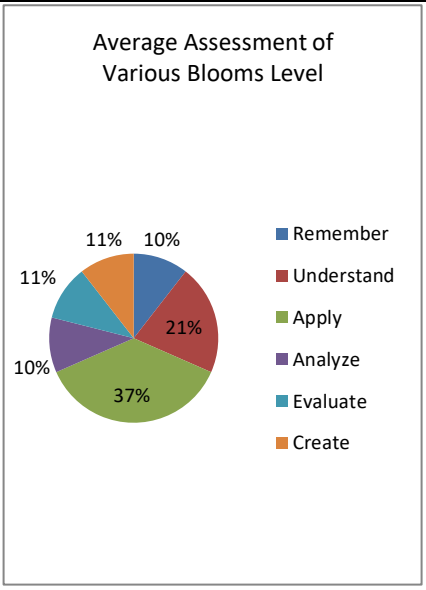
7^{th} and 8^{th} Semesters

New Horizon College of Engineering
Department of Information Science and Engineering
Seventh Semester B.E Program-Scheme AY: 2022-23

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	XXISE71	Software Testing & Automation	ISE	3	0	0	3	3	50	50	100
2.	XXISE72	Computer Networks	ISE	3	0	0	3	3	50	50	100
3.	XXISE73	Cloud Computing	ISE	3	0	0	3	3	50	50	100
3.	XXISE74X	Professional Elective – 4	ISE	3	0	0	3	3	50	50	100
4.	XXISE75X	Professional Elective - 5	ISE	3	0	0	3	3	50	50	100
5.	NHOPXX	Open Elective – 2	COE's	3	0	0	3	3	50	50	100
6.	XXISL76	Software Testing & Automation Lab	ISE	0	0	1.5	1.5	3	25	25	50
8.	XXISL77	Computer Networks Lab	ISE	0	0	1.5	1.5	3	25	25	50
9.	XXISE78	Project Phase-1	ISE	-	-	-	2	4	25	25	50
Total							**23**	**28**	**375**	**375**	**750**



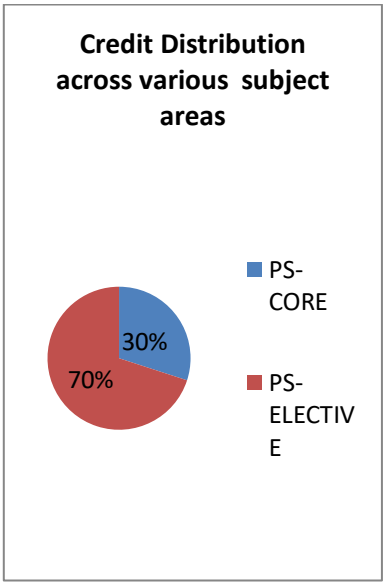


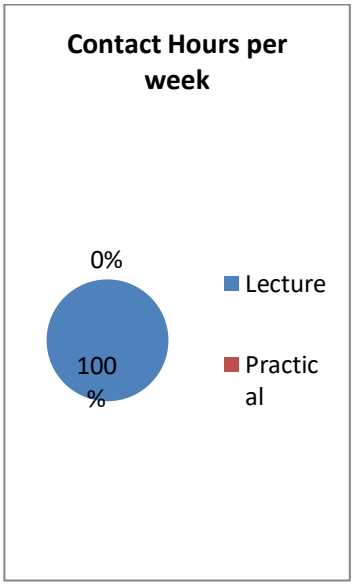


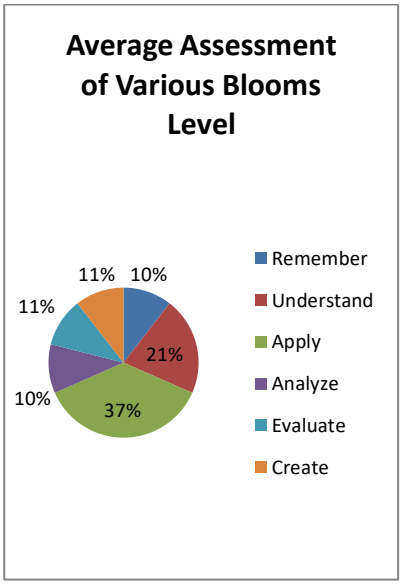
Professional Elective - 4	
Course Code	**Course Name**
XXISE741	Computer Forensics
XXISE742	Cryptography & Network Security
XXISE743	Cyber Law
XXISE744	Information Theory & Coding
XXISE745	Natural Language Processing
Professional Elective – 5	
Course Code	**Course Name**
XXISE751	Social Network Analysis
XXISE752	Big Data Analytics
XXISE753	DevOps
XXISE754	Robotics
XXISE755	Deep Learning

New Horizon College of Engineering
Department of Information Science and Engineering
Eighth Semester B.E Program–Scheme AY: 2022-23

Sl. No.	Course Code	Course Name	BOS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	TOTAL
1.	XXISE81X	Professional Elective-6	ISE	3	0	0	3	3	50	50	100
2.	XXISE82X	Professional Elective-7	ISE	3	0	0	3	3	50	50	100
3.	XXISE83	Internship Viva	ISE	-	-	-	4	0	50	50	100
4.	XXISE84	Project Phase-2	ISE	-	-	-	10	0	150	150	300
Total							**20**	**6**	**300**	**300**	**600**







Professional Elective – 6	
Course Code	**Course Name**
XXISE811	Computer System Performance Analysis
XXISE812	Enterprise Application Programming
XXISE813	Agile Software Development
XXISE814	Management & Entrepreneurship
XXISE815	Web Semantics
Professional Elective – 7	
Course Code	**Course Name**
XXISE821	Software Architecture & Design Patterns
XXISE822	Service Oriented Architecture
XXISE823	Software Metrics
XXISE824	Storage Area networks
XXISE825	Human Computer Interaction