SHSB1101	TECHNICAL ENGLISH	L	T	P	EL	Credits	Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand specialized subject areas and skills included for their study.
➢ To comprehend and react in oral and written forms to the specialized texts.
➢ To respond to listening, reading and writing tasks by using digital tools.
➢ To enhance communication, collaboration and critical thinking skills.
➢ To explore creativity through blended learning contexts.

UNIT 1   9 Hrs.

Listening	:	Listening to choose the correct answer from the options given (MCQ).
Speaking	:	Self Introduction, Talking about likes and dislikes.
Reading	:	Comprehending a passage- Skimming, scanning, detailed reading.
Writing	:	Letter of Job Application, Resume, Letter to the Editor (problems and solutions).
Vocabulary	:	Kinds of Sentences, Affixes, Collocations, Sequence words, contextual guessing of words.
Language Focus	:	Parts of Speech, Tense and its types, Voice - Impersonal Passive.
Language Lab work:		Focus Digital literacy: students join zoom platform/ using online tools.

UNIT 2   9 Hrs.

Listening	:	Listening to advertisements about a product, say true or false.
Speaking	:	JAM on current topics, mini presentations.
Reading	:	Identifying topic sentences by reading content.
Writing	:	Writing compare/ contrast paragraphs, process description, E-Mail Writing.
Vocabulary	:	Verbal phrases, Prepositions and Prepositional phrases, Concord, Discourse Markers.
Language Focus	:	Clauses, Conjunctions, Sentence Types - Simple, Compound & Complex.
Language Lab	:	Digital literacy: Responding to quiz using Kahoot application.

UNIT 3   9 Hrs.

Listening	:	Listening to summarize the information, debates/ discussions.
Speaking	:	Group discussion on a given topic.
Reading	:	To find specific information and to prepare notes using the format.
Writing	:	Framing open ended questions- Survey Report- Arranging the sentences in the right order.
Vocabulary	:	Paired expressions, Adjectives/ adverbs, Technical definitions, Compound Nouns.
Language Focus	:	Punctuation, Editing, Same words used as different parts of speech.
Language Lab	:	Digital literacy: Power point tools –Slide share to make presentation on the survey report.

UNIT 4   9 Hrs.

Listening	:	Listening to differentiate instructions and recommendations.
Speaking	:	Debate on current issues.
Reading	:	Reading to understand and classify the information.
Writing	:	Instructions, Recommendations, Preparation of User Manual.
Vocabulary	:	Classification of words, Abbreviations, Acronyms.
Language Focus	:	Reported Speech, Causatives, Basic Sentence Patterns.
Language Lab	:	Digital literacy: Using online discussion forum.

UNIT 5   9 Hrs.

Listening and
Summarizing   :   Listening to identify the structure of sentences, small talks, TED talks.
Speaking   :   Giving impromptu talks, Speech Writing.
Reading   :   Read argumentative essays and paragraphs.
Writing   :   Essay writing, Checklist preparation, Note making.
Vocabulary   :   Homophones/Homonyms, Idioms and Phrases.
Language Focus :   Negatives, Tag questions, Similes and Metaphors.
Language Lab   :   Digital literacy: Creating own Blogs and interactive exercises and quizzes online.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Classify technical words to use them in sentences framing, compose problem solving paragraphs.

CO2 - Categorize information based on the understanding of reading materials to prepare notes.

CO3 - Prepare and document to report, identify elements of editing.

CO4 - Interpret technical definitions related to the text and design a user manual using instructions.

CO5 - Summarize reading materials and outline an essay on any topic given.

CO6 - Demonstrate their language learning activities in the classroom/ online group environment.

PRESCRIBED TEXT

1. Technical English [2019], Department of English, Sathyabama Institute of Science & Technology.

TEXT / REFERENCE BOOKS

1.   Beer, David F., and David McMurrey. A Guide to Writing as an Engineer. 4th ed., Wiley, 2013.
2.   Alred, Gerald J., et al. Handbook of Technical Writing. 11th ed., Bedford/St. Martin's, 2019.
3.   Pearsall, Thomas Edward. Technical Writing: A Practical Guide for Engineers, Scientists, and Nontechnical Professionals. McGraw-Hill Education, 2017.
4.   Straus, Jane. The Blue Book of Grammar and Punctuation. John Wiley & Sons, 2014.
5.   O'Conner, Patricia T. Woe is I: The Grammarphobe's Guide to Better English in Plain English, Riverhead Books, 2019.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration : 3 Hrs.**
PART A : 10 questions of 2 marks each – No choice   **20 Marks**
PART B : 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SMTB1103	CALCULUS AND NUMERICAL METHODS	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVES

➢ The Objective of this Course is to identify, reflect upon, evaluate and achieve conceptual understanding and knowledge of traditional Calculus to form independent judgements. The purpose of this course is for modelling the Engineering problems and obtaining its solutions mathematically. This helps in understanding Science, Engineering and Computer Science analytically and logical thinking is attained.

UNIT 1   DIFFERENTIAL CALCULUS   9 Hrs.

Definitions – Derivative of standard functions (Results only) - Differentiation of function of function – Logarithmic differentiation – Derivatives of implicit function – Partial derivatives (Simple Problems only).

UNIT 2   INTEGRAL CALCULUS   9 Hrs.

Integral of standard functions (Results only) – Integration by the method of substitution– Integration using partial fractions – Integration by parts – Generalization of integration by parts – Definite integral – Properties – Simple problems.

UNIT 3   DIFFERENTIAL EQUATIONS   9 Hrs.

Higher order linear differential equations with constant coefficients – Particular Integral for e^{ax}, sinax or cosax, x^n, $x^n e^{ax}$ – Method of Variation of Parameters – Homogeneous equation of Euler's – System of simultaneous linear differential equations with constant coefficients.

UNIT 4   NUMERICAL METHODS FOR SOLVING EQUATIONS   9 Hrs.

Solution of algebraic equation and transcendental equation: Regula Falsi Method, Newton Raphson Method – Solution of simultaneous linear algebraic equations: Gauss Elimination Method, Gauss Jacobi & Gauss Seidel Method.

UNIT 5   NUMERICAL INTERPOLATION, DIFFERENTATION AND INTEGRATION   9 Hrs.

Interpolation-Newton forward and backward interpolation formula, Lagrange's formula for unequal intervals – Numerical differentiation: Newton's forward and backward differences to compute first and second derivatives – Numerical integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Evaluate Definite Integrals and analyze properties of Beta and Gamma functions.
CO2 - Examine the maxima and minima of functions of several variables.
CO3 - Solve any higher order linear differential equations.
CO4 - Categorize and implement the numerical solutions of algebraic, transcendental, simultaneous linear equations.
CO5 - Appraise various numerical methods for Interpolation.
CO6 - Develop the solutions for Numerical differentiation and integration.

TEXT / REFERENCE BOOKS
1.   Narayanan, S. and Manickavachagam Pillai, T.K., Calculus, Vol.I and Vol. II, S.Viswanathan Printers & Publishers, 2009.
2.   P.R.Vittal., Calculus -Margham Publications, 2000
3.   Veerarajan T., Engineering Mathematics for First Year, II Edition, Tata McGraw Hill Publishers, New Delhi, 2008.
4.   Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, Singapore, 2012.
5.   Grewal B.S., Higher Engineering Mathematics, 41th Edition, Khanna Publications, New Delhi 2011.
6.   Steven C .Chapra, Raymond P. Canale, Numerical Methods for Engineers, Tata McGraw Hill Publishing Co., New Delhi, 2003.
7.   Kandasamy P., Thilagavathy K., and Gunavathy K., Applied Numerical Methods, S. Chand & Co., New Delhi, 2003.

<center>**END SEMESTER EXAMINATION QUESTION PAPER PATTERN**</center>

Max. Marks: 100   **Exam Duration: 3Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SPHB1101	PHYSICS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand the concept of crystal structures and symmetry, the physics of scattering and diffraction theory, experimental diffraction from single crystals, instrumentation and powder diffraction.

➢ Students will be able to understand the Identify and describe properties of matter, including: flexibility, strength and transparency.

➢ The objective of this course is to develop a working knowledge of the laws and methods of thermodynamics and elementary statistical mechanics and to use this knowledge to explore various applications.

➢ Differentiate between various acoustic terms and understand how these apply to different materials and acoustic design solutions.

➢ To give knowledge about semiconductor physics and discus working and applications of basic devices, including p-n junctions, BJTs and FETs.

UNIT 1   QUANTUM MECHANICS   9 Hrs.

Introduction to Quantum mechanics-Energy distribution function, Wave – particle duality-de Broglie matter waves – Concept of wave function and its physical significance – Heisenberg's Uncertainty Principle – Schrodinger's wave equation – Time independent and Time dependent equations – Particle in a one dimensional rigid box – tunnelling (Qualitative) – Scanning Tunnelling Microscope (STM).

UNIT 2   PROPERTIES OF MATTER   9 Hrs.

Introduction- Elasticity- Hooke's law - Torsional stress & deformations – Twisting couple – Torsion pendulum - theory and experiment–bending of beams - bending moment–cantilever:-Theory and experiment–uniform and non-uniform bending: theory and experiment- Magnetism - Basic definitions - Magnetic permeability, susceptibility, relation between permeability and susceptibility - Bohr magneton. Classification of magnetic materials-Hysteresis.

UNIT 3   CRYSTAL PHYSICS   9 Hrs.

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances – coordination number and packing factor for SC, BCC, FCC, HCP.– crystal imperfections: point defects, line defects –growth of single crystals: solution and melt growth techniques.

UNIT 4   SEMICONDUCTOR PHYSICS   9 Hrs.

Classification of materials-Theory of semiconductors: Intrinsic and extrinsic semiconductors, band structure of semiconductors - Fermi level in intrinsic and extrinsic semiconductors. Theory of p-n junctions – diode and transistor: p-n junction under thermal equilibrium, forward bias, reverse bias, carrier density, V-I characteristics, junction capacitance and voltage breakdown. Zener diode and its characterisation- Avalanche breakdown- JEFT- I-V characteristics- amplifying and switching.

UNIT 5   LASER AND ITS APPLICATIONS   9 Hrs.

Absorption and Emission of Radiation by atoms, ions and molecules. Laser medium Phenomenon of population inversion. Laser cavity (fiber laser, and other cavities), generation of coherent beam, Q-switching, short pulse generation, power amplification. Basic Laser Principles: Theory of Laser, Properties of Laser, Fundamental Optical properties, Modified Optical properties, Laser output – its characteristics.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to

CO1 - Solve the time independent Schrodinger wave equation for a particle in a box to obtain the Eigen values and Eigen functions.

CO2 - Understand the dual nature of radiation and matter.

CO3 - Estimate the atomic packing factor for SC, BCC & FCC structures.

CO4 - Recognize sound level descriptors and how they are used in architectural acoustics and analyse acoustic properties of typically used materials for design consideration.

CO5 - Understanding the working, design considerations and applications of various semi conducting devices including p-n junctions, BJTs and FETs.

CO6 - Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.

TEXT / REFERENCE BOOKS
1.   Pillai S.O., Solid state Physics, New age International Publishers, 7th Edition.
2.   Arthur Beiser, Concepts of Modern Physics, Tata McGraw Hill Publications.
3.   M.N.Avadhanulu&P.G.Kshirasagar. A text book of Engineering Physics, S. Ch.Publishing.
4.   B. B.Laud,Lasers and nonlinear optics, New age International Publishers, II-Edition.
5.   R. Murugesan, Modern Physics, S. Chand Publishing, 15th Edition (2015).
6.   D. S. Mathur, Elements of Properties of Matter, S. Chand Publishing (2014).
7.   A. K. Bandyopadhyay, Nanomaterials, New age International Publishers,
8.   K. K. Chattopadhyay, Introduction to nano science and nano technology, PHI publisher,
9.   Sulabha Kulkarni, Introduction to Nanoscience and Nanotechnology 2nd Edition
10.   David Griffiths, Introduction to electrodynamics, Addison-Wesley publishing 3rd Edition

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SEEB1101	ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- ➢ To understand the fundamental concepts of electrical wiring and its components.
- ➢ To analyze DC and AC circuit behaviour
- ➢ To impart Knowledge on electronic devices and their applications.
- ➢ To gain Knowledge on operation of UPS and SMPS power supplies.

UNIT 1   INTRODUCTION TO ELECTRICAL SYSTEMS   9 Hrs.
Basic Element Resistors, inductors and capacitors - Domestic Wiring - Wiring Materials and Accessories -Staircase Wiring - Fluorescent Tubes-Earthing-Types & Benefits.

UNIT 2   DC CIRCUITS   9 Hrs.
Electrical Quantities - Ohm's law - Kirchoff's laws -Resistance in series and parallel combinations - Current and Voltage division rules - Mesh analysis and Nodal analysis.

UNIT 3   AC CIRCUITS   9 Hrs.
Sinusoidal functions - R.M.S and Average values for Sinusoidal waveform - Phasor representation - Sinusoidal excitation applied to purely resistive, inductive and capacitive circuits - RL , RC and RLC series circuits - power and power factor.

UNIT 4   SEMICONDUCTOR DEVICES   9 Hrs.
VI Characteristics of PN-junction diodes and Zener diodes, BJT and its configurations – input/output Characteristics, Junction Field Effect Transistor – Drain and Transfer Characteristics - Silicon Controlled Rectifiers.

UNIT 5   POWER SUPPLY   9 Hrs.
Introduction to Power Supplies- Regulated power supplies- Single and Dual regulated power supply- Design using regulator IC- Switched Mode Power Supplyc(SMPS) - Design used in Computer Systems- Introduction to Uninterrupted power supplies(UPS), online UPS, offline UPS, high frequency online UPS

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand the fundamental electrical concepts.
CO2 - Analyze simple DC circuits using appropriate techniques
CO3 - Apply phasor analysis techniques to solve AC circuits.
CO4 - Demonstrate the characteristics of various semi-conductor devices
CO5 - Analyze characteristics of Switched Mode Power Supply
CO6 - Design power supply unit using regulator IC.

TEXT / REFERENCE BOOKS
1. Dr. Ramana Pilla, Dr. M Surya Kalavathi & Dr. G T Chandra Sekhar, Basic Electrical Engineering, S.Chand & Co.,2022.
2. Dr.Sanjay Sharma ,Electronic Devices and Circuits,2nd edition,S.K.Kataria & Sons,2012.
3. B.N.Mittle & Aravind Mittle, Basic Electrical Engineering,2nd edition,Tata McGraw Hill,2011.
4. Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering,2nd edition,PHI Learning PrivateLtd,2010.

5.   B.L.Theraja, Fundamentals of Electrical Engineering and Electronics,1st edition,S.Chand & Co.,2009.
6.   G.K.Mithal, Basic Electronic Devices and circuits,2nd Edition,G.K.Publishers Pvt,2008

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S11BLH11	PROGRAMMING IN C	L	T	P	EL	Credits	Total Marks
		2	0	4	0	4	100

COURSE OBJECTIVES

➢ To understand the concepts of variables, operators, control structures and arrays.

➢ To gain knowledge on functions, structures and union in C.

➢ To explore the concepts of pointers and files to create real world applications using C.

UNIT 1   BITS AND BYTES IN COMPUTING   12 Hrs.

Computers: Hardware – Software – Processor – Memory – I/O devices – Interface – Programming Languages – Evolution from COBOL, FORTRAN to C, Python – Need

Algorithms: Role in problem solving – Analysis – Design – Flowcharts: Role in problem solving – Symbols – Design – Pseudo code: Role in problem solving – Design – Program: Role in problem solving – Design

Practice: Describe a simple real world problem in your domain of interest and describe it in the form of problem statement, input, output and provide its solution in terms of algorithm, flowchart, pseudo code and program.

UNIT 2   C: MATH BEHIND CODING   12 Hrs.

C: Structure of program – Character set – Tokens – Keywords – Identifiers – Constants – Variables – Data types – Strings – Operators and its types – Functions – Header Files

Algorithmic Strategies: Iteration and Recursion – Efficiency – Role of time and space consumption while building an algorithm – Complexities

Practical:

• Describe a simple real world problem in your domain of interest and provide a computing and non-computing solution for the same. Calculate the time and space consumed in both solutions. Compare and contrast the pros and cons in both solutions.

• Write an algorithm, flowchart, pseudo code followed by a simple C code to do find the Factorial and Fibonacci series using both iteration and recursion.

• Input the number of days taken to cultivate both rice and wheat in turns in an agricultural land from the user. Write a C program to display the days as years, months and days using simple operators.

• You have a circular plot for building playground and a rectangular plot for building an apartment. Get the input from the user for both plots and write a C program to calculate the area and perimeter of both plots.

UNIT 3   C: MAGIC BEHIND INSTANT OUTPUTS   12 Hrs.

Advanced Coding Concepts: Decision Making using branching statements and its types – Decision making using looping statements and its types – Switch statements – Break – Continue – Goto – Jump statements.

Case Study: Fun with Code -- Printing Alphabets / Flags of Countries / Flying Alphabet Screensaver.

Practical:

• Describe a problem statement in your domain of interest whose solution involves repetition of same steps and provide code as solution involving for, while and do while loops.

• Describe a problem statement in your domain of interest whose solution involves decision making and provide code as solution involving if-else, nested if-else and ladder if-else.

• Develop a simple scientific calculator using Switch case statement.

• A Cartesian co-ordinate system has four quadrants. Write a C program to find the quadrant of the co-ordinate points given by the user using both if-else and nested if-else control structure.

• Given a rose flower to you, dismantle the petals of the flower from inside, if you notice - it follows

the sequence of Fibonacci. Now, try to arrange the word "PIZZA" in several ways without repeating and calculate number of ways it can be done using factorial concept. Write a C program to find both Fibonacci and factorial by getting the mentioned input.

1. Product of two large prime numbers is used as encryption key in encryption algorithms. Write a C program to display all the prime numbers between 1 to 100 and give the first two largest numbers as the output.

UNIT 4   STORING GROUP OF HOMOGENOUS ELEMENTS: ARRAYS   12 Hrs.

Diving into Arrays: Definition – Syntax – Types – Representation: Row and Column Order – Dynamic Arrays.

Idea behind Functions: Declaration – Definition – Types – Calling – Arguments – Prototypes – Call by Value – Call by Reference – Pointers – Amalgamation of Pointers with Arrays and Strings.

Case Study: Fun with Code – Simple Game Development using Arrays and Functions.

Practical:

* Describe a problem statement in your domain of interest where you need to work with group of same type of data. Provide a solution in terms of C program to store and manage the data effectively.
* You're playing UNO cards, suddenly a person is getting rev card. Write a C program to reverse the round by storing the number of players in array.
* Write a C program for Vehicle Regulation System where odd number ending vehicles can use the road on odd days and even number ending vehicles can use the road on even days using two separate arrays to store and display the odd and even numbers.
* Write a C program to do the following applications in array:
  a. (i). Get set of positive and negative integers from user, replace positive integers by 0 in the array.
  b. (ii). Reverse the floating point numbers stored in the array.
  c. (iii). Return the smallest value and largest value position in the array.
  d. (iv). Search the number '5' in array and replace it with '10'
* Write C program to do the following string handling applications.
  a. (i). Get favourite actor and actress name, concatenate it and display
  b. (ii). Display your name in uppercase, lowercase and as fname and lname.
  c. (iii). Count the frequency of "the" in any sentence and delete it from sentence.
  d. (iv). Check whether the given string is a palindrome or not.
* Write a C program for counting the total number of duplicate elements in an array, print all the unique elements in the same array as two different functions.
* Write a C program to sort the elements in an array in both ascending and descending order using two different functions.
* Write a C program to find the largest and smallest number in an array using recursion and to convert the output into a binary number.
* Write a C program to swap two numbers using two functions, one using pointers and the other one without using pointers.

UNIT 5   STORING GROUP OF HETROGENOUS ELEMENTS: STRUCTURE   12 Hrs.

Outset of Structure and Union: Structure definition and declaration – Structures fusion with Arrays – Pointers – Functions – Union initiation, Definition and declaration – Memory allocation- Static and dynamic

Working with Files: File handling functions – Read – Write – Other operations – Different file types

Case Study: Report on using file functions to create score board for any game, importing it to program

Practical:

* Describe a problem statement in your domain of interest where you need to work with group of different type of data. Provide a solution in terms of C program to store and manage the data

effectively.
- Write a C program to get the details of the student (roll no, name, date of birth, state, 10th percentage and 12th percentage) using structure. Calculate the age of the student and display the eligibility status for his admission.
  a. Eligibility criteria: more than 60 percent in 10th and 12th, age>=17, state==TN.
- Write a menu driven C program for library management system with ten entries:
  a. (i). Add Book (ii). Add Author (iii). Add Category (iv). Book Cos
     (v). Display - Book by Author, Book by Category, Book under cost
- Write a C program to create an employee Union with employee details (id, name, salary) Accept the details of 'n' employees, rearrange the data in ascending order of employee name, id and salary as three different functions and display it.

Complex Practice Problems
- Design a C program by creating your own header file for any function of your choice and display the output by calling the header file.
- Create TIC-TAC-TOE game using C Language.
- Given a situation, you are going to ATM to withdraw money. Write a C program, get the money requested from the user as input and display the number of possible bank notes for the requested money. Note: Give input as number ending in 0's or 5's.
- Develop a C program for managing Car Rental process with various modules for registration as new user, login, get id proof, keep track of cars available and cars given for rental.
- Create SUDOKU game using C Language.

Max. 60 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Interpret the difference between components of problem solving such as algorithm, flowchart, pseudo code and source code.
CO2 - Build simple solutions for any given problem statement using various components of problem solving techniques and measure its efficiency in terms of time and space.
CO3 - Examine the roots and foundation of C programming's key concepts like Data types, Operators.
CO4 - Design applications using different core concepts such as Arrays and Functions in C language.
CO5 - Formulate real time solutions through programs using Structure and Union in C language.
CO6 - Develop various applications for solving real time societal problems.

TEXT / REFERENCE BOOKS
1. Yashavant Kanetkar, "Let us C", BPB Publications, Fourteenth Edition, 2019.
2. R.G.Dromey, "How to Solve it by Computer", Pearson Education, 2008..
3. Balagurusamy, "Programming in ANSI C", McGraw Hill Publications, Eighth Edition, 2019.
4. Greg Perry, Dean Miller "C Programming Absolute Beginner's Guide", Third Edition, 2013.

SPHB2101	PHYSICS LAB	L	T	P	EL	Credits	Total Marks
		0	0	2	0	1	50

1.   Determine the Rigidity modulus of a given wire by Torsional pendulum
2.   To determine the angle of Minimum Deviation by I - D curve method.
3.   Determine V-I characteristics of a photodiode
4.   To determine the Numerical aperture of an optical fiber
5.   To find the Energy gap of a semiconductor
6.   Determination of Young's modulus- Non-uniform bending
7.   Determination of Young's modulus- Uniform bending
8.   Determination of the wave length of the laser using grating- Laser.
9.   Determination of thickness of a thin sheet/wire- Air wedge.
10.   Determination of Numerical Aperture and acceptance angle- Optical fibre.
11.   Photoelectric effect
12.   Michelson Interferometer.
13.   V-I characterisation of solar cell
14.   CRO- FUNCTIONS

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Measure the rigidity modulus of a given wire by oscillations.
CO2 - Measure the angle of minium deviation by spectrometer.
CO3 - Analyse the I-V characteristics of the given photo diode.
CO4 - Measure the band gap of the given semiconductor.
CO5 - Measure the young's modulus of bar by uniform bending method.
CO6 - Determine the wavelength of the given laser light source.

SMTB1203	DISCRETE STRUCTURES	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVES

➢ The Objective of this Course is to identify, reflect upon, evaluate and achieve conceptual understanding and knowledge of traditional Calculus to form independent judgements. The purpose of this course is for modelling the Engineering problems and obtaining its solutions mathematically. This helps in understanding Science, Engineering and Computer Science analytically and logical thinking is attained.

UNIT 1   LOGIC   9 Hrs.
Statements – Truth Tables – Connectives – Equivalent Propositions – Tautological Implication – Normal Forms – Inference Theory – Consistency and Inconsistency of Premises. Proportional Functions – Quantifiers – Universal and Existential – Inference Theory – Rules of Inference Theory – Problems

UNIT 2   ALGEBRAIC STRUCTURES   9 Hrs.
Algebraic system – Semigroups – Monoids (definitions and examples only) – Groups – Cyclic groups – Subgroups – Cosets – Lagrange's Theorem

UNIT 3   COMBINATORICS   9 Hrs.
Mathematical Induction – Recurrence Relation – Solving Homogeneous and Non- Homogeneous Recurrence Relations – Generating Functions-Partial order relation – Hasse Diagram – Lattices – Properties of Lattices – Duality of Lattices – Special Lattices – Modular lattices – Complemented Lattices – Distributive Lattices

UNIT 4   BOOLEAN ALGEBRA   9 Hrs.
Boolean Identities – Atomic Boolean Algebra – Boolean Functions – Simplification of Boolean Functions

UNIT 5 GRAPH THEORY   9 Hrs.
Introduction to Graphs – Graph Terminology – Cycles – Paths – Complete and Bipartite Graphs – Matrix Representation of Graphs – Graph Isomorphism – Connectivity – Trees – Euler and Hamiltonian Graphs
Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course the student will be able to
CO1 - Apply logic and truth tables to solve problems on Inference theory for propositional calculus and predicate calculus. Distinguish PCNF and PDNF
CO2 - Understand the basics of group properties and cosets. Apply the above concepts to derive Lagrange's theore
CO3 - Appraise the solution of mathematical induction and pigeonhole principle. Develop the recurrence relation and generating functions
CO4 - Distinguish PCNF and PDNF. Analyze properties of functions and groups
CO5 - Develop Euler, Hamiltonian paths. Identify graph isomorphism.
CO6 - Illustrate the generality of tree, binary tree and tree expression.

TEXT / REFERENCE BOOK
1. Kenneth H. Rosen, Discrete Mathematics and its applications, 6thEdition, McGraw- Hill, 2007.

2.   Veerarajan T., Discrete mathematics with Graph Theory and Combinatorics, Tata Mcgraw Hill Publishing Co., NewDelhi, 2006.
3.   Narasingh Deo, Graph Theory with application to Engineering and Computer Science, Prentice Hall India, 2010.
4.   Steven C .Chapra, Raymond P. Canale, Numerical Methods for Engineers, Tata McGraw Hill Publishing Co., NewDelhi, 2003.
5.   Kandasamy P., Thilagavathy K., and Gunavathy K., Applied Numerical Methods, S.Chand & Co., New Delhi, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCYB 1101	CHEMISTRY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To understand the basic concepts of quantum chemistry from bonds to bands.
- To learn the principles and applications of energy levels in molecules.
- To know the importance of electrochemistry in batteries.
- To explore the concept of corrosion mechanism and design principles.
- To study the various synthetic approaches in nanochemistry.

UNIT 1   ATOMIC AND MOLECULAR STRUCTUR   9 Hrs.

Introduction to quantum chemistry – Motion of a quantum mechanical particle in one dimension (time-independent) – Physical meaning of wave function – Schrodinger equation for Hydrogen atom (No derivation. Only wave function). Angular and radial wave functions and probability densities – Quantum numbers – Principal, azimuthal, spin and magnetic quantum numbers – Wave functions and orbital shapes - s,p,d,f - LCAO-MO of H2 – Band theory of solids: Conductors, semi-conductors– Role of As and Ga doping on band structures.

UNIT 2   MOLECULAR SPECTROSCOPY   9 Hrs.

Electromagnetic spectrum – Interaction of radiation with matter – Energy levels in molecules – Microwave spectroscopy – Principle – Classification of molecules based on moment of Inertia – Rotational energy expression (J levels) – Calculation of J for CO molecule – Vibrational spectroscopy – Normal modes of vibrations – Vibrations of polyatomic molecules (CO_2 and H2O) – Determination of Force constant – Electronic transitions in organic molecules – Mathematical derivation of Beer- Lambert's law.

UNIT 3   ELECTROCHEMISTRY   9 Hrs.

Electrochemistry: Galvanic cell - Electrochemical cell representation - EMF series and its significance. Batteries: Terminology – Mechanism of Lead-acid accumulator - Mechanism of Nickel-cadmium batteries. Mechanism of Lithium batteries: Li/SOCl2 cell - Li/I2 cell - Lithium ion batteries. Mechanism of Fuel Cells: Hydrogen-oxygen fuel cells - Solid oxide fuel cell (SOFC).

UNIT 4   CORROSION SCIENCE   9 Hrs.

Introduction: Definition. Types: Dry corrosion: Mechanism - Pilling-Bedworth rule - Wet Corrosion: Mechanism. Types: Galvanic corrosion and differential aeration cell corrosion. Galvanic series and its significance. Factors influencing corrosion. Corrosion prevention: Material selection and design - Cathodic protection – Sacrificial anodic method and Impressed current method – Inhibitors – Anodic and Cathodic inhibitors.

UNIT 5   CHEMISTRY OF MATERIAL SCIENCES   9 Hrs.

Phase equilibria: Gibbs phase rule – Terms involved in Phase rule – Phase diagram of water system – Thermal method of analysis – Construction of simple eutectic system (Lead-Silver alloy system). Fuels– Classification of fuels – Determination of calorific values of solid fuels by bomb calorimeter–
Manufacture of synthetic petrol by Fischer-Tropsch method – Knocking in IC engines – Chemical structure – Octane and acetane rating of fuels. Nanomaterials: Size dependent properties of nanomaterials – Synthesis of gold and silver nanoparticles by Chemical reduction method–Applications of nanoparticles in medicine.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Apply the principles of quantum chemistry for energy level quantisation in molecules.

CO2 - Analyse the molecular transitions by interaction of EMR with matter

CO3 - Assess the reaction mechanism in electrochemical storage device

CO4 - Comprehend the corrosion mechanism for environmental sustainability. Examine the mechanism of corrosion for mitigation.

CO5 - Interpret the role of phase diagram/ fuels/ nanoparticles in chemical/ material science.

CO6 - Apply the concept of chemical science in real world applications.

TEXT / REFERENCE BOOKS

1. A.K.Chandra, Introductory Quantum Chemistry, Tata McGraw-Hill, 4th edition, 2019.
2. Ira N. Levine, Physical chemistry, 6th Edition, 2018.
3. Ira N. Levine, Quantum chemistry, 7th Edition, 2013.
4. David W. Ball and Thomas Baer, Physical Chemistry, Wadsworth Cengage Learning, 2nd Edition, 2014.
5. Mars G Fontana, Corrosion Engineering, 3rd Edition, Tata McGraw Hill, 2018.
6. Douglas A. Skoog and Donald M.West, Principles of Instrumental Analysis, Cengage, 6th Edition, 2014.
7. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai Publication, 2018.
8. David Linden, Thomas B Reddy, Handbook of Batteries, 4th Edition, McGraw-Hill, 2010.

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END SEMESTER EXAMINATION QUESTION PAPER PATTERN

</div>

Max. Marks: 100   **Exam Duration: 3Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1271	INTRODUCTION TO CYBER SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
➢ Understand the key concepts and principles of cybersecurity.
➢ To Identify common threats, attacks, and vulnerabilities in computer systems.
➢ Understand basics of cryptographic algorithms.
➢ Demonstrate knowledge of cryptographic techniques and their applications.
➢ Understand legal and ethical issues related to cybersecurity.

UNIT 1   INTRODUCTION TO CYBERSECURITY   9 Hrs.
Definition and scope of cybersecurity, Cybersecurity goals and objectives, Security principles: confidentiality, integrity, availability, Threats, Attacks, and Vulnerabilities-Overview of common cybersecurity threats and attack vectors, Malware, phishing, and other attack techniques, Identifying and assessing vulnerabilities in systems and networks

UNIT 2   NETWORK SECURITY   9 Hrs.
Network security concepts and protocols - Firewall -Intrusion Detection System (IDS) and Intrusion Prevention System (IPS)-TCP/IP-Virtual Private Network (VPN)- Internet Protocol Security (IPsec)- - Secure Sockets Layer/Transport Layer Security (SSL/TLS)- Internet Protocol Security (IPsec)

UNIT 3   CRYPTOGRAPHY AND DATA PROTECTION   9 Hrs.
Basics of cryptography: encryption, decryption, hashing, Symmetric and asymmetric encryption algorithms- Advanced Encryption Standard (AES)- Data Encryption Standard (DES)- Blowfish, RSA (Rivest-Shamir-Adleman)- Diffie-Hellman (DH)- Digital Signature Algorithm (DSA)- PGP (Pretty Good Privacy), ElGamal.

UNIT 4   WEB SECURITY   9 Hrs.
Common web security vulnerabilities (e.g., Cross-Site Scripting, SQL injection), Web application security best practices, Securing web servers and web applications. Access Control and Authentication-Principles of access Control-Authentication methods (e.g., passwords, biometrics).

UNIT 5   ETHICAL AND LEGAL ISSUES IN CYBERSECURITY   9 Hrs.
Ethical principles and professional codes of conduct, Laws, regulations, and privacy issues in cybersecurity, Cybersecurity ethics in the workplace.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understands the importance fundamentals of cyber threat intelligence and its importance in cybersecurity.
CO2 - Understands to develop skills to collect, analyze, and interpret threat intelligence data.
CO3 - Understands basics of cryptographic algorithms.
CO4 - Understands various types of malware and their characteristics.
CO5 - Explain the fundamentals of cryptography and its role in securing data
CO6 - Understand legal and ethical issues related to cybersecurity.

TEXT / REFERENCE BOOKS
1. Raef Meeuwisse." Cybersecurity For Beginners"Lulu,2015
2. Mayank Bhusan/Rajkumar Singh Rathore/Aatif Jamshed, "Fundamentals of Cyber Security", BPB, 2020

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1262	BLOCKCHAIN AND CRYPTOCURRENCY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To Impart strong technical understanding of Blockchain technologies.
➢ To introduce the concept and the basics of Ethereum that helps developers publish distributed applications.
➢ To learn various aspects of working and use of BitCoin.
➢ To give the knowledge to transfer of money for medium of exchange .
➢ To provide knowledge on SECURITY AND PRIVACY of Block chain technologies.
➢ To applied the various applications of block chain technologies.

UNIT 1   INTRODUCTION OF BLOCKCHAIN   9 Hrs.

Peer-to-Peer(P2P) Networking, Blockchain Architecture, Design and Integration, key Participants in the block chaining, Blocks in Blockchain, Types of Block chain, the Logical Components of Blockchain, Core Components of Blockchain Architecture, Smart contracts and their applications.

UNIT 2   ETHEREUM BASICS   9 Hrs.

Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, writing smart contracts using Solidity & JavaScript

UNIT 3   INTRODUCTION OF BITCOIN   9 Hrs.

Bitcoin features, Blockchain and Bitcoin, Bitcoin Security, Bitcoin Transaction, Transaction Lifecycle, Consensus Protocol, Role of Bitcoin Crimes, Dark Side of Bitcoin Crimes, Open Challenges to Bitcoin Crimes.

UNIT 4   FUNDAMENTALS OF CRYPTOCURRENCIES   9 Hrs.

Nodes, P2P, Ledger, Gossip Protocol, Consensus Methods, Messages, Account Balance, Genesis Block and New Coins, how a Crypto currency Works, crypto currency Exchange, Smart Contracts, E-Governance.

UNIT 5   SECURITY AND PRIVACY ISSUES OF BLOCKCHAIN TECHNOLOGY   9 Hrs.

Introduction, Blockchain Aspects for Consideration, Security of block chain, Privacy of blockchains, Security Issues of Blockchain Technology, Privacy Issues of Blockchain Technology, Types of Attack, Security Enhancement to Blockchain Systems, Applications of Blockchain in Health care, Finance.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concepts of Blockchain technologies.
CO2 - Implement Ethereum block chain contract.
CO3 - Illustrate the concepts of Bitcoin and their usage.
CO4 - Understand basic principles of Cryptocurrencies.
CO5 - Apply security features in blockchain technologies.
CO6 - Use smart contract in real world applications.

TEXT / REFERENCE BOOKS

1. Tapscott, Don, Tapscott, Alex," Blockchain Revolution How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World".

2. MerunasGrincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications using Ethereum-supported Tools, Services, and Protocols", Packt Publishing.

3. Raj, Pethuru Saini, KavitaSurianarayanan, Chellammal," Blockchain Technology and Applications".

4. Melanie Swan," Blockchain Blueprint for a New Economy".

5. Shiho Kim, Ganesh Chandra Deka," Advanced Applications of Blockchain Technology".

6. Rajneesh Gupta," Hands-On Cybersecurity with Blockchain Implement DDoS protection, PKI-based identity, 2FA, and DNS security using Blockchain".

7. Martin Quest," Cryptocurrency Master Everything You Need to Know About Cryptocurrency and Bitcoin Trading, Mining, Investing, Ethereum, ICOs, and the Blockchain".

8. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies A Comprehensive Introduction", Princeton University Press.

9. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S11BLH21	PROGRAMMING IN PYTHON	L	T	P	EL	Credits	Total Marks
		3	0	2	1	4	100

COURSE OBJECTIVES
- ➢ To learn about data structures lists, tuples, and dictionaries in Python.
- ➢ To build packages with Python modules for reusability and handle user/custom exceptions.
- ➢ To create real world GUI applications, establish Database connectivity and Networking.

UNIT 1   INTRODUCTION TO PYTHON   12 Hrs.
History of Python- Introduction to the IDLE interpreter (shell) - Data Types - Built-in function – Conditional statements - Iterative statements- Input/output functions - Python Database Communication - data analysis and visualization using python.
Practical:
- Implement built-in functions and trace the type of data items.
- Implement concepts of Conditional and Iterative Statements.
- Use the built-in csv module to read and write from a CSV file in Python.
- Perform data analysis and visualization on a given dataset using Python libraries like pandas, numpy, matplotlib and display charts, graphs, and plots.

UNIT 2   OBJECT ORIENTED CONCEPTS   12 Hrs.
Class – Objects – Constructors – Polymorphism – Encapsulation -Inheritance -Data Abstraction- Method Overloading-Method Overriding-Database Access-Data Hiding-Import Class.
Practical:
- Execute concepts on Polymorphism, Encapsulation.
- Implement Data Abstraction and Inheritance.
- Differentiate Method Overloading and Overriding.
- Create a class called "Person" with attributes "name" and "age." Make the "age" attribute private and implement a getter method to access it.
- Create a module called "math_operations.py" with a class called "Calculator." Import the "Calculator" class into another script and use its methods to perform mathematical operations.

UNIT 3   FILES AND EXCEPTIONS HANDLING, MODULES, PACKAGES   12 Hrs.
File Operations –Iterators - Exception handling - Regular Expressions- Functions and modules-Import Statement Introduction to PIP-Installing Packages via PIP-Using Python Packages.
Practical:
- Create a text file called "numbers.txt" and write the numbers from 1 to 10 in words, each on a separate line.
- Implement a custom iterator that generates a sequence of Fibonacci numbers and print the first 10 numbers.
- Create a try-except block to catch a File Not Found Error and print a message when a file is not found.
- Write a Python program that handles a Zero Division Error and prints a custom error message to the console.
- Create a module called "greetings.py" with a function called "hello" that prints "Hello, World!" Import the module into another script and use the "hello" function.
- Install the "numpy" package using PIP. Import the package and create a NumPy array with random values.

UNIT 4   GUI PROGRAMMING   12 Hrs.

GUI Programming in Python - Introduction to GUI library - Layout management - Events and bindings - Fonts – Colors - Canvas - Widgets (frame, label, button, check box, entry, list box, message, radio button, text, spin box).

Practical:

- Design a GUI form with a vertical box layout that includes labels and entry fields for user registration information.
- Create a GUI window with a grid layout that contains buttons representing a 3x3 game board.
- Create a canvas in your GUI program and draw simple shapes such as rectangles, circles, and lines.
- Create a GUI form program that includes various widgets and implement event handling Concepts also add Create a drop-down menu that allows users to select different font styles for text display.

UNIT 5   DATABASE AND NETWORK   12 Hrs.

Database (using NoSQL): Connector Module –Cursor – Statements - Exceptions in database. Network connectivity: Socket module - Client – Server –Email – URL Access.

Practical:

- Connect to the NoSQL database using a Python connector module, such as "pymongo" for MongoDB or "cassandra-driver" for Cassandra.
- Use a cursor to iterate over the records in a collection/table and print specific fields/attributes.
- Implement error handling for specific scenarios, such as duplicate key violation or record not found, in the NoSQL database.
- Implement either a TCP/IP or UDP client-server application using the socket module for sending and receiving messages.
- Write a program using the smtplib module to send an email from a specified email address to another recipient.

Max. 60 Hrs.

COURSE OUTCOMES

On Completion of the course, student will able to

CO1 - Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
CO2 - Do the decision making and write functions in Python.
CO3 - Explain how to design GUI Applications in Python and evaluate different database operations.
CO4 - Design and develop Client Server network applications using Python.
CO5 - Ability to design real life situational problems and think creatively about solutions of them.
CO6 - Apply the best features of mathematics, engineering and natural sciences to program real life problems.

TEXT / REFERENCE BOOKS

1. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson,2013.
2. Python Notes for Professionals by Stack Overflow Documentation (https://books.goalkicker.com/PythonBook/)
3. Dr. Charles R. Severance, "Python for Everybody- Exploring Data Using Python 3", 2016.
4. Paul Gries, Jennifer Campbell, Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Pragmatic Bookshelf, 2nd Edition,2014.

S731BLH22	DATA STRUCTURES & ALGORITHMS	L	T	P	EL	Credits	Total Marks
		3	0	2	0	4	100

COURSE OBJECTIVES
➢ To impart the basic concepts of data structures and algorithms.
➢ To be familiar with writing recursive methods
➢ To implement operations on Linked List, Stack and Queues.
➢ To implement traversal operations of trees and graphs.
➢ To understand concepts about various algorithm design techniques, searching and sorting techniques.

UNIT 1   INTRODUCTION TO ALGORITHMS   12 Hrs.

Introduction to Data vs Information - Data Structures - Classification – Abstraction - Abstract data types (ADT) - Array - characteristics - Storage Representations. Array Order Reversal- Recursion- Array operations, Algorithm- complexity – Time and Space trade off.

Practical Exercise:

1. Python program to find the sum of all elements of an array
2. Python program to find a series in an array consisting of characters
3. Python program to find the occurrence of a particular number in an array
4. Python program to find the largest element in an array
5. Python program for array rotation

UNIT 2   LINKED LIS   12 Hrs.

Array Vs Linked List – Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list – Polynomial Manipulation using List - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List.

Practical Exercise:

1. Program to implement operations on a Singly linked list.
2. Program to implement operations on a doubly linked list

UNIT 3   STACKS & QUEUE   12 Hrs.

Introduction – Array Representation of a Stack – Linked List Representation of a Stack - Stack Operations - Algorithm for Stack Operations - Stack Applications: Tower of Hanoi - Infix to postfix Transformation - Evaluating Arithmetic Expressions. Queue – Introduction – Array Representation of Queue – Linked List Representation of Queue - Queue Operations - Algorithm for Queue Operations -. Queue Applications: Priority Queue.

Practical Exercise:

1. Program to implement a Stack using an array and Linked list.
2. Program to implement Queue using an array and Linked list.
3. Program to implement Circular Queue.

UNIT 4   TREES AND GRAPHS   12 Hrs.

Preliminaries of Tree ADT - Binary Trees - The Search Tree ADT–Binary Search Trees - AVL Trees - Tree Traversals - B-Trees - Heap Tree – Preliminaries of Graph ADT - Representation of Graph – Graph Traversal - BFS – DFS – Applications of Graph – Shortest - Path Algorithms – Dijkstra's Algorithm

Minimum Spanning Tree – Prims Algorithm

Practical Exercise:

1.   Program to convert an infix expression to postfix expression.
2.   Program to implement BFS and DFS
3.   Program to implement N Queens problem.
4.   Program to implement Binary Tree Traversal
5.   Program to implement Travelling Salesman Problem

**UNIT 5   ALGORITHM DESIGN TECHNIQUES & SEARCHING AND SORTING
                 TECHNIQUES**   **12 Hrs.**

Divide and Conquer Strategy – Greedy Algorithm – Dynamic Programming – Backtracking Strategy - List
Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort -
Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

Practical Exercise:

1.   Program to sort the elements using insertion sort.
2.   Program to sort the elements using quick sort.
3.   Program to sort the elements using merge sort.
4.   Program to find an element using Linear and Binary Search.

                                                                Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concept of recursive algorithms.
CO2 - Demonstrate the different types of data structures.
CO3 - Able to understand the operations on linear data structures.
CO4 -   Summarize searching and sorting techniques.
CO5 - Choose appropriate data structure as applied to specified problem definition.
CO6 - Understand and implement the various algorithm design techniques.

TEXT / REFERENCE BOOKS

1.   Jean-Paul Tremblay, Paul G. Sorenson,'An Introduction to Data Structures with Application', TMH,
       2017.
2.   Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3.   Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Editin, 2004.
4.   Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

SCYB 2101	CHEMISTRY LAB	L	T	P	EL	Credits	Total Marks
		0	0	2	0	1	50

COURSE OBJECTIVES
- To understand the basic principle involved in volumetric and instrumental analysis.
- To acquire practical knowledge in pHmetry, potentiometry and conductometry.
- To develop the skill in water analysis.

List of Experiments
1. Estimation of mixture of acids by conductometry.
2. Estimation of ferrous ion by potentiometry.
3. Determination of pKa value of glycine by pHmetry.
4. Estimation of hardness of water by EDTA method.
5. Determination of alkalinity of water
6. Estimation of Iron by photocolorimetry.
7. Estimation of copper in brass
8. Determination of high molecular weight polymer using Ostwald viscometer.

COURSE OUTCOME
On completion of the course, student will be able to
CO1 - Estimate the ionic conductance of mixture of acids.
CO2 - Construct a redox cell for the emf measurement.
CO3 - Interpret the concept of Zwitter ion in amino acids
CO4 - Predict the quality of water sample for domestic and industrial applications.
CO5 - Demonstrate the validity of Beer-Lambert's law.
CO6 - Apply Poiseuille's law for molar mass measurement.

TEXT / REFERENCE BOOKS
1. G,H. Jeffery, Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition. Persons Education 2004.
2. S. S. Dara, Experiments and Calculations in Engineering Chemistry, S. Chand and Co. 2010.

END SEMESTER EXAM QUESTION PAPER PATTERN
Max. Marks: 50   **Exam Duration: 2 Hrs.**

CAE	Evaluation of Regular Lab class	15 Marks	**25 Marks**
	Model practical exam	10 Marks	
ESE	University Practical exam		**25 Marks**

SMTB1304	MATRICES AND LINEAR ALGEBRA	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVES
> The Objective of this Course is to identify, reflect upon, evaluate and achieve conceptual understanding and knowledge of traditional Calculus to form independent judgements. The purpose of this course is for modeling the Engineering problems and obtaining its solutions mathematically. This helps in understanding Science, Engineering and Computer Science analytically and logical thinking is attained.

UNIT 1   MATRICES   9 Hrs.
Characteristic equation of a square matrix – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen Vectors – Cayley-Hamilton theorem (without proof) – verification, finding inverse and power of a matrix – Diagonalization of a matrix using orthogonal transformation – Quadratic forms – Nature of quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT 2   VECTOR SPACES   9 Hrs.
Vector Spaces – Definition – Simple properties – Examples – Sub spaces and algebra of subspaces – Quotient spaces –Internal direct sum – External direct sum.

UNIT 3   LINEAR INDEPENDENCE AND DIMENSION   9 Hrs.
Linear combination of vectors, linear span, linear independence – basis and dimension, dimension of subspaces – Dimension of Quotient spaces.

UNIT 4   INNER PRODUCT SPACE   9 Hrs.
Inner product spaces – Definition – Examples – Applications – Orthogonal complement of a sub space – Orthonormal Basis – Gram Schmidt Orthogonalization process.

UNIT 5   LINEAR TRANSFORMATION   9 Hrs.
Linear Transformation – The Algebra of linear transformations – null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation – Characteristic roots – Canonical forms – Triangular forms.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, students will be able to
CO1 - Define Eigen values and Eigen vectors.
CO2 - Use the Internal direct sum and External direct sum.
CO3 - Analyze the Linear combination of vectors, linear span, linear independence
CO4 - Apply Orthogonal complement of a sub space – Orthonormal & Orthonormal Basis
CO5 - Develop the Algebra of linear transformations
CO6 - Create equations of spheres with various properties

TEXT / REFERENCE BOOKS
1.   I.N.Herstein, Topics in Algebra, 2nd Edition, John Wiely, NewYork, 2013.
2.   Stephen H.Friedberg, Arnold J.Insel, Lawrence E.Spence, Linear Algebra, 4thEd., Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3.   A.R. Vasistha, A first course in Modern Algebra, Krishna Prakasan, Meerut, 2019.
4.   S. Lang, Introduction to Linear Algebra, 2nd Edition, Springer, 2005

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1301	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
➢ To impart knowledge on understand ALU and its operations, types of memory organizations.
➢ To understand the types of memory organizations, interface and communication in I/O devices.
➢ To analyse about the characteristics, structure, communication and synchronization of multiprocessors.

UNIT 1   GENERAL REGISTERS   **9 Hrs.**
Introduction - General Register Organization - Stack organization - Basic computer Organization - Instruction codes - Computer Registers - Computer Instructions - Instruction Cycle.

UNIT 2   ARITHMETIC LOGIC UNIT AND COMPUTER ARITHMETIC   **10 Hrs.**
Introduction to ALU - Arithmetic – Logic - Shift Micro operations - Arithmetic Logic Shift unit - Example Architectures: MIPS – RISC – CISC - Addition - Subtraction - Multiplication and Division algorithms - Floating Point Arithmetic operations - Micro programmed Control- Design of Control unit

UNIT 3   MEMORY ORGANIZATION   **8 Hrs.**
Memory Hierarchy - Main memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual memory

UNIT 4   INPUT - OUTPUT ORGANIZATION   **9 Hrs.**
Peripheral Devices - I/O Interface - Modes of transfer - Priority Interrupt - DMA - IOP - Serial Communication.

UNIT 5   CHARACTERISTICS OF MULTIPROCESSORS   **9 Hrs.**
Interconnection Structures - Interprocessor Arbitration - Interprocessor Communication and Synchronization - Cache coherence.
                                                                                                 Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Classify the various types of registers, microinstructions and addressing modes.
CO2 - Explain Arithmetic Logic Unit and computer arithmetic operations.
CO3 - Infer the usage of Memory Organization.
CO4 - Describe about the I/O devices and organization.
CO5 - Explain the interconnection structures and interprocessor communication
CO6 - Describe the characteristics and synchronization of multiprocessors.

TEXT / REFERENCE BOOKS
1. M.Morris Mano, "Computer system Architecture", 3rd Edition, Prentice-Hall Publishers, 2007.
2. Mark Burrell, "Fundamentals of Computer Architecture", Mcmillan Higher Education, 2003.
3. John D. Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 2001.
4. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, McGraw-Hill, 2002.
5. William Stallings, "Computer Organization and Architecture - Designing for Performance", 9th Edition, Prentice Hall, 2012.
6. John P Hayes, Computer Architecture Organization, McGraw Hill Edition 4, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SISB 4301	UNIVERSAL HUMAN VALUES	L	T	P	EL	Credits	Total Marks
		2	0	0	3	3	100

COURSE OBJECTIVES

➤ To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

➤ To understand (or developing clarity) the harmony in the human being, family, society and nature / existence.

➤ To strengthen self-reflection, develop commitment and courage to act.

MODULE 1   COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration– what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

MODULE 2   UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

MODULE 3   UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE 4   UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE

Understanding the harmony in the Nature Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature Understanding Existence as Co-existence of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence. Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

MODULE 5   IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

Sum up. Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Total: 28 Lectures and 14 Practice Sessions

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - To become more aware of themselves, and their surroundings (family, society, nature)
CO2 - They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind
CO3 - They would have better critical ability
CO4 - They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
CO5 - It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction
CO6 - To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

TEXT/ REFERENCE BOOKS
1.   R Gaur, R Sangal, G P Bagaria," Human Values and Professional Ethics", Excel Books, New Delhi, 2010.
2.   Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3.   Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
4.   The Story of Stuff (Book).
5.   The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
6.   Small is Beautiful - E. F Schumacher.
7.   Slow is Beautiful - Cecile Andrews
8.   J C Kumarappa Economy of Permanence -
9.   Bharat Mein Angreji Raj - PanditSunderlal
10.   Dharampal Rediscovering India
11.   Mohandas K. Gandhi Hind Swaraj or Indian Home Rule
12.   Maulana Abdul Kalam Azad, India Wins Freedom
13.   Vivekananda - Romain Rolland (English)

14.   Gandhi - Romain Rolland (English)

ASSESSMENT

Assessment by faculty mentor   : 10 marks
Self-assessment   : 10 marks
Assessment by peers   : 10 marks
Socially relevant project/Group Activities/Assignments : 20 marks Semester End Examination: 50 mark

SCSB1303	THEORY OF COMPUTATION	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVES
➢ To introduce Automata Theory, Regular Languages, Context Free languages and recognizers for different languages.
➢ To design Turing Machines for various languages.
➢ To gain knowledge on undecidable problems.

UNIT 1   FINITE AUTOMATA AND REGULAR LANGUAGES   9 Hrs.
Finite automata and regular languages - Regular languages and regular expressions - Finite automata - Non-determinism and Kleene's theorem - Non-deterministic finite automata and NFA with null transition.

UNIT 2   CONTEXT-FREE LANGUAGES AND NORMAL FORMS   9 Hrs.
Context-free grammars - Definition - More examples - Union, concatenations, and *'s of CFLs - Derivation trees and ambiguity - Unambiguous CFG for algebraic expressions - Normal Forms - CNF – GNF.

UNIT 3   PUSH DOWN AUTOMATA   9 Hrs.
Pushdown automata - Introduction - Definition - Deterministic pushdown automata - PDA corresponding to a given context-free grammar – Context-free Grammar corresponding to PDA. Pumping Lemma for CFG.

UNIT 4   TURING MACHINES   9 Hrs.
Turing machines - Models of computation and the Turing thesis - Definition of TM and TM as language acceptor - Non-deterministic TM and Deterministic TM – Universal TM.

UNIT 5   RECURSIVE LANGUAGES AND UNDECIDABILITY   9 Hrs.
Recursively enumerable and recursive languages – Properties of Recursively enumerable and recursive languages - Enumerating a language. Introduction to Undecidability- Halting problem-Undecidability of Post correspondence problem (PCP)-Modified PCP -Rice Theorem.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
On completion of the course the student will be able to
CO1 - Build solutions for acceptance, rejections problems using Finite State Machine.
CO2 - Perform operations on Context free Languages using context free grammars.
CO3 - Solve problems on Context Free Languages using Push Down Automata.
CO4 - Design a solution for given problems using Turing Machine.
CO5 - Distinguish Recursively Enumerable Languages and Recursive languages.
CO6 - Hypothesize solutions to unsolvable problems.

TEXT / REFERENCE BOOKS
1. Introduction to Languages and the Theory of Computation, John. C. Martin, Tata McGraw-Hill, 2003.
2. Introduction to Automata Theory, Languages and Computation, Hopcroft, Motwani, and Ullman, Pearson Publishers, Third Edition, 2006

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1372	SECURED NETWORK PROTOCOLS AND STANDARDS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- ➢ To understand the concepts of different layers of protocols.
- ➢ To identify the various protocols in cyber security.
- ➢ To understand the various attacks and intrusion detection system.
- ➢ To provide knowledge and overview about cyber physical system and IoT.
- ➢ To make students aware of various cyber risk assessment and threats.

UNIT 1   INTRODUCTION   9 Hrs.

Introduction (overview of network security issues, cryptographic algorithms, authentication techniques) - Layer 2/3 security - Authentication systems, Key establishment protocols, Kerberos- Secure communication at the data link and network layers (IPSEC and IKE) - Secure communication at the transport and application layers (SSL/TLS, email security, PGP) - Vulnerabilities of Internet protocols

UNIT 2   PROTOCOLS   9 Hrs.

Secure Sockets Layer (SSL) - SSL Protocol Stack - SSL Record Protocol Operation IP Security (IPsec) - IP Security (IPsec) architecture - Benefits of IPsec Hypertext Transfer Protocol Secure (HTTPS) Kerberos - Drawbacks and limitations - Kerberos Vulnerabilities Transport Layer Security (TLS).

UNIT 3   ATTACKS AND THREATS   9 Hrs.

Denial of service (DoS) attacks and defences - Firewalls, IP spoofing prevention - Routing protocols security and router security - Domain name server (DNS) security - Traffic monitoring, Intrusion detection, Honeypots - Wireless networks security - Spam, Phishing, and Pharming - Malware propagation and containment, Botnets - Anonymity and privacy on the Web.

UNIT 4   SECURITY IN NEXT GENERATION SYSTEM   9 Hrs.

Internet Security Protocols and Standards - TCP Attacks, DNS Vulnerabilities, SSL/TLS, DDoS - Next Generation System Designs and Challenges - Cyber-Physical System Overview and Security - Internet of Things and Smart Grid Security - Data & Infrastructure Security in Cloud/Edge Computing.

UNIT 5   CYBER RISK ASSESSMENT   9 Hrs.

Blockchain and Decentralized Applications- Hash cash and other Consensus Protocols Blockchain Security- Smart Contracts - Scalability and Privacy challenges, Security Economics and Risk Modelling - Cyber-Risk Assessment - Threat Information Sharing - Cyber-insurance

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 -   Analyse the security issues and authentication algorithms.
CO2 -   Express the various protocols in different layers.
CO3 -   Explain the use of different attacks and security mechanism in current networking scenario.
CO4 -   Analyse the security issues in IoT and smart grid applications.
CO5 -   Evaluate the security methods using blockchain.
CO6 -   An Ability to analyse the cyber risk assessment.

TEXT / REFERENCE BOOKS

1. Uyless D. Black," Computer Networks: Protocols, Standards and Interface 2nd Edition", 2nd Edition, 2015.
2. James F Kurose and Keith W. Ross, "Computer Networking - A Top-Down Approach", Addison-Wesley, Fifth Edition, 2010.
3. L. Peterson and B. Davie, "Computer Networks: A Systems Approach", Elsevier Inc., Fifth Edition, 2011.
4. William Stallins," Network Security Essentials: Applications and Standards", Pearson Publication,2016.
5. YassineMaleh ," Security and Privacy Management, Techniques, and Protocols", Morocco,2018

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S12BLH31	PROGRAMMING IN JAVA	L	T	P	EL	Credits	Total Marks
		3	0	2	1	4	100

COURSE OBJECTIVES
  ➢ To introduce object oriented concepts in Java.
  ➢ To understand Packages, Interfaces and Multithreading Concepts.
  ➢ To understand Input and Output Operations
  ➢ To understand GUI Programming and Database Connectivity .
  ➢ To understand the concepts of Server Side Programs.

UNIT 1   JAVA BASICS   12 Hrs.
Features of Java Language - JVM - Bytecode –Data Types-Java Tokens-Access Modifiers-Operators-Arrays one dimensional   and   multi-dimensional - Control Structures- String Handling – String class – String buffer class.
Practcal: Implementation of Matrix Operations using Arrays, String Operations, Looping Control Statements, Conditional Control Statements.

UNIT 2   OBJECT ORIENTED PROGRAMMING   12 Hrs.
Object Oriented Concepts-Classes and Objects –Constructors –. Method Overloading-Inheritance – Types – Using Super – Method Overriding – Abstract Classes – Using final with inheritance- Garbage Collection
Practical: Implementation of Constructors, Inheritance ,Static and dynamic Polymoryphism, Abstract Class

UNIT 3   PACKAGES, INTERFACES AND THREADS   12 Hrs.
Introduction to Packages – User Defined Packages - Importing packages – Access protection – Interfaces – Exception Handling – Using try, catch, throw, throws and finally –Java Thread Model – Main thread – Multithreading – Thread priorities – Synchronization.
Practical: Creating custom Packges, Interfaces. Handling predefined and User Defined Exceptions, Implementation Single and Multi Threading.

UNIT 4   FILE STREAMS AND COLLECTIONS FRAMEWORK   12 Hrs.
-IO Package - Introduction – Input Stream and Output Stream classes - Data Output Stream and Data Input Stream classes –File Input Stream – File Output Stream. - Reader and Writer Classes – File Reader and File Writer-Collections Framework-List,Set,Map
Practcal: Reading Contents From file and Writing Contents to File, Implementation of Collections Framesworks

UNIT 5   GUI PROGRAMMING, DATA BASE CONNECTIVITY, SERVER SIDE
**   PROGRAMMING   12 Hrs.**
GUI Programming using Java FX-Explore Events-Accessing Database using JDBC-   Introduction to servlet – Servlet life cycle - Developing and Deploying Servlets – JSP TAGS-Expressions-Applications using   Servelt and JSP
Practical: Creation of Graphicl user Interface for different Applications.Cretion of Server side Programs using Servlet and JSP.

**   Max. 60 Hrs.**

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Develop applications using java object oriented concepts.
CO2 - Create User defined Packages and Interfaces..
CO3 - Build Software using the concepts of Files and Collection Framework
CO4 - Design GUI using Java FX.
CO5 - Implement Java Applications web using Data base Connectivity
CO6 - Design Web Applications using Servlet and JSP

TEXT / REFERENCE BOOKS

1. Herbert Schildt ,"The Complete Reference JAVA2", Fifth Edition, Tata Mcgraw Hill, 2017.
2. Bruce Eckel , "Thinking in Java", Pearson Education, Fourth Edition 2006.
3. Core Java Volume-I Fundamentals, 9th Edition, Cay Horstman and Grazy Cornell, Prentice Hall, 2013.
4. Y. Daniel Liang, Introduction to Java programming-comprehensive version-Tenth Edition, Pearson ltd 2015
5. https://docs.oracle.com/javase/tutorial/.
6. https://www.tutorialspoint.com/java/.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB2371	LINUX NETWORKING AND PROTOCOL PROGRAMMING LAB	L	T	P	EL	Credits	Total Marks
		0	0	4	0	2	100

COURSE OBJECTIVES
- To introduce Network related commands and configuration files in Linux Operating System
- To practice Network Programming using Linux System Calls.
- Demonstrate mastery of main protocols comprising the Internet.
- Develop skills in network programming techniques.
- Apply the client-server model in networking applications. .

LIST OF EXPERIMENTS
1. Study about sockets and the types of sockets
2. Various commands including ls, cp, mv, touch, rm, echo, man, cd, mkdir, rmdir, pwd, file, find, htop, free
3. Study the Linux filesystem
4. Installing, updating and removing apps in Linux
5. Complete a simple program using bash scripting
6. Learn to manage process – monitoring, killing (pkill and kill commands), fg and bg commands, scheduling using crontab
7. Process control using C – use getpid(), getppid(), getuid(). Find and kill this process using kill command
8. Learn to use the fork(), exec(), wait() and exit() system calls in C
9. Compiling/Interpreting Python and C code in Linux
10. Debugging and profiling a C program using gdb and gprof

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Be able to create sockets and analyze different (client/server) models.
CO2 - Be able to create processes, threads, semaphores and Bluetooth programming.
CO3 - Be able to analyze different protocols.
CO4 - Demonstrate the installation and configuration of network simulator.
CO5 - Understand the key topology which supports the internet.
CO6 - Develop operating system and network application programs

TEXT / REFERENCE BOOKS
1. Richard Stevens, Bill Fenner, Andrew M. Rudoff, "UNIX Network Programming, Volume 1: The Sockets Networking API", 3rd Edition, Addison-Wesley Professional, 2013.
2. William Shotts, "The Linux Command Line", 2nd Edition, No Starch Press, 2019.
3. William von Hagen, "The Official Ubuntu Book", 10th Edition, Pearson Education, 2020.
4. Tom Adelstein, Bill Lubanovic, "Linux System Administration", 3rd Edition, O'Reilly Media, 2017.
5. Chris F.A. Johnson, "Pro Bash Programming: Scripting the GNU/Linux Shell", 2nd Edition, Apress, 2009.
6. Robert Love, "Linux System Programming: Talking Directly to the Kernel and C Library", 2nd Edition, Addison-Wesley Professional, 2013.

SMTB1402	PROBABILITY AND STATISTICS	L	T	P	EL	Credits	Total Marks
		3	1	0	0	3	100

COURSE OBJECTIVE

➢ The Objective of this Course is to identify, reflect upon, evaluate and achieve conceptual understanding and knowledge of traditional Calculus to form independent judgements. The purpose of this course is for modelling the Engineering problems and obtaining its solutions mathematically. This helps in understanding Science, Engineering and Computer Science analytically and logical thinking is attained.

UNIT 1   BASIC CONCEPTS OF PROBABILITY   9 Hrs.

Probability Space – Events – Axiomatic approach to Probability – Conditional Probability – Independent Events – Baye's Theorem.-Random Variables–Functions of Random Variables and their Probability Distribution.

UNIT 2   PROBABILITY DISTRIBUTION   9 Hrs.

Discrete Distributions: Binomial, Poisson and Geometric – Continuous Distributions: Uniform, Exponential and Normal – Applications only (no derivation).

UNIT 3   TWO DIMENSIONAL RANDOM VARIABLES   9 Hrs.

Joint Probability distributions– Marginal and Conditional Distributions–Transformation of Random Variables.

UNIT 4   CORRELATION AND REGRESSION   9 Hrs.

Correlation–Linear regression–Multiple and Partial Correlation–Curve Fitting–Method of Least Squares– Fitting of the Curve of the form $y = a+bx$, $y = a+bx+cx^2$, $z = ax+by+c$.

UNIT 5   ANALYSIS OF VARIANCE AND STATISTICAL QUALITY CONTROL   9 Hrs.

Review of F-test– Design of experiments: Completely Randomized Design, Randomized Block Design and Latin Square Design–Statistical Quality Control: Mean, Range, p, np, c–charts.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand probability concepts and Baye's theorem problems. Explain functions of random variables and their probability distributions.

CO2 - Analyze discrete and continuous probability distributions.

CO3 - Estimate the distributions and transformations of two dimensional random variables

CO4 - Distinguish correlation and regression. Construct curve fitting by the method of least squares.

CO5 - Evaluate problems on design of experiments using analysis of variances.

CO6 - Sketch the control charts and point out the results based on the charts

TEXTS / REFERENCE BOOKS

1. Hong R.V, Tanis E.A and Zimmerman D L, Probability and Statistical Inference, Pearson Education Limited, Ninth Edition, 2015.
2. Miller I.and Freund J.E, Probability and Statistics for Engineers, Pearson Publishers, Ninth Edition, 2017.
3. Gupta S C and Kapoor V K, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, Tenth Edition, 2002.
4. VeerarajanT., Probability, Statistics and Random Processes, Tata McGraw-Hill, New Delhi, Fourth Edition, 2014.
5. Sivaramakrishna Das P., VijayaKumari C., Probability and Random Processes, Pearson Education, Sixth Edition, 2014.

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END SEMESTER EXAMINATION QUESTION PAPER PATTERN
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Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1401	OPERATING SYSTEMS AND UNIX	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To have an overview of different types of operating systems and process management.
➢ To understand the concepts of storage management, I/O and file systems.
➢ To learn the basics of Unix Programming

UNIT 1   INTRODUCTION   8 Hrs.

Introduction - Operating system structures - System components - OS services - System calls - System structure - Resources Processes - Threads - Objects - Device management - Different approaches - Buffering device drivers

UNIT 2   PROCESS MANAGEMENT   9 Hrs.

Processes - Process concepts - Process scheduling - Operations on processes - Cooperating processes - CPU scheduling - Basic concepts - Scheduling criteria - Scheduling algorithms - Preemptive strategies - Non-preemptive strategies.

UNIT 3   SYNCHRONIZATION AND DEADLOCKS   9 Hrs.

The critical section problem - Semaphores - Classic problems of synchronization - Critical regions - Monitors-Dead locks - Deadlock characterization - Prevention - Avoidance - Detection - Recovery.

UNIT 4   MEMORY MANAGEMENT AND I/O MANAGEMENT   10 Hrs.

Storage Management Strategies - Contiguous Vs. Non-Contiguous Storage Allocation - Fixed and Variable Partition Multiprogramming - Paging - Segmentation - Paging/Segmentation Systems - Page Replacement Strategies - Demand & Anticipatory Paging, File Management: Access Methods - Directory Structure, Allocation Methods, Disk Management: Disk Structure- Disk Scheduling

UNIT 5 Unix   9 Hrs.

Unix Components, Internal and External commands, File and directory related commands, File permission and manipulation, Standard I/O, configuring vi environment, Regular expression, Process related commands, Shell programming- Branching control structures- if, case etc., Loop control structures– while, until, for, etc., Jumping control structures – break, continue, exit, etc., Integer and Real arithmetic in shell programs.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Understand the fundamental components of a computer operating system and how computing resources are managed by the operating system.
CO2 - Apply the concepts of CPU scheduling in process management.
CO3 - Analyse synchronization and deadlocks in real computing problems.
CO4 - Demonstrate the different memory and I/O management techniques used in Operating Systems.
CO5 - Have practical exposure in disk scheduling
CO6 - Write shell scripts in vi environment

TEXT / REFERENCE BOOKS
1. Abraham Silberschatz, Peter Galvin and Gagne, "Operating System Concepts", 10th Edition, Addison Wesley, 2018.
2. Harvey M.Deitel, "Operating System", 3rd Edition, Addison Wesley, 2004
3. Gary Nutt, "Operating System, A modern perspective", 3rd Edition, Addison Wesley, 2004.
4. Andrew S. Tanenbaum, "Modern Operating Systems".4th edition 2015.
5. Art of UNIX Programming, The 1st Edition, by Eric S. Raymond,2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S11BLH 41	DATABASE MANAGEMENT SYSTEMS	L	T	P	EL	Credits	Total Marks
		3	0	2	1	4	100

COURSE OBJECTIVES
➢ To understand the concept of DBMS and ER Modeling.
➢ To be familiar with normalization, query optimization and relational algebra
➢ To apply concurrency control, recovery, security and indexing for the real time data.

UNIT 1   DATABASE SYSTEMS CONCEPTS AND ARCHITECTURE   12 Hrs.
History and motivation for database systems - characteristics of database approach - Actors on the scene - Workers behind the scene - Advantages of using DBMS approach - Data Models, Schema, and Instances - Three-Schema Architecture and Data Independence - The Database System Environment - Centralized and Client/Server Architectures for DBMS - Classification of DBMS.
Practical: Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.

UNIT 2   DATA MODELING   12 Hrs.
Entity Relationship Model: Types of Attributes, Relationship, Structural Constraints - Relational Model, Relational model Constraints - Mapping ER model to a relational schema - Integrity Constraints
Practical: Create a set of tables, add foreign key constraints and incorporate referential integrity.

UNIT 3   SCHEMA REFINEMENT   12 Hrs.
Guidelines for Relational Schema - Functional dependency - Normalization, Boyce Codd Normal Form, Multi-valued dependency and Fourth Normal form - Join dependency and Fifth Normal form.
Practical: Query the database tables using different 'where' clause conditions and also implement aggregate functions. Query the database tables and explore sub queries and simple join operations.

UNIT 4   QUERY PROCESSING AND TRANSACTION PROCESSING   12 Hrs.
SQL fundamentals -Translating SQL Queries into Relational Algebra - heuristic query optimization - Introduction to Transaction Processing - Transaction and System concepts - Desirable properties of Transactions - Characterizing schedules based on recoverability - Characterizing schedules based on serializability
Practical: Execute complex transactions and realize DCL and TCL commands.

UNIT 5   CONCURRENCY CONTROL, RECOVERY TECHNIQUES & NOSQL DBMS   12 Hrs.
Two-Phase Locking Techniques for Concurrency Control – Concurrency Control based on timestamp – Recovery Concepts – Recovery based on deferred update – Recovery techniques based on immediate update -Shadow Paging – Introduction, Need of NoSQL – different NoSQL data models: Key-value stores – Column families – Document databases – Graph databases.
Practical: Create Document, column and graph-based data using NOSQL database tools.

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Explain the basic concept and role of DBMS in an organization.

CO2 - Illustrate the design principles for database design, ER model and normalization.

CO3 - Demonstrate the basics of query evaluation and heuristic query optimization techniques.

CO4 - Apply Concurrency control and recovery mechanisms for the desirable database problem.

CO5 - Compare the basic database storage structure and access techniques including B Tree, B+Tress & hashing.

CO6 - Design and implement the database system with the fundamental concepts of DBMS.

TEXT / REFERENCE BOOKS

1. Silberschatz, A., Korth, H. F., and Sudarshan, S. Database System Concepts, McGraw-Hill, 7th Edition. 2019..
2. Elmasri, R., & Navathe, S. B. Fundamentals of database systems, 4th Edition, Addison Wesley Publishing Edition, 2017.
3. Majumdar, A. K., and Bhattacharyya, P. Database Management Systems. McGraw-Hill, 2017.
4. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of
5. Polyglot persistence, Addison Wesley, 2012.
6. Shashank Tiwari, Professional NoSql,Wiley ,2011

SCSB2574	ADVANCED CYBER SECURITY LAB	L	T	P	EL	Credits	Total Marks
		0	0	4	0	2	100

COURSE OBJECTIVES

➢ To study about different attacks on learning systems.
➢ To identify errors in different modules of the system.
➢ To learn the administration settings in Linux.
➢ To discover the vulnerabilities in Linux system.
➢ To analyse the real-world cybercrime problems.

SUGGESTED LIST OF EXPERIMENTS

1. Study about past adversarial attacks on image recognition systems.
2. Generate an adversarial example using Fast Gradient Sign Attack to attack a MNIST classifier.
3. Use dependency walker to analyse the dependencies of a portable executable file.
4. Create and configure a virtual machine for malware analylsis.
5. Analyse a .dll file using IDA Pro.
6. Create a new account in Linux and assign appropriate permissions.
7. Secure your linux system with firewall to block all ports except port 22.
8. Setup a bash script in cron with logging.
9. Scan your linux system for vulnerabilities using "nikto".
10. Study recent cases and their judgements relevant to cybersecurity in India.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Exploring different attacks in the Linux system
CO2 - Able to configure a virtual machine for different malware analysis
CO3 - Able to setup a secured Linux system
CO4 - Discovering the security permissions in Linux
CO5 - Exploring the vulnerabilities in Linux system
CO6 - Discovering the real-world problems in cyber crime

TEXT / REFERENCE BOOKS

1. Bhadresh M. Patel, "Adversarial Machine Learning: Attacks and Defenses for Artificial Intelligence and Deep Learning Systems", CRC Press, 2020.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
3. Matt Pietrek, "Windows Internals, Part 1: System architecture, processes, threads, memory management, and more", Pearson Education, 2017.
4. Michael Hale Ligh, Steven Adair, Blake Hartstein, Matthew Richard, "Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code", Wiley, 2010.
5. Ric Messier, "Linux Basics for Hackers: Getting Started with Networking, Scripting, and Security in Kali", No Starch Press, 2018.
6. Prashant Mali, "Cyber Law Simplified: Understanding Cyber Laws in India", Cyberlekh Publications, 2019.

SCSBDPROJ	DESIGN THINKING AND INNOVATION	L	T	P	EL	Credits	Total Marks
		0	0	4	0	2	100

COURSE OBJECTIVES
- To apply knowledge in Real time problem solving.
- To foster innovation in design of products, processes or systems.
- To develop creative thinking in finding viable solutions to Engineering /Non Engineering problems.

Activity 1:
Design thinking introduction:
- Phases of design thinking- a study approach
- Group Discussion on Ideation- Users perspective
  Formation of team – Thinking skills- Brain storming

Activity 2:
Problem identification (phase I)
- Selecting user requirements
- Survey on various user's applications
- Specific Problem selection to proceed with the work – Team presentation on identified problems and various possible solutions.

Activity 3:
Problem identification (Phase II)
- Study of an application and its importance to end user.
- Various models of an applications
- Finalize the identified problem

Activity 4:
Design ideation and various stages
- Sketch design diagram
- Architecture or full diagrammatic study

Activity 5:
Review and upgradation
- Review of the ideation (one to one interaction)
- Feedback
- Upgradation plan

Activity 6:
Implementation (Phase I)
- Build the prototype using available resources
- Record Module diagrams

Activity 7:
Implementation(Phase II)
- Display and review of the prototype.
- Record its functionality and its Usage-Technical manual

Activity 8:
Testing
- To test the product design with real time environment
- Record Process-user manual

Activity 9:
IPR-Activity I
- To study various IPR activities
- To prepare for IPR Process
- To file an IPR

Activity 10:
Start-ups Formation
• To exhibit the product to public: feedback approach
• To prepare full documentation
• Start-ups registration/apply patent/publish paper/submit model/prototype/Apply for seed/submit as research proposal

COURSE OUTCOMES
On completion of the course, the students will be able to:
CO1 - Solve real world problems by applying knowledge across domains
CO2 - Develop various design products, processes or technologies for sustainable and socially relevant applications
CO3 - Demonstrate knowledge of resource utilization/budgets to Implement appropriate methodologies
CO4 - Execute tasks by application of engineering standards/ requirements/ design criteria, within timelines
CO5 - Conduct extended investigation that results in the translation of idea to product / production of a research thesis/ developing a proof of concept.
CO6 - Communicate well organized technical and scientific findings effectively in written and oral forms, following ethical and professional norms

TEXT / REFERENCE BOOKS
1. Mueller-Roterberg, Christian. "Handbook of Design Thinking." Hochschule Ruhr West (2018).
2. Design Kit by IDEO.org. "The field guide to human centered design."(2015),ISBN:978-0-9914063-1-9.
3. https://www.interaction-design.org/literature/article/design-thinking-getting-started-with-empathy
4. https://www.interaction-design.org/literature/article/stage-4-in-the-design-thinking-process-prototype
5. https://www.interaction-design.org/literature/article/test-your-prototypes-how-to-gather-feedback-and-maximise-learning
6. https://uxplanet.org/what-are-insights-aa1f2d1b3b9c
7. https://labs.sogeti.com/using-design-thinking-to-design-business-models/
8. https://www.northeastern.edu/graduate/blog/implementing-business-model-innovation/

COURSE ASSESSMENT METHODS

Direct Methods	Design innovation Reviews Report Submission IPR Registration
Indirect Methods	Course Exit Survey

Weightages

Assessment Method	Rubrics	Marks allotted	Assessment Type
Review 1	1	30	CAE
Internal Guide	2	10	CAE
IPR Process and Registration	5	10	ESE
Total – Internal		50	
Final Review	3	30	ESE
Report Submission	4	20	ESE
Total –External		50	

Note: The design thinking guidelines is suggestive and the procedures can customize the rubrics based on their domain requirement

SCSB1501	DATA COMMUNICATIONS AND NETWORKS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
➢ Classify different network architectures, transmission methods and switching techniques.
➢ Evaluate network errors, examine methods to detect and remove them.
➢ Articulate the functioning behind the data transfer through different transmission mode in a network.

UNIT 1   INTRODUCTION   9 Hrs.
Data communication process - Components of communication media – Modes of Communication – IEEE protocol and Standards – Network Classifications – Rudiments of Networks topologies – Client Server and Peer to Peer Network Architecture.

UNIT 2   TRANSMISSION MEDIA & SWITCHING   9 Hrs.
Communication Media – Guided transmission, Unguided and Line of Sight (LOS) – Network Connecting Devices - Multiplexing Techniques – Switching Techniques – Packet Switching Techniques – Analog and digital signals – Encoding and modulation – Parallel and serial transmission

UNIT 3   ERROR DETECTION, CORRECTION & COMMUNICATION   9 Hrs.
Types of Network Errors – Error Detection – Error Correction Methods – Flow control – Error control – IEEE 802.3 – IEEE 802.5 – IEEE 802.11 – IEEE 802.15.1 (Piconet and Scatternet)

UNIT 4   ISDN & ATM   9 Hrs.
Access to ISDN – ISDN layers – Broadband ISDN – Packet layer protocol – ATM – ATM architecture – ATM layers – Congestion control – Leaky bucket algorithm.

UNIT 5   REFERENCE MODELS & PROTOCOLS   9 Hrs.
OSI Reference models – Routing algorithms – TCP/IP Layered Architecture – Transport and application layers of TCP/IP – Network Protocols – DHCP – NAT – DNS – SMTP – HTTP – WWW.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Infer and interpret the foundations of communication, network and transmission along with its devices, types, topologies & protocols.
CO2 - Compare and construct different network architectures, transmission methods and switching techniques.
CO3 - Classify various types of network errors, examine methods to detect them and evaluate various correction algorithms to remove it.
CO4 - Apprehend and perceive the working of advanced switching network, its protocol and architecture.
CO5 - Deduce and master the functioning behind the data transfer through different transmission mode in a network.
CO6 - Categorize the classification of layers built in a network and discern the data flow between the layers through diverse range of algorithms.

TEXT / REFERENCE BOOKS
1. Behrouz and Forouzan, "Data Communications and Networking", 2nd Edition, Tata McGraw Hill, 2007.
2. Andrew.S.Tenenbaum, "Computer Networks" , 4th Edition, Prentice Hall of India, 2008
3. WilliamStallings, "Data and Computer Communication ", 6th Edition, Pearson Education, 2000.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCB1571	ADVANCED CYBER SECURITY AND ETHICAL POLICY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To learn about the security of machine learning systems.
- To acquire knowledge about different malware analysis
- To increase knowledge of threat modelling throughout the medical device ecosystem
- Practicing core functionalities of securing Linux
- To learn about the legal perspectives of cyber security

UNIT 1   CYBER SECURITY FOR AI   **9 Hrs.**

Analyzing the phases of learning – Security Analysis – Framework – Exploratory attacks – Causative Attacks – Repeated learning games – Privacy-preserving learning

UNIT 2   MALWARE ANALYSIS   **9 Hrs.**

Basic static analysis – Malware analysis in virtual machine – Basic dynamic analysis – Crash course in x86 assembly – IDA Pro – Analyzing malicious windows program

UNIT 3   IoT AND BIOMEDICAL DEVICE SECURITY   **9 Hrs.**

IoT threats, vulnerabilities and risks – attacks and countermeasures – Today's IoT attacks – systematic approaches –Threat modelling in biomedical devices – The four questions – Structured modelling – STRIDE – Eliminate, mitigate, accept and transfer approaches – Checklist for evaluating.

UNIT 4   CLOUD SECURITY AND LINUX HARDENING   **9 Hrs.**

Keeping systems updated, Securing user accounts – Securing server with Firewall – SSH Hardening – Access control – Scanning, auditing and hardening requirements – Logging and log security – Vulnerability scanning

UNIT 5   INTRODUCTION OF CYBER ETHICS   **9 Hrs.**

Introducing Ethics – Cyber Ethics – Ethical issues in cyber security – Ethics, Law, and Policy: How Are They Different, How Are They Linked? – Policy and Law – Making and Analyzing Policy – Law as a Toolbox for Policy– Ethics as Its Foundation – Disability Policy and Law, What's Wrong with Calling It "Disability Law and Policy"? Disability Policy and the Models of Disability, The Social Model of Disability – The Social Model and the Rights Approach, Enduring Themes of Disability Policy and Law, Disability Ethics.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1	-	Understanding the attacks for learning systems
CO2	-	Gained knowledge about tools and techniques used by professional analysts
CO3	-	Provides a foundation that can inform an organization's threat modelling practices
CO4	-	Explain the various cyber threats and attacks.
CO5	-	Able to setup a secure Linux environment
CO6	-	Explore the legal aspects of cybersecurity.

TEXT / REFERENCE BOOKS

1. Anthony D. Joseph, Blaine Nelson, Benjamin I. P. Rubinstein, J. D. Tygar. "Adversarial Machine Learning", Cambridge University Press, 2019
2. Michael Sikorski and Andrew Honig. Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software, No Starch Press, 2012
3. Playbook for threat modelling medical devices, U.S. Food and Drug Administration, 2021
4. Donald A. Tevault. "Mastering Linux Security and Hardening", Packt Publishing, 2020
5. Nina Godbole, SunitBelapure, Cyber Security- Understanding cyber-crimes, computer forensics and legal perspectives, Wiley Publications, 2016
6. Ishaani Priyadarshini, Chase Cotton, "Cybersecurity Ethics, Legal, Risks, and Policies ", Apple Academic Press.2021.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration : 3 Hrs.**

PART A : 10 questions of 2 marks each – No choice   **20 Marks**

PART B : 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S614BLH53	NETWORK DEFENCE	L	T	P	EL	Credits	Total Marks
		3	0	2	0	4	100

COURSE OBJECTIVES

➢ To understand the fundamentals of cryptography
➢ To acquire knowledge on standard algorithm used to provide confidentiality, integrity and authenticity
➢ To explore the various key distribution and management schemes
➢ To understand how to deploy encryption techniques to secure data in transit data networks
➢ To learn various mechanisms for network security to protect against the threats in the network

UNIT 1   BASICS OF CRYPTOGRAPHY AND DATA SECURITY   12 Hrs.

The OSI Security Architecture -Services, Mechanisms and Attacks - A Model for Network Security – Classical Encryption Technique – Symmetric Cipher Model – Substitution Technique – Rotor Machines – Steganography
Stream Cipher- SDES - Block Cipher principles – The Data Encryption Standard – The strength of DES – Advanced Encryption Standard- Triple DES.
Practical Programs:
1. Learn to setup and configure a OpenVPN server
2. Generate OpenVPN client configuration flies and connect to server

UNIT 2   KEY DISTRIBUTION AND KEY MANAGEMENT   12 Hrs.

Random key Generation- Requirements- Linear Congruential Generators- Blum BlumShubGeneratorPlacement of encryption - Traffic confidentiality – Key distribution-Public key cryptography and RSA – Key Management Diffie-hellman Key exchange
Practical Programs:
1. Study and setup letsencrypt certificate (auto renew)
2. Study about iptables and understand firewalls in Linux

UNIT 3   NETWORK PROTECTION, MONITORING AND DETECTION   12 Hrs.

Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls- Intrusion Detection System- Signature and Anomaly based detection, Honeypots and Honeynets
Practical Programs:
1. Use UFW to configure a basic firewall to allow only web traffic (port 80 and 443)
2. Use https://www.shodan.io/ to check for webcam streams

UNIT 4   AUTHENTICATION AND HASH FUNCTIONS   12 Hrs.

Authentication requirements – Authentication functions – message authentication codes – Hash functions – Security of hash functions and MAC'S – MD 5 (Message Digest Algorithm) – HMAC. Digital Signatures and authentication protocols: Digital Signatures – Authentication protocols – Digital Signature Standard – Kerberos – X.509 Authentication Service
Practical Programs:
1. Encrypt and decrypt messages encrypted using PGP keys
2. Configure secure SSH access on server (fail2ban, restrict password – only keys)

UNIT 5   ATTACKS AND SYSTEM SECURITY   12 Hrs.

Unauthorized access - Distributed Denial of Service (DDoS) attacks- Man in the middle attacks-Code -SQL injection attacks- Privilege escalation- Insider threats- ARP Cache poisoning- MAC flooding, Side-channel attack-The Secure Sockets Layer (SSL)- Pretty Good Privacy (PGP)-E.mail Security-Web Security-IP Security –Biometric Security

Practical Programs:
1. Use Wireshark to monitor the HTTP messages while connecting to https://www.sathyabama.ac.in/ and understand the result
2. Use Wireshark to determine which port had the highest traffic while browsing YouTube

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Exhibit the facts and basic concepts of symmetric encryption techniques

CO2 - Illustrate various encryption standards and its challenges in the network

CO3 - Experiment with key encryption mechanisms and key management strategies in new applicable situations.

CO4 - Analyse and design suitable network protection, monitoring and detection strategies that prevent from the threat.

CO5 - Defend the network from external or internal authentication threats

CO6 - Design security strategies and resolve security issues in networks and computer systems to secure an organization / IT infrastructure

TEXT / REFERENCE BOOKS

1.   William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson edition, 2020.
2.   Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 3rd Edition 2015.
3.   W. Stallings, Network Security Essentials: Applications and Standards,6th Edition, Pearson Prentice Hall, 2016
4.   Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education, 2012
5.   C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.

S614BLH54	WEB DEVELOPMENT	L	T	P	EL	Credits	Total Marks
		3	0	2	0	4	100

COURSE OBJECTIVE
> ➢ To understand the basics of web development
> ➢ To learn how to create attractive and user-friendly web pages using HTML, CSS, and JavaScript.
> ➢ To develop the skills to build interactive web applications that can handle user input and store data in databases.
> ➢ To gain knowledge about common security risks in web development
> ➢ Become familiar with the tools and techniques used in web development

UNIT 1　INTRODUCTION TO WEB DEVELOPMENT　　　　　　　　　　12 Hrs.
Overview of web development and its importance in cyber security, Introduction to client-side and server-side programming, HTML fundamentals: tags, elements, attributes, CSS basics: selectors, properties, styling Introduction to JavaScript: variables, data types, functions
Practical Programs :
1.　Design a static web pages required for an online book store web site with home page, login page, catologue page and registration page.
2.　Develop and demonstrate the usage of inline, internal and external style sheet using CSS. Use our college information for the web pages.

UNIT 2　FRONT-END DEVELOPMENT　　　　　　　　　　　　　　　12 Hrs.
HTML5 and CSS3 advanced concepts, Responsive web design: media queries, flexible layouts, CSS frameworks (e.g., Bootstrap) for rapid development, Introduction to JavaScript frameworks (e.g., React, Angular, Vue.js) , DOM manipulation and event handling with JavaScript
Practical Programs :
1.　Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
2.　Write programs in Java using Servlets:
　　1. To invoke servlets from HTML forms
3.　Session tracking using hidden form fields and Session tracking for a hit count

UNIT 3　BACK-END DEVELOPMENT　　　　　　　　　　　　　　　12 Hrs.
Introduction to server-side programming languages (e.g., Python, Node.js),Building dynamic web pages with server-side scripting, Introduction to databases: SQL and No SQL, Connecting databases to web applications , Handling user input and form validation
Practical Programs :
1.　Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
2.　Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

UNIT 4   WEB APPLICATION SECURITY   **12 Hrs.**

Common web vulnerabilities: cross-site scripting (XSS), SQL injection, cross-site request forgery (CSRF),Best practices for secure coding and input validation, User authentication and authorization, Security protocols and encryption, Web application firewalls and intrusion detection systems.

Practical Programs :

1.   Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.

2.   Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document by crating and saving an XML document at the server. Implement for 10 users Information.

UNIT 5   WEB DEVELOPMENT TOOLS AND DEPLOYMENT   **12 Hrs.**

Version control systems (e.g., Git) for collaboration and code management, Debugging and testing web applications Performance optimization techniques, Web hosting options: shared hosting, virtual private servers (VPS), cloud platforms Deployment and maintenance considerations

Practical Programs :

1.   Using PHP validates the form using for regular expression. Also stores a form data into database using PHP.

2.   Write a web service for finding the feed back of 500 peoples for any consumer product.

                                                                                      Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - To create their own web pages using HTML, CSS, and JavaScript

CO2 - Develop a interactive and responsive websites that adapt to different screen sizes.

CO3 - Will be capable of building dynamic web applications that can store and retrieve data from databases

CO4 - Will understand the common security vulnerabilities in web development and know how to implement measures to protect web applications.

CO5 - Be familiar with various web development tools and be able to use them effectively.

CO6 - Will gain the ability to deploy and maintain web applications on different hosting platforms

TEXT / REFERENCE BOOKS

1.   "HTML and CSS: Design and Build Websites" by Jon Duckett
2.   JavaScript and JQuery: Interactive Front-End Web Development" by Jon Duckett
3.   Web Development and Design Foundations with HTML5" by Terry Felke-Morris
4.   Deitel and Deitel and Nieto, ─Internet and World Wide Web - How to Program‖, Prentice Hall, 5th Edition, 2011.
5.   UttamK.Roy, ─Web Technologies, Oxford University Press, 2011
6.   Stephen Wynkoop and John Burke ─Running a Perfect Website‖, QUE, 2nd Edition, 1999.
7.   Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
8.   Jeffrey C and Jackson, ─Web Technologies A Computer Science Perspective, Pearson Education, 2011
9.   Gopalan N.P. and Akilandeswari J., ─Web Technology, Prentice Hall of India, 2011

SCSB2471	CAPTURE THE FLAG LAB	L	T	P	EL	Credits	Total Marks
		0	0	4	0	2	100

COURSE OBJECTIVES
➢ To understand the registers and stack.
➢ To learn the usage of Gdbdebugger, Hexrays and Godbolt.
➢ Develop skills in hacking the password and hidden string.
➢ To determine the MAC address.
➢ To apply the Reverse engineering.

LIST OF EXPERIMENTS
1. Understanding Registers and Stack.
2. Use the gdb debugger to set breakpoints and disassemble a function.
3. Use the gdb debugger to see the value of register at each step in the code.
4. Explore how assembly code works using Godbolt.
5. Try and find out the password of the given C code. (Hint: The C code is overflowing).
6. What is the MAC address of the computer these files originate from? (Hint: One of the files is the missing lnk to your answer).
7. Find out the hidden string in the given file.
8. Reverse engineer the given APK and insert your name instead of the string <name>.
9. Login to the given android app.
10. Use IDA hexrays to decompile the given code and reconstruct it in Python.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Be able to understand the registers and stack.
CO2 - To learn the usage of Gdbdebugger, Hexrays and Godbolt.
CO3 - Be able to develop the skills in hacking the password and hidden string.
CO4 - Be able to determine the MAC address.
CO5 - Be able to apply the Reverse engineering.
CO6 - Be able to capture and demonstrate the flag.

TEXT / REFERENCE BOOKS
1. Randal E. Bryant, David R. O'Hallaron, "Computer Systems: A Programmer's Perspective", Pearson, 2016.
2. Richard M. Stallman, Roland H. Pesch, Stan Shebs, et al., "Debugging with GDB: The GNU Source-Level Debugger", Free Software Foundation, 2019.
3. Jon Erikson, "Hacking: The Art of Exploitation", No Starch Press, 2008.
4. Georgia Weidman, "Penetration Testing: A Hands-On Introduction to Hacking", No Starch Press, 2014.
5. Harlan Carvey, "Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 10", Syngress, 2017.

SCSB1671	CYBER THREAT MANAGEMENT USING AI	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

> ➢ To understand the knowledge in solving AI problems
> ➢ To study the fundamentals of Cyber security
> ➢ To learn and analyse the impact of AI on cyber security
> ➢ To secure the web with AI and develop the Web Application Security
> ➢ To study the cyber threats

UNIT 1   INTRODUCTION AND PROBLEM SOLVING   9 Hrs.

Introduction – Understanding AI Basics – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies - Searching with partial Information. Fundamentals of AI for Security- deep learning fundamentals from a security perspective - cyber security space problem solution.

UNIT 2   FUNDAMENTALS OF CYBER SECURITY   9 Hrs.

Identity, authentication, confidentiality, privacy, anonymity, availability and integrity-Exploring cryptographic algorithms together with major attacks- Exploring high-level security protocols- biometric authentication - Compliance and security assessment – introduction to penetration testing - Active Directory Security Assessment (ASDA) and cyber insurance risk assessment.

UNIT 3   IMPACT OF AI ON CYBER SECURITY   9 Hrs.

Threat hunting in memory, file system and network data - introductory analysis of malicious programs - cyber threat hunting and digital investigation --detailed analysis of real-world case studies - unusual and non-virulent types of malwares: KNN (K - Nearest Neighbours) for threat visualizers, Isolation Forest for anomaly detection, LSTM for multi-vector correlation, DBSCAN for risk ware detection and fraud, LSTM (Auto encoder) for endpoint protection.

UNIT 4   SECURE WEB AND APPLICATION   9 Hrs.

Securing web with AI - making websites secure using AI techniques for injection - using regular expressions and identifying patterns and matching with existing scores – Applications using statistical patterns and Bayesian statistics -Web Application Security, Injection, Broken authentication, Sensitive data exposure, XML External Entities (XXE), Broken access control, Security misconfiguration, Cross-Site Scripting (XSS), Insecure deserialization, Using components with known vulnerabilities and Insufficient logging and monitoring.

UNIT 5   CYBER THREATS   9 Hrs.

Future of AI in Advancing Security and Promoting, Artificial Intelligence vs. Data Analytics, Applying AI to cybersecurity, some early AI adopters, AI Use by Adversaries, Using Artificial Intelligence Tools to Enhance Security, Deep learning applications, Cyber Security Threats and Development of Secure Software, Securing IOT Infrastructure, Secure AI Development, Large scale deployment of AI algorithms on production, End-to-end case study for a secure IoT application in a develops ecosystem

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the knowledge in solving AI problems.

CO2 - Study the fundamentals of Cyber security.

CO3 - Analyze the impact of AI on cyber security.

CO4 - Secure the web with AI and develop the Web Application Security.

CO5 - Understand the cyber threats.

CO6 - Implement the case study for secure IOT application.

TEXT / REFERENCE BOOKS

1. Jerzy Peja and PrzejPiegat," Enhanced Methods in Computer Security, Biometric and Artificial Intelligence Systems", Springer, Technical University of Szczecin, Poland.

2. https://www.coursera.org/learn/ibm-cyber-threat-intelligence#instructors

3. https://www.captechu.edu/search?keywords=syllabus
   http://polisci.rutgers.edu/images/syllabi/Cyber_Security_and_AI_790_574_90_Course_Syllabus_V1_19493.pdf

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1672	INFORMATION TECHNOLOGY SECURITY EVALUATION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➤   To introduce the information technology and security techniques.
➤   To study the security functional requirements.
➤   To learn the security assurance requirements.
➤   To be familiar with protecting of the profile and the target security issues.
➤   To evaluate and analyze the security techniques.

UNIT 1   INTRODUCTION AND GENERAL MODEL   9 Hrs.

Scope, over view, General Model – Security Context, Common Criteria approach, Security concepts, CC descriptive material, Types of evaluation, Common Criteria requirements and evaluation results.

UNIT 2   SPECIFICATION AND SECURITY FUNCTIONAL REQUIREMENTS   9 Hrs.

Specification: Common Criteria project (informative), Specification of Protection Profiles, Specification of Security Targets. Security Functional Requirements: Scope, Security functional components – Over view, Component catalogue, Class FAU: Security audit- Security audit automatic response, Security audit data generation, Security audit analysis, Security audit review, Security audit event selection, Security audit event storage.

UNIT 3   SECURITY ASSURANCE REQUIREMENTS   9 Hrs.

Class FCO: Communication, Class FCS: Cryptographic support, Scope, Security assurance requirements – Structures, Component taxonomy, Protection Profile and Security Target evaluation criteria class structure, Usage of terms in ISO/IEC 15408-3, Assurance categorization, Assurance class and family overview, Maintenance categorization, Maintenance of assurance class and family overview.

UNIT 4   PROTECTION PROFILE AND SECURITY TARGET CRITERIA   9 Hrs.

Overview, Protection Profile criteria overview, Security Target criteria overview, Class APE: Protection Profile evaluation- Class APE: Protection Profile evaluation, Security environment, PP introduction, Security objectives, and IT security requirements. Explicitly stated IT security requirements.

UNIT 5   SECURITY EVALUATION   9 Hrs.

Class ASE: Security Target evaluation, Evaluation assurance levels, Assurance classes, families, and components, Class AVA: Vulnerability assessment, Class AMA: Maintenance of assurance

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the basics of information technology and security techniques.
CO2 - Identify the security functional requirements.
CO3 - Apply the security assurance requirements.

CO4 - Analyze and validate the protection profile and target the criteria of security.

CO5 - Apply the Security evaluation techniques.

CO6 - Understand the study of Maintenance assurance.

TEXT / REFERENCE BOOKS

1. Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-1, First edition 1999-12-01 — Part 1: (Unit1, Unit5)

2. Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-2, First edition 1999-12-01 — Part 2: (Unit 2)

3. Information Technology — Security techniques — Evaluation criteria for IT security, INTERNATIONAL STANDARD, ISO/IEC 15408-3, First edition 1999-12-01 — Part 3: (unit1, unit5)

4. Information Technology Security Evaluation Criteria (ITSEC) by IBM ICE Publications

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1674	ARTIFICIAL INTELLIGENCE FOR CYBERSECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- ➢ To introduce the concepts, techniques, and applications of artificial intelligence in the field of cyber security.
- ➢ To learn how AI can be leveraged to detect, prevent, and respond to various cyber threats
- ➢ To implement AI algorithms
- ➢ To develop a tools for cyber security.
- ➢ To provide skills to design suitable techniques and applications.

UNIT 1   INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN CYBERSECURITY   9 Hrs.

Overview of AI and its applications in cyber security, Challenges and opportunities of AI for cyber security, Ethical considerations and implications, Anomaly detection , Intrusion detection systems (IDS) , intrusion prevention systems (IPS) , Feature selection and extraction for cyber security.

UNIT 2   DEEP LEARNING FUNDAMENTALS FOR MALWARE ANALYSIS   9 Hrs.

Introduction to neural networks and deep learning, Convolutional neural networks (CNNs) for image-based cyber security tasks, Recurrent neural networks (RNNs) for sequence-based cyber security tasks, Malware detection using deep learning techniques, Behavior-based analysis and static analysis of malware, Malware classification and clustering using deep learning models.

UNIT 3   NATURAL LANGUAGE PROCESSING (NLP) FOR CYBERSECURITY   9 Hrs.

Introduction to NLP and its applications in cyber security, Text-based cyber threat detection and sentiment analysis, Named entity recognition, text classification for cyber security, Adversarial attacks and defences, Adversarial examples and their impact on cyber security systems, Techniques for adversarial training and robust model development.

UNIT 4   AI FOR NETWORK SECURITY AND THREAT INTELLIGENCE   9 Hrs.

AI-based network traffic analysis and anomaly detection, Network intrusion detection and prevention using AI techniques, AI-enabled network security operations and management, AI-driven threat intelligence and information sharing, Threat hunting and detection using AI algorithms, AI-powered threat intelligence platforms and tools, AI for security incident detection and response, Automated incident triage and handling using AI, Security orchestration, automation, and response (SOAR) systems.

UNIT 5   EXPLAINABLE AI FOR CYBERSECURITY BASED ON SECURITY ANALYTICS AND
**   VISUALIZATION   9 Hrs.**

Explain ability and interpretability in AI models for cyber security, Interpretable machine learning algorithms and techniques, Ethical considerations in deploying AI models in cyber security, AI-powered security analytics and visualization techniques, Visualization of cyber security data and insights, Real-time monitoring and alerting using AI-based analytics, AI-driven user and entity behavior modelling and analysis, Detection of insider threats using AI techniques, User and Entity Behavior Analytics (UEBA) platforms and applications in cyber security.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the evolution, principles, and benefits of AI with cyber security.

CO2 - Apply the Different neural networks and deep learning techniques

CO3 - Know how to apply text-based cyber threat detection.

CO4 - Analyse the security injection prevention techniques

CO5 - Deploying AI models in cyber security.

CO6 - An Ability to analyse security analytics and visualization .

TEXT / REFERENCE BOOKS

1.   Stuart Russell and Peter Norvig," Artificial Intelligence a Modern Approach", Third Edition, Pearson Education Limited ,2016

2.   Artificial Intelligence for Dummies, John Wiley & Sons, Inc.,

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S614BLH63	WEB EXPLOITATION AND DEFENSE	L	T	P	EL	Credits	Total Marks
		3	0	2	0	4	100

COURSE OBJECTIVES

➢ To understand the entire penetration testing process
➢ To understand the fundamental information associated with methods employed and insecurities identified
➢ To analyze entire penetration testing process including planning, reconnaissance, scanning, exploitation, post-exploitation, and result reporting and
➢ To implement effective and actionable mitigations for any security problems
➢ To develop an excellent understanding of current cyber security issues
➢ To Learn how hackers find security vulnerabilities

UNIT 1   BASICS   12 Hrs.

Using Kali Linux – Linux File System – User Privilege – File permission – Data manipulation – Managing and Networking – Shell and python Scripting – Metasploit Framework
Practical Programs:
1.Study of Web exploitation and its tools
2.SQL Injection Attack - SQL Injection Attack from webpage , SQL Injection Attack from command line

UNIT 2   ASSESSMENTS AND EXPLOITATION   12 Hrs.

Finding Vulnerabilities – Nmap scripting engine – Metasploit Scanner – Metasploit exploit check functions – Web application scanning – Using wireshark to capture traffic – SSL attacks and scripting – Exploiting Web Dav credentials – Exploiting Open php MyAdmin – Exploiting third party web applications
Practical Programs:
1.   Cross-Site Scripting (XSS) Attack
        Posting a Malicious Message to Display an Alert Window
        Posting a Malicious Message to Display Cookies
        Stealing Cookies from the Victim's Machine
        Impersonating the Victim using the Stolen Cookies
2.   Generate Real time DOS Traffic

UNIT 3   EXPLOIT DEVELOPMENT   12 Hrs.

Stack based buffer overflow in Linux – Memory Theory – Linux Buffer overflow – Stack based buffer overflow in Windows – Causing a crash – Locating EIP – Structured exception handler – Fuzzing programs – Porting public exploits – Writing 60etasploit modules – Exploitation mitigation techniques
Practical Programs:
1.   Analyze Collected Real Time DOS Traffic
        Analyzing TCP based Traffic
        Analyzing UDP based Traffic
2.   Implement Cookie Poisoning attack
        Client Side Cookie Poisoning

UNIT 4   POST EXPLOITATION   12 Hrs.

Client side exploitation – Bypassing filters – Client side attacks – Social Engineering – Bypassing Antivirus applications – Meterpreter – Local information gathering – Lateral movement – Pivoting – Persistence – Web Application testing – SQL injection – Xpath injection – Cross site scripting – Web application scanning with w3af.

Practical Programs:
1.Implement HTTP Flood Attack
     HTTP Get Attack
     HTTP Post Attack

UNIT 5   OWASP Top 10   **12 Hrs.**
Broken Access control – Cryptographic failures – Injection – Insecure design – Security misconfiguration – Vulnerable and outdated components – Identification and authentication failures – Software and data integrity failures – Security logging and monitoring failures – Server side request forgery
Practical Programs:
Case study on keylogger and anti-key logger

Max. 60 Hrs.

COURSE OUTCOMES
On completion of the course the student will be able to
CO1 - To know the basic principles and techniques of how attackers can enter computer systems.
CO2 - To acquire knowledge into practice by performing ethical penetration tests and hide the intrusion.
CO3 - To perform analysis of data breaches and audits of information technology security.
CO4 - To evaluate the strengths and weaknesses of various information technology solutions in terms of data security.
CO5 - To perform demonstrations of pen-tests for educational purposes.
CO6 - To evaluate the societal role of web exploitation

TEXT / REFERENCE BOOKS
1.   Andrew Hoffman , Web Application Security Exploitation and Countermeasures for Modern Web Applications, O'Reilly 2nd Edition, 2020
2.   Gilberto Najera-Gutierrez, Juned Ahmed Ansari, Web Penetration Testing with Kali Linux , Packet Publishing, 2018 second Edition
3.   OWASP Top 10 (https://owasp.org/www-project-top-ten/)
4.   Advanced Web Attacks and Exploitation, Offensive Security, First edition 2020

SCSB3017	CYBER DIGITAL TWIN	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To gain knowledge in cyber security and digital firmware.
➢ To understand about Risk Management and Twin Constructions
➢ To make students aware of security concerns while implementing Cyber Digital Twin Technology

UNIT 1   INTRODUCTION   9 Hrs.

Introduction - Cyber Digital Twin-definition – benefits - need for digital twin - working principle. Digital thread - digital shadow - building blocks of digital twin - digital twin technology drivers and enablers.

UNIT 2   DATA MODELLING ENVIRONMENT   9 Hrs.

Types of digital twin - Based on Product and Process - Based on Functionality - Based on Maturity. Development considerations - Overview of Data Modelling Environment - model and data management - Managing data - implementing the model - Cloud and IOT technologies.

UNIT 3   DIGITAL TWIN OPTIMIZATION   9 Hrs.

Cyber range vs digital twin - human behavior modelling in digital twin - optimization using digital twin - digital twin and cyber security - Techniques. Technologies - Industrial IOT and Digital Twin - Simulation and Digital Twin - Machine Learning and Digital Twin - Virtual Reality and Digital Twin - Cloud Technology and Digital Twin.

UNIT 4   RISK MANAGEMENT   9 Hrs.

Digital Twin and Risk Assessment - Digital Twin reference model – Implementation - Development of risk assessment plan - Development of communication and control system - Development of digital twin tools – Integration - platform validation – Difficulties - Practical implications.

UNIT 5   APPLICATIONS   9 Hrs.

Applications: Digital Twin in Manufacturing - Digital Twin in Automotive - Digital Twin in Healthcare - Digital Twin in Utilities - Digital Twin in Construction - Digital Twin in Education - Digital Twin in Medicine.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to
CO1 - Implement fundamental Cyber System and Digital Twin Technology.
CO2 - Understand types and data modelling of Digital twin.
CO3 - Understand the optimization, simulation and validation.
CO4 - Know about the risk and Control development.
CO5 - Understand the application in different fields.
CO6 - Develop applications using Cyber digital Twin Technologies.

TEXT / REFERENCE BOOKS

1. Cyber-physical System and Digital Twins - Michael E. Auer Kalyan Ram B.Digital - Part of the Lecture Notes in Networks and Systems book series.
2. Development and Deployment on the Cloud – Nassim Khaed, Bibin Pattel and Affan Siddiqui – Elsevier 2020.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

S614BLH38	CYBER FORENSICS	L	T	P	EL	Credits	Total Marks
		3	0	2	0	4	100

COURSE OBJECTIVES

➢ To learn about the Cyber Crime and to Understand the concepts of open source tools
➢ To learn about Cyber Forensics and to identify and report the forensic on disk level
➢ To learn about Cyber Investigation and to Implement forensic concepts in network level
➢ To learn about Evidence Management and to Analyze Virtual machine forensic
➢ To learn about Cyber Laws and Authorities and Analyze various cloud forensic

UNIT 1   CYBER CRIME   **12 Hrs.**
Cyber Space – Cyber Crime – Criminal Behaviour – Jurisdictional Concerns - Jurisprudential Inconsistency– eCash Security – Prepaid Cards – Stored Values Cards – Mobile Payments – Internet Payment Services - Cyber stalking - Cyber extortion – Cyber terrorism - Cyber warfare –Cyber weapons -ATM frauds – Phreaking – Internet Gambling.
Practical: Open source Forensic Tools , Credit Card Forensics

UNIT 2   CYBER FORENSICS   **12 Hrs.**
Hard disk –Disk characteristics - Disk imaging - Data Carving – Techniques - commercial piracy - soft liftin – Steganography – Network components - Port scans - Wireshark - pcap analysis - Trojans and Backdoors – Botnets - DoS– DDoS Attacks - Honey Pots – Malware – Virus and Worms
Practical: Disk Forensics

UNIT 3   CYBER INVESTIGATION   **12 Hrs.**
Concepts of Investigation - cyber investigation, Network Investigation - Investigating audit logs - Investigating Web attacks -Investigating Computer Intrusions - Profiling – Cyber Criminal profiling – Stylometric Techniques – Warranted searches – Warrantless searches – Undercover Techniques
Practical: Network Forensics, Telecommunications Forensics

UNIT 4   EVIDENCE MANAGEMENT   **12 Hrs.**
Evidence – Digital Evidence - Types – physical evidence – Real evidence – Circumstantial evidence – network evidence - Evidence collection – Evidence Analysis - Contextual Information –Evidence Management – pre search activities – On Scene activities – Report Preparations
Practical: Device Forensics , Forensic Analysis of a Virtual Machine

UNIT 5   CYBER LAWS AND AUTHORITIES   **12 Hrs.**
Technology Act 2000 – Digital signature - Electronic Governance - Secure electronic records- Regulation of certifying authorities – CERNTin - Electronic signature certificates - Penalties compensation - Future Trends and Emerging Concerns
Practical: Forensic analysis of Cloud storage and data remnants

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Outline the Cybercrime and its types. and Understand the concepts of various levels of forensics

CO2 - Explore the Cyber Forensics Techniques and Remembering the concepts of disk forensics.

CO3 - Use the Cyber Investigation Techniques and Implement the concepts of forensics in network.

CO4 - Explore the Cyber Evidence Management Techniques and Understand the concepts of forensics in devices.

CO5 - Outline the Cyber Laws in India. and Apply the concepts for finding virtual machine forensics

CO6 - Understand the cyber laws. and Implement cloud data forensics.

TEXT / REFERENCE BOOKS

1. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson, 2013.
2. Garima Tiwari, "Understanding Laws– Cyber Laws and Cyber Crimes", Lexis Nexis, 2014.
3. Chuck Easttom, Jeff Taylor, "Computer Crime, Investigation, and the Law", Course Technology, 2018.
4. Eoghan Casey, "Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet", Eoghan Casey, 2018

SCSB3471	AUDIT AND MONITORING FOR INFORMATION SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To describe the fundamental concepts in information security and systems auditing.
➢ To discuss the cryptographic techniques.
➢ To know the information security audit tasks, reports and post auditing actions.
➢ To expose the various types of network and host attacks.
➢ To manage the vulnerabilities and its assessment.

UNIT 1 INTRODUCTION TO INFORMATION SECURITY 9 Hrs.

Concept and objective of information security – importance of information security – Performance metrics and reporting – Issues and factors affecting performance metrics – Information Security Audits structure and reports – Infrastructure, Networks and Communication – IS methodologies (Grey-box, white-box, black-box) – phases in IS Audit and strategies.

UNIT 2 CRYPTOGRAPHIC TECHNIQUES 9 Hrs.

Cryptographic techniques – symmetric encryption, asymmetric encryption, message authentication and cryptographic hash functions, digital signatures and digital certificates, public-key infrastructure and web of trust.

UNIT 3 SECURITY AUDITS 9 Hrs.

IT security audit – Compliances – Scope of IT compliance audit - Pre-audit checklist - data collection - vulnerability analysis - internal and external security audit – firewall security audit –IDS security audit – social engineering security audit, web application security audit – IS audit deliverables & report – result analysis, post auditing actions, report retention.

UNIT 4 NETWORK AND HOST SECURITY 9 Hrs.

Types of network attacks – host-based attack, network-based attack, web-based attacks, Network defence techniques – intrusion detection systems and firewall, IPsec and DNSSec, IPv6, cloud computing – Types of host attacks – virus, worm, Trojan horse, Rootkit & Stealth and stack-based buffer overflow – Host defence techniques.

UNIT 5 MANAGING VULNERABILITIES 9 Hrs.

IS based vulnerabilities – threats and vulnerabilities (human-based social engineering, computer-base social engineering, social media countermeasures) – vulnerability management – scanning – testing threat management & remediation - vulnerability assessment and its types – phases in vulnerability assessment – assessment reports – IS risk assessment.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Describe fundamental concepts of information security and system auditing.
CO2 - Understand the difference between security metrics and audits.
CO3 - Knowledge on Vulnerability Management.
CO4 - Analyse the latest trend of network and host security threats and its defence.
CO5 - Learn to analyse the Vulnerability Management.
CO6 - Apply the vulnerabilities in various countermeasures

TEXT / REFERENCE BOOKS

1. Andrew Vladimirov, Konstantin Gavrilenko, and AndriejMichajlowski," Assessing   Information Security strategies tactics logic and framework".

2. Marty M. Weiss and Michael G. Solomon," Auditing IT Infrastructure for compliance", Jones& Bartlett Learning, 2016

3. Peter Szor," The Art of Computer Virus Research and Defence", Addison-Wesley.

4. William Stallings and Lawrie Brown, "Computer Security Principles and Practice", Pearson ,3rd Edition, 2014.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3818	PERFORMANCE EVALUATION OF COMPUTERS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To gain in depth knowledge of fundamentals of performance Evaluation of Computers.

➢ To discuss appropriate evaluation techniques - performance metrics and workloads for a system field.

UNIT 1   INTRODUCTION AND BASIC CONCEPTS   9 hrs

Background - Performance Evaluation Viewpoints and Concepts - Goals of Performance Evaluation - Applications of Performance Evaluation - Techniques - Metrics of Performance - Workload characterization - Benchmarking.

UNIT 2   PROBABILITY THEORY REVIEW   9 hrs

Basic Concepts on Probability Theory - Sample Space and Events - Conditional Probability and Independence - Mean and Median use - Geometric - and Harmonic Mean - Variance - and Standard Deviation - Random Variables - Expectation and Variance - Density and Distribution Functions - Comparing Systems Using Sample Data - Regression Models.

UNIT 3   MEASUREMENT/TESTING TECHNIQUE   9Hrs   .

Event and Measurement Strategies - Event Tracing - Hardware Monitor - Software Monitors. Hybrid Monitors - Traffic Issues and Solutions - Accounting Logs. Benchmarking and Capacity Planning-Types of Benchmark Programs -Common Mistakes in Benchmarking - Example Benchmark Programs - Procedures of Capacity planning - Problems in Capacity Planning.

UNIT 4   DATA REPRESENTATION AND GAME RATIO   9Hrs.

Guidelines for Preparing Plots - Charts Used for Data Presentation - Program Profiling - Common Mistakes in Charts Construction - Errors in Experimental Measurements.

UNIT 5   BASICS OF QUEUEING THEORY AND QUEUEING NETWORKS   9Hrs.

Introduction - Queueing Modelling Notations - Rules for all Queues - Single-Queue - Single (M/M/ 1) System - Single-Queue - Multiple Server (M/M/c) System - Other Queues - Little's Law. Queueing Networks- Definitions - Open Queueing Networks - Closed Queueing Networks - Product-Form Queueing Networks - Case Studies.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1-Develop both analytical and simulation modelling of computer systems.

CO2-Compute probabilities.

CO3-Infer properties of samples and associate confidence measures to sampled statistics.

CO4-Extract the salient features from a sample and to present them.

CO5-Follow a scientific approach to understanding.

CO6-Recognize why the performance of a system varies with some fact.

TEXT /REFERENCE BOOKS

1. Raj Jain, The Art of Computer System Performance Analysis: Techniques for Experimental Design Measurements Simulation and Modelling, Wiley, (2015).
2. Mor Harchol-Balter, Performance Modelling and Design of Computer Systems, Cambridge, (2013).
3. Peter G. Harrison, Naresh M. Patel, Performance Modelling of Communication Networks and Computer Architectures, Addison-Wesley Longman, (1993).
4. K. S. Trivedi, Probability and Statistics with Reliability Queueing and Computer Science Applications, Wiley, (2001).

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3473	INTRODUCTION TO MACHINE LEARNING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
➢ To focus on the construction and study of algorithms that can learn from data
➢ To emphasis on the logical, knowledge-based approach
➢ To introduce students to the basic concepts and techniques of Machine learning
➢ TO develop skills of using recent machine learning software for solving practical problems
➢ To gain experience of doing independent study and research

UNIT 1   INTRODUCTION TO MACHINE LEARNING   9 Hrs.
Machine learning – examples of machine learning applications – Learning associations –Classifications – Regressions – Unsupervised learning – Supervised learning – Learning class from examples – PAC learning – Noise, Model selection and generalization – Dimension of supervised Machine learning Algorithm.

UNIT 2   DECISION THEORY   9 Hrs.
Bayesian Decision Theory – Introduction – Classification – Discriminant function – Baysian networks – Association rule – Parametric Methods – Introduction – Estimation – Multivariate methods - Data parameter estimation – Dimensionality reduction – PCA – Linear discriminant analysis.

UNIT 3   CLUSTERING AND REGRESSION   9 Hrs.
Clustering – Mixture densities – K-means clustering – Supervised Learning after clustering – Hierarchical clustering – Nonparametric methods – Density estimation – Generalization of multivariate data – smoothing models – Decision trees – Univariate trees - Multivariate trees – Learning rules from data – Linear Discrimination – Gradient Descent.

UNIT 4   MULTILAYER PERCEPTRONS   9 Hrs.
Structure of Brain – Neural networks as a parallel processing – Perceptron – Multilayer perceptron – Back propagation- Training procedures – Tuning the network size – Learning time.

UNIT 5   LOCAL MODELS   9 Hrs.
Competitive learning – Adaptive resonance theory – Self organizing map – Radial basis functions – Bagging- Boosting – Reinforcement Learning.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand complexity of machine learning algorithms and their limitations
CO2 - Understand modern notions in data analysis oriented computing
CO3 - Be capable of confidently applying common Machine learning algorithms in practice and implementing their own
CO4 - Be capable of performing distributed computations
CO5 - Can demonstrate working knowledge of reasoning in the presence of incomplete and /or uncertain information
CO6 - Gain ability to apply knowledge representation, reasoning and machine learning techniques to real world problems

TEXT / REFERENCE BOOKS

1. EthemAlpaydin,"Introduction to Machine Learning" MIT press,2004
2. Tom, Mitchell, "Machine Learning" McGraw Hill, 1997
3. Shai Shalev-Shwartz and Shai-Ben David, " Understanding Machine Learning" : From theory to Algorithms Cambridge University Press 2014

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3474	PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA	L	T	P	EL	Credits	Total Marks
		3	0	0	3	3	100

COURSE OBJECTIVES
➢ To discuss about privacy in social networks
➢ To Study the different encryption system in social network
➢ To know the importance of K-Anonymity
➢ To understand the types of attacks against individuals' privacy.
➢ To discuss the privacy preserving for users.

UNIT 1   ANALYSIS OF PRIVACY IN SOCIAL NETWORKS   9 Hrs.

Introduction to social media- Modern social media outlets- Three-Layered Framework-Characteristics Used to Analyze Social Web Privacy-Social Media: End Users and Business - Privacy Issues Related to Social Web Users-Privacy Issues Related to Service Providers-Security and Privacy for Digital Facets-Identifiable Facets-Private Facets- Technological safeguards.

UNIT 2   ENCRYPTION FOR PEER-TO-PEER SOCIAL NETWORKS   9 Hrs.

Introduction to P2P bases OSN Architecture-Essential Criteria for the P2P Encryption Systems-Existing P2P OSN Architectures-Evaluations of Existing Encryption Schemes Based on Our Criteria-Broadcast Encryption-Predicate Encryption-Survey of Unethical Behaviour-Influencing factors.

UNIT 3   STEALING REALITY AND K-ANONYMITY   9 Hrs.

Stealing Reality- Social Attack Model- Social Learnability- k-Anonymity- k-Degree Anonymity- k-Neighbourhood Anonymity- k-Automorphism- k-Isomorphism-L-diversity- Attack Model and Privacy Guarantee- Insights from an ℓ-Diversified Graph- Anonymization Techniques..

UNIT 4   LINKS RECONSTRUCTION ATTACK AND BITCOIN SYSTEM   9 Hrs.

Privacy in Social Networks- Link Prediction- Feature Extraction- Communities Datasets- Electronic Currencies- Anonymity- The Bitcoin System- The Transaction Network- The User Network- Anonymity Analysis- Integrating Off-Network Information- The Bitcoin Faucet- Voluntary Disclosures- TCP/IP Layer Information- Context Discovery- Flow and Temporal Analyses.

UNIT 5   PRIVACY-PRESERVING DATA INTEGRATION USING DECOUPLED DATA   9 Hrs.

Record Linkage - Privacy- Preserving Computation-   Use Case and the Threat Model - Use Case for Privacy- Preserving Record Linkage- Threat Model for Privacy-Preserving Record Linkage - Information and Privacy - Sensitivity and Identifiability - Decoupled Data Access Model - Social Security Numbers- Need for Chaffing.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand the concepts of privacy in social network.
CO2 - Apply the Different encryption techniques
CO3 - Know How to Steal and Attack social model
CO4 - Understand the importance of Bitcoin System.
CO5 - Analyze the privacy preserving for decoupled data.
CO6 - Develop the use case model for privacy preserving.

TEXT / REFERENCE BOOKS

1. Yaniv Altshuler, Yuval Elovici, Armin B. Cremers Nadav Aharony, Alex Pentland," Security and Privacy in Social Networks".
2. Privacy and Security in Online Social Media course in NPTEL.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3475	CRYPTONOMICS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand the secure communication.
➢ To learn about production, consumption in secure manner.
➢ To know about the implementation of cryptographic techniques in blockchain.
➢ To understand how the blockchain creates economic incentives.
➢ To get familiarized with game theory mechanism.

UNIT 1   CRYPTONOMICS AND MECHANISM OF CONSENSUS   9 Hrs.

Basics of Cryptography: Hash Algorithm, Key Encryption, Digital Signature-Basics of Economics-Supply and Demand-CAP Theory-Proof of Work (PoW) Mechanism-Proof of Stake (PoS) Mechanism-Leased Proof of Stake (LPoS) Mechanism-Delegated Proof of Stake (DPoS) Mechanism.

UNIT 2   OPTIMIZED CONSENSUS MECHANISM   9 Hrs.

Optimized Versions of PoW Mechanism-Optimized PoS: Byzantine General and Byzantine, Algorithm for Realizing Proof-of-Stake, Trap of Proof-of-Stake-PBFT Optimized Version: Federal Byzantine-Other: Algorand Agreement

UNIT 3   GAME THOERY AND CRYPTONOMICS   9 Hrs.

Game Theory-Nash Equilibrium-Schelling Point-Bounded Rational Model-Game Theory Mechanism Design and Consensus Mechanism-Game Theory Mechanism Design and Blockchain Security-Prospect of Game Theory-Based Consensus Mechanism – Ethereum's Casper Consensus Algorithm.

UNIT 4   BEHAVIOR ECONOMICS AND CRYPTONOMICS   9 Hrs.

Behavioral Economics vs. Traditional Economics: Irrational vs. Rational-Behavioral Economics in the Blockchain World: How to introduce blockchain to a friend, Indifferent to $10,000 Bitcoin, Projects Like Airdrops, Future of DAO, Need and Importance of Smart Contract-The Intersection of Behavioral Economics and Cryptonomics.

UNIT 5   CRYPTONOMICS, SECURITY AND FUTURE OF BLOCKCHAIN   9 Hrs.

Sybil Attacks-Fork: Soft Fork and Hard Fork- P+€ Attacks-DAO Attacks-Zero Knowledge Proof-Beyond Boundaries Cryptonomics Around the world-Institutional Economy of Blockchain-Money, Dequity and the Batter Economy of the Future-Public Policy in Blockchain Era-Future of Cryptonomics.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Identify the suitable game theory design for blockchain security in terms of economics
CO2 - Know the various consensus mechanisms
CO3 - Explain the importance of bitcoin by behaviour economics
CO4 - Design different consensus mechanisms
CO5 - Familiar with security in terms of Cryptonomics from various attacks
CO6 - Understand the block chain technologies.

TEXT / REFERENCE BOOKS

1. Jian Gong and Wei Xu, "Cryptoeconomics: Iginiting a New Era of Blockchain", Taylor and Francis 2020.

2. Chris Berg, Jason Potts, Sinclair Davidson, "Understanding the Blockchain Economy: An Introduction to Institutional Cryptoeconomics", Edward Elgar Publishing 2019.

3. AnlisWanlin Wang, "CryptoEconomy: How blockchain, cryptocurrency and token economy are disrupting the financial world", Skyhorse Publishing 2018.

4. Bettinga Warburg, Bill Wanger, PhD, Tom Serres, "Basics of Blockchain: A guide for building literacy in the economics, technology and business of blockchain", Animal Ventures 2019

5. Mark Van Rijmenam, Philippa Ryan, "Blockchain Transforming Your Business and our world", Taylor and Francis 2018.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3038	ADVANCED COMPUTER NETWORKS	L	T	P	EL	Credits	Total Marks
		2	0	2	0	3	100

COURSE OBJECTIVES

- To introduce topics related to computer networks and internet operating system
- To gain knowledge on how to develop products over them.
- To introduce basics of Linux Kernel Architecture where the network devices based on and its interface with various products developed for these devices.

UNIT 1   LINUX KERNEL   9 Hrs.

Linux Kernel Programming Introduction, Static & Dynamic Linking of modules, User vs Kernel Space, Systems Calls, Makefile for modules. Shell Programming.
Programming Assignments: Writing shell programs related to shell function, line count of several files and wait and sleep commands.

UNIT 2   NETWORK DRIVERS   9 Hrs.

Introduction to Network Device Drivers. Character Device Driver Development, Process Synchronization and Scheduling, Interrupt Handling, Kernel Debugging.
Programming Assignments: Writing a kernel program, compiling and inserting and removing a module in kernel

UNIT 3   eBPF - NETWORKING AND SECURITY   9 Hrs.

Basics of eBPF, Packet Filters basics, Introduction to Kernel's Traffic Control Layer, Use of C for eBPF
Programming Assignments: Writing a simple C program to interact with eBPF using syscall.

UNIT 4   NETWORK OPERATING SYSTEM PROGRAMMING MODULE   9 Hrs.

Introduction to Internet Operating System. Basics of Cisco IOS XR7, Cisco IOS and Open Network Linux. Socket basics, basics of Client-Server Architecture, Basics of Overlay Networking and Virtualization, Content Delivery Networks and Network Automation.
Programming Assignments: Writing a simple C program on SNULL (Simple Network Utility for Loading Localities). Writing a C program to capture network packets.

UNIT 5   NETWORK DRIVERS TESTING   9 Hrs.

Socket basics, Loopback Addressing, Structure of SNULL (Simple Network Utility for Loading Localities)

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Understand the fundamentals of Linux Kernel architecture.
CO2 - Develop products related to advanced computer networks.
CO3 - Deep knowledge in structure of networks to the protocol content and usage level.
CO4 - Understand the internet operating systems running in routers and switches
CO5 - Develop products run in these networks and network devices.
CO6 - Test and maintain the products run in the networks.

TEXT / REFERNCE BOOKS

1. Robert Love, Linux Kernel Development, 3 rd edition, Addison Wesley, 2010, ISBN: 8131758184.
2. Andrew S.Tanenbaum, David J.Wetherall, Computer Networks, 5th Edition, Pearson, ISBN-13: 978-0-13-212695-3.
3. M J Bach, The Design of the Unix Operating System, 1st edition, Pearson Education,2015, ISBN: 9332549575.
4. J Cooperstein, Writing Linux Device Drivers - A Guide with Exercises, Createspace, 2009, ISBN: 1448672384.

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END SEMESTER EXAMINATION QUESTION PAPER PATTERN
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Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3004	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand the fundamentals of Cryptography
➢ To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
➢ To explore the various key distribution and management schemes.
➢ To understand how to deploy encryption techniques to secure data in transit across data networks
➢ To learn various mechanisms for network security to protect against the threats in the networks.

UNIT 1   INTRODUCTION   9 Hrs.

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT 2   SYMMETRIC CRYPTOGRAPHY   9 Hrs.

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic- Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT 3   PUBLIC KEY CRYPTOGRAPHY   9 Hrs.

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT 4   MESSAGE AUTHENTICATION AND INTEGRITY   9 Hrs.

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509.

UNIT 5   SECURITY PRACTICE AND SYSTEM SECURITY   9 Hrs.

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the fundamentals of networks security, security architecture, threats and vulnerabilities

CO2 - Apply the different cryptographic operations of symmetric cryptographic algorithms

CO3 - Apply the different cryptographic operations of public key cryptography

CO4 - Apply the various Authentication schemes to simulate different applications.

CO5 - Understand various Security practices

CO6 - Understand various System security standards

TEXT / REFERENCE BOOKS

1.   William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.
2.   C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
3.   BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
4.   Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

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END SEMESTER EXAMINATION QUESTION PAPER PATTERN
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Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3820	DIGITAL TRANSFORMATION AND FUTURE SOCIETIES	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- To learn basics of DIGITAL TRANSFORMATION.
- Understand the meaning of design thinking and how it is relevant to real-world situations.
- Understand the need for an agile system, and perceive its benefits.
- To overcome the critical challenges in the path to digital transformation.
- Innovation with future and technologies in societies

UNIT1   INTRODUCTION TO DIGITAL TRANSFORMATION   9 Hrs.
Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.

UNIT 2   DESIGN THINKING FOR STRATEGIC PRODUCT AND SERVICE INNOVATION   9 Hrs.
An Introduction to Design Thinking - Empathy: Begin with the User in Mind - Define: Finding the Innovation Opportunity - Ideate: Brainstorming without boundaries - Prototype: The minimum viable solution - Test, Iterate, & Implement: Prototype to Product - Design Project

UNIT 3   AGILE BUSINESS TRANSFORMATION   9 Hrs.
Introduction to Agile- Blueprint of Agile Transformation - Roadmap of Agile Transformation - Agile Culture & Leadership.

UNIT 4   DIGITAL LEADERSHIP   9 Hrs.
Personal Leadership- rules of personal leadership- how to build and lead teams to success, and drive a culture of innovation at an organizational level, Team Leadership - Organizational Leadership - Leading Disruptive Change.

UNIT 5   LEADING IN THE DIGITAL ERA   9 Hrs.
Succeeding on the path to digital maturity - Fostering a sense of purpose throughout the organization Embedding responsible and ethical judgment into business decisions- Enabling an outside-in perspective and developing contextual intelligence. Leading for co-creation vs. "followership"

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - An Ability to understand the concepts of digital transformation
CO2 - An Ability to analyse design thinking and service innovation
CO3 - Build and nurture scalable, agile processes and teams
CO4 - Overcome the critical challenges in the path to digital transformation.
CO5 - An ability to learn the levers of change and apply personal leadership.
CO6 - Succeeding on the path of digital maturiy

TEXT / REFERENCE BOOKS
1. David L . Rogers,"The Digital Transformation Playbook: Rethink Your Business for the Digital Age",CU Press, 2016.
2. Isaac Sacolick,"Digital Trailblazer: Essential Lessons to Jumpstart Transformation and Accelerate Your Technology Leadership",driving digital ,2022
3. George Westerman, Didier Bonnet and Andrew McAfee –"Leading Digital: Turning Technology into Business Transformation"HBR press 2014.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3573	DATA PRIVACY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- Brief the introduction on data security threats and its techniques.
- Learn about session management and configuration management.
- To Understand the concept of Authentication and Authorization.
- To learn about the session management.
- To learn about the cryptography Techniques.

UNIT 1   DATA SECURITY THREATS, DATA SECURITY THREAT TECHNIQUES   9 Hrs.
Introduction, Data breach, Identity Theft, Bank fraud Physical or Digital theft (Stolen laptops, removable media, impersonation), Malware, SQL Injection, Dumpster diving, Phishing and Pre-Phishing, Denial of Service attack, Social Engineering.

UNIT 2   COUNTER MEASURES AND DATABASE ACTIVITY MONITORING TOOL   9 Hrs.
Introduction, Disk Encryption, Hardware based mechanisms for protecting data, Backups, Data masking, Data Erasure, and Database Activity Monitoring using IBM Infosphere Guardium.

UNIT 3   APPLICATION SECURITY, AUTHENTICATION AND AUTHORIZATION   9 Hrs.
Input Validation - Buffer overflow; cross-site scripting; SQL injection; canonicalization, Sensitive information Access sensitive data in storage; network eavesdropping; data tampering Network eavesdropping; Brute force attack; dictionary attacks; cookie replay; credential theft Elevation of privilege; disclosure of confidential data; data tampering; luring attacks; Phishing.

UNIT 4   CONFIGURATION MANAGEMENT AND SESSION MANAGEMENT   9 Hrs.
Unauthorized access to administration interfaces; unauthorized access to configuration stores; retrieval of clear text configuration data; lack of individual accountability; over privileged process and service accounts. Hijacking; session replay; man in the middle.

UNIT 5   CRYPTOGRAPHY AND ITS PARAMETER   9 Hrs.
Cryptography Poor key generation or key management; weak or custom encryption Parameter manipulation; Query string manipulation; form field manipulation; cookie manipulation; HTTP header manipulation, Exception management Information disclosure; denial of service Auditing and logging, User denies performing an operation; attacker exploits an application without trace; attacker covers his or her tracks, Countermeasures Introduction to code analysis using IBM Rational App Scan
Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course the student will be able to
CO1   - Work on data security threats and it's techniques.
CO2   - Work on DB activity monitoring tools.
CO3   - Have an overview of code analysis.
CO4   - Demonstrate hijacking Techniques.
CO5   - Implement different cryptography key generation Techniques.
CO6   - Discuss the auditing and logging.

TEXT / REFERENCE BOOKS
1.   IT Data security & Application Security, IBM ICE Publication

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3005	CYBER PHYSICAL SYSTEMS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To study the basic concepts, requirements, principles, and techniques in emerging cyber physical systems.
➢ To provide students hands-on experience in prototyping a cyber-physical system and address real-world problems through Cyber Physical Systems
➢ To develop an exposition of the challenges in implementing a cyber-physical system from a computational perspective

**UNIT 1   COMPUTATIONAL FOUNDATION, DESIGN AND SYSTEM
                REQUIREMENTS   9 Hrs.**

Cyber Physical Systems in real world - Basic principle of Cyber Physical Systems - Industry 4.0 - IIoT - Cyber Physical Systems design recommendations - CPS system requirement - Cyber Physical System application - Case study of Cyber Physical Systems.

UNIT 2   PLATFORMS, MODELS AND DYNAMICS BEHAVIOURS   9 Hrs.

Hardware platforms for Cyber Physical Systems (Sensors/Actuators, Microprocessor/Microcontrollers) - Wireless technologies for Cyber Physical Systems - Continuous Dynamics - Discrete dynamics - Hybrid systems.

UNIT 3   CONCURRENT MODELS OF COMPUTATION   9 Hrs.

Structure of model - Synchronous reactive models - Dataflow models of computation -Timed models of computation.

**UNIT 4   STUDY OF EMBEDDED SYSTEMS VS INTERNET OF THINGS VS CYBER
                PHYSICAL SYSTEM   9 Hrs.**

Design of Embedded Systems (I/O Units, Multitasking and Scheduling) - Internet of Things – Architecture - CPS architecture.

UNIT 5   SECURITY AND PRIVACY IN CYBER PHYSICAL SYSTEMS   9 Hrs.

Security and Privacy issues in CPSs - Local network security for CPSs – Internet - Wide Secure Communication - Security and privacy for cloud - Interconnected CPSs - Case Study: Cyber security in Digital Manufacturing / Industry 4.0.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Comprehend the need and purpose of the different components of cyber physical systems.
CO2 - Develop the ability to interact with cyber physical systems.
CO3 - Design a new system with which a product can be made.
CO4 - Comprehend the semantics of a CPS model.
CO5 - Develop the ability to interact with cyber physical systems protocols.

CO6 - Analyse common methods used to secure cyber physical systems.**TEXT / REFERENCE BOOKS**

1.   Rajeev Alur, "Principles of Cyber Physical Systems", MIT Press, 2015.
2.   E. A. Lee, SanjitSeshia , "Introduction to Embedded Systems – A Cyber–Physical Systems Approach", Second Edition, MIT Press, 2017, ISBN: 978-0-262-53381-2.
3.   Guido Dartmann, Houbing song, Ankeschmeink, "Big data analytics for Cyber Physical System", Elsevier, 2019.
4.   Houbing song, Danda B Rawat, Sabina Jeschke, Christian Brecher, "Cyber Physical Systems Foundations, Principles and Applications", Elsevier, 2017.
5.   Chong Li, MeikangQiu, "Reinforcement Learning for Cyber Physical Systems with Cyber Securities Case Studies", CRC press, 2019.
6.   Houbing Song, Glenn A.Fink, Sabina Jesche, "Security and Privacy in Cyber-Physical Systems: Foundations, Principles and Solutions", IEEE Press.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each-No choice   **20 Marks**
PART B : 2 Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

SCSB3575	SECURE CODING PRACTICES	L	T	P	EL	Credits	Total Marks
		3	0	0	3	3	100

COURSE OBJECTIVES
- ➢ To introduce the secure coding concepts.
- ➢ To develop robust and secure software
- ➢ To provide skills and knowledge about including common vulnerabilities.
- ➢ To implement threat modelling.
- ➢ To provide skills to design suitable secure coding techniques, and best practices.

UNIT 1 INTRODUCTION TO SECURE CODING PRACTICES AND THREAT MODELING 9 Hrs.
Importance of secure coding, Overview of common security vulnerabilities, Introduction to security standards and guidelines, Understanding threat modelling process, Identifying assets, threats, and vulnerabilities, Risk assessment and mitigation strategies.

UNIT 2 INPUT VALIDATION AND OUTPUT ENCODING   9 Hrs.
Importance of input validation, Techniques for input validation, Output encoding to prevent injection attacks , Authentication mechanisms and best practices, Authorization models and access control, Session management, Secure storage of credentials, Secure error handling techniques, Logging practices for security and auditing.

UNIT 3 SECURE COMMUNICATION WITH DATABASE ACCESS AND FILE HANDLING 9 Hrs.
Secure protocols (SSL/TLS), Secure data transfer and encryption , Certificate management and validation, SQL injection prevention techniques, Parameterized queries and stored procedures, Database access control and encryption, File input/output vulnerabilities, File upload security considerations, Secure file permissions and access control.

UNIT 4   SECURE CODING FOR WEB APPLICATIONS AND MOBILE APPLICATIONS 9 Hrs.
Cross-Site Scripting (XSS) prevention, Cross-Site Request Forgery (CSRF) protection, Click jacking prevention techniques, Mobile application security challenges, Secure data storage in mobile devices, Code obfuscation and tampering prevention.

UNIT 5   SECURE CODING IN CLOUD ENVIRONMENTS AND SECURE
DEVELOPMENT LIFECYCLE   9 Hrs.
Security considerations in cloud computing, Secure configuration and access control, Secure communication and data protection in the cloud, Secure coding methodologies (e.g., SDL), Security testing and vulnerability scanning.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand the evolution, principles, and benefits of secure coding practices.
CO2 - Apply the Different encryption techniques
CO3 - Know How to Steal and Attack secure model
CO4 - Analyse the security injection prevention techniques
CO5 - Evaluate the security methods using web applications and mobile applications.
CO6 - An Ability to analyse secure configuration and access control .

TEXT / REFERENCE BOOKS
1.   William Stallings, Lawrie Brown, Computer Security: Principles and Practice, 3rd edition, 2014.
2.   Charles P. Pfleeger, Security in Computing, 4th Edition, Pearson, 2009

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3037	COMPREHENSIVE LINUX	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To emphasize the significance of server management concepts of an Enterprise Linux Operating System.

➢ To comprehend the importance of GIT repositories and Security vulnerability in Linux Operating System.

➢ To explore the cloud level services offered by Linux Operating System

UNIT 1   STARTING WITH LINUX   9 Hrs.

Understanding What Linux Is- Exploring Linux History- Understanding How Linux Differs from Other Operating Systems- Understanding How Linux Distributions Emerged- Creating the perfect Linux desktop- Lab: Ubuntu OS installation on Virtual machines- Starting with the Ubuntu Desktop Live image- Handling Ubuntu desktop- Using the Desktop- Understanding the importance of threads- Lab: Understanding Basic Desktop Application Management in Ubuntu- Adding an application launcher- Managing files and folders-- Installing and managing additional software- Lab: Knowing Advanced Desktop Application management in Ubuntu- Using tools- Lab: Configuring basic tools in Ubuntu OS- Working with shell in UBUNTU- Lab1: Getting aquatinted with different types of shell- LAB3: Basic Shell Management.

UNIT 2   GAINING ACCESS   9 Hrs.

Using the root User Account-Exploring Administrative Commands, Configuration Files, and Log Files- Using Other Administrative Accounts- Lab: Implementing privilege escalation- Using Shell Variables, expanding arithmetic expressions Expanding variables- Lab: Manipulating environmental/shell variable- Getting Information about Commands and help- Managing user accounts in UBUNTU- User Management- Lab: Managing Regular User Account-Group Management-Lab: Group Management- Moving around the file system UBUNTU- File Management- Lab: Working with basic file system- Permission Management- Lab: Working with file system permissions- Access Control Lists- Lab: Managing User and Group Permissions- Working with text files in UBUNTU.

UNIT 3   FILE MANIPULATIONS   9 Hrs.

Editing text files from shell prompt- Managing running processes- Process Management-Lab: Monitoring process activity- Writing simple shell scripts- Understanding Shell Scripts- Lab: Implementing basic shell programs- Understanding server managing in RHEL- Install the server RHEL- Lab: RHEL 8 Installation on Virtual Machine- Initial Server Configuration- Lab: Configuring and Verifying the Initial Server Settings- Remote Server Management- Lab: RHEL Remote Server management-Initial Server Configuration- Lab: Configuring and Verifying the Initial Server settings-Remote Server Management- Lab: RHEL Remote Server management- File Transfer-Lab: Securely coping files between Servers-Log Management- Lab1: Monitoring system logs-Lab2: Recording and Managing Server Logs- Server Monitoring- Lab: Monitoring the Health of the server.

UNIT 4   MANAGING SOFTWARE IN RHEL   9 Hrs.

System software and package management- administering networking in RHEL- Lab: Examining and Configuring Network in Server- Starting and stopping services in RHEL- Lab: Managing Daemons and Services in RHEL- Configuring a web server in RHEL- Lab: Managing a Basic Webserver- Advance Webserver Management-Lab: Advance Webserver Management- Secure Webserver-Lab: Securing the Webserver Effectively- Managing disks and file systems- Lab: Making Simple Partitions- Logical Volume Management- Lab: Implementing Logical Volume Management (LVM)- Configuring Samba server in RHEL- Lab: Deploy a samba share directory- Configuring an NFS file server in RHEL- Lab: Deploy a NFS Share export- Introducing container technology.

UNIT 5 INTRODUCTION TO GIT   9 Hrs.

Getting started with GIT and its architecture- Lab: Installing and Configuring GIT in RHEL- Remote Repositories - Lab: Exploring GIT Remote Repository- BRANCHING AND MERGING- Lab: Learning and Exploring Branches in GIT- Configuring databases in LINUX- Lab: MariaDB (MYSQL) installation and configuration in RHEL-MongoDB-Lab: MongoDB installation and configuration in RHEL-UNDERSTANDING LINUX SECURITY OS- Lab: Kali Linux Installation on Virtual Machine- Description about Different Security tools in Kali Linux-Hands-on Study on Nmap and Metasploit-Lab: Gathering information using NMAP-Metasploit-Lab: Vulnerability Management using Metasploit- Knowing LINUX as cloud workhorse- Amazon Web Service (AWS- Lab: Operating and Managing an EC2 Instance in AWS Cloud.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Identify the need of a Linux Operating System.
CO2 - Know the process management functions of a Linux Operating System.
CO3 - Understand the need of users and group management in Linux Operating System.
CO4 - Find the significance of GIT repositories and databases.
CO5 - Recognize the essentials of file management part of a Linux Operating System.
CO6 - Gain an insight of the importance of cloud and security in Linux Operating System.

TEXT / REFERENCE BOOKS

1.   "Comprehensive Linux for All ", Red Hat, 1st Edition, 2023.
2.   Petersen, Richard, "Red Hat Enterprise Linux 8: Desktops and Administration, Surfing Turtle Press, 2019.
3.   Colino, Miguel Perez, " Red Hat Enterprise Linux 8 Administration: Master Linux Administration Skills ", Packt Publishing, 2021.
4.   Günther, Tobias, "Learn Version Control with Git: A Step-By-step Course for the Complete Beginner, Independently Published, 2017.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3671	SYSTEM AND NETWORK SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand the problems and issues related to security in modern networked computer systems

➢ To provide underlying concepts of computer security and basic knowledge about security relevant decisions in IT infrastructure

➢ To provide knowledge to secure complex systems and practical skills in managing a wide range of computer systems.

UNIT 1   INTRODUCTION   9 Hrs.

Introduction to system and network security: Need for security – Security attacks – Services and mechanisms – Network security – Assets and threat models – Examples.

UNIT 2   CONTROL HIJACKING AND CIPHERS   9 Hrs.

Control Hijacking: Attacks and defences – Buffer overflow and control hijacking attacks – Symmetric ciphers: Substitution and transposition techniques – Block cipher – DES – Triple DES – Stream ciphers – RC4.

UNIT 3   LEAST PRIVILEGE AND KEYS   9 Hrs.

Least privilege, access control, operating system security: The principle of least privilege – Access control concepts – Operating system mechanisms and examples – Public key cryptography – RSA algorithm – Key distribution and management – Diffie-Hellman key exchange – Digital signatures.

UNIT 4   AUTHENTICATION MECHANIC   9 Hrs.

Authentication: Authentication requirements – Message Authentication Codes (MAC) – Hashes – MD5 and SHA hash functions – User authentication: Password – Certificate and Biometric authentication – Kerberos.

UNIT 5   NETWORK PROTOCOL SECURITY   9 Hrs.

Network protocols and vulnerabilities: Overview of basic networking infrastructure and network protocols – Internet Protocols – TCP – Routing protocols – DNS – Network defence tools – Secure protocols – Firewall – VPN – Intrusion Detection and filters.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Develop concept of security needed in communication of data through computers and networks along with various possible attacks

CO2 - Understand various encryption mechanisms for secure transmission of data and management of key required for required for encryption

CO3 - Study different encryption and decryption techniques.

CO4 - Understand network security concepts and study different web security mechanisms

CO5 - Understand authentication requirements and study various authentication mechanisms

CO6 - Study Routing protocols and firewall

TEXT / REFERENCE BOOKS

1. Alfred Menezes, Paul van Oorschot, Scott Vanstone, "Handbook of Applied Cryptography", CRC Press,1997
2. Ross Anderson, "Security Engineering", John Wiley & Sons, 2001
3. William Stallings, "Network Security Essentials: Applications and Standards", Prentice Hall, 4th edition, 2010.
4. Michael T. Goodrich and Roberto Tamassia, "Introduction to Computer Security", Addison Wesley, 2011.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3815	WEB PROGRAMMING THROUGH PHP &HTML	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
➢ Understand PHP Basics.
➢ Learn operators, structures and functions in PHP.
➢ Learn arrays and PHP file handling
➢ Object Oriented programming features of PHP.
➢ Learn advanced PHP

UNIT 1   PHP BASICS   9 Hrs.
Introduction to PHP, Support for Database, PHP Installation, Working with PHP, Why PHP? Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, assigning value to a variable, Constants, Managing Variables.

UNIT 2   OPERATORS, CONTROLS STRUCTURES AND FUNCTIONS IN PHP   9 Hrs.
Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, Ifelse if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each, Loop control: Break and Continue. Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, call by value and call by references, understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

UNIT 3   ARRAYS AND PHP FILE HANDLING   9 Hrs.
Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, writing to files, Reading from File, searching a record from a file, closing a File, Using PHP with HTML Forms.

UNIT 4   CLASS, OBJECT AND EXCEPTION HANDLING, JAVA SCRIPT   9 Hrs.
Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters. Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP. Java Introduction, JavaScript Basics.

UNIT 5   INTRODUCTION TO ADVANCE PHP, SET UP PHP DEVELOPMENT ON ECLIPSE
         CREATINGAND DEBUGGING PHP PROJECTS   9 Hrs.
Advanced functions in PHP, Serializing data for persistence, Pattern matching with PHP, Object-oriented Programming and PHP, PHP frameworks – Cake PHP, Symfony, & Zend Framework, Manage PEAR modules, install prebuilt PHP applications, Eclipse installation – All in one, PDT runtime, installation via Update Manager Eclipse, installing a debugger, Running the code inside the web server. Install the local Web Server, Install the PHP engine. Create and Run PHP Project, Understanding Debug View, The PHP debug perspective – the Variables view, the breakpoints' view, the editor view, the console view, the debug output view, the browser output view; Installing and

Configuring the debuggers – Install the Zend debugger, Install XDebug, Configure the debuggers, setting up PDT (PHP Development Tools) – Set up PHP servers, set up PHP executables, Debug Web Application, Inserting other languages e.g., SQL, HTML, Java Script in PHP Code. SQL – PHP SQL Script Installing PHP Projects on Web Server

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Do PHP programming.
CO2 - Embed PHP in HTML.
CO3 - Have learnt Javascript.
CO4 - Have understood advanced concepts in PHP programming.
CO5 - Discuss the concepts of PHP on Eclipse.
CO6 - Demonstrate various web applications

TEXT / REFERENCE BOOKS

1.   Web Programming Thru PHP (IBM ICE Publications)
2.   PHP Bible - Tim Converse REFERENCE BOOKS 1. PHP A beginner's guide - Bill McCarthy
3.   PHP and MySQL Web Development - Luke Welling
4.   Learning PHP - OReilly Press
5.   http://in.php.net/quickref.php
6.   http://www.w3schools.com/php/default.asp
7.   http://www.tizag.com/php/

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3673	ARTIFICIAL INTELLIGENCE FOR ENGINEERING APPLICATION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- To describe the introduction of AI and problem-Solving search techniques.
- To demonstrate the AI case-based Reasoning Application.
- To discuss the NLP in grammars and Application.
- To construct the application of AI uses in computer Applications, Medical Needs.
- To make use of AI hardware application in robots and drones.
- To generalize the various AI applications of Engineering.

UNIT 1   INTRODUCTION AND PROBLEM SOLVING   9 Hrs.

Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies, Heuristic Functions – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information, Heuristic

UNIT 2   CASE-BASED REASONING   9 Hrs.

Introduction, Applications of Case-Based Reasoning, Planning, Design, Diagnosis, Case-Based Reasoning Process, Case Retrieval, Selection by search conditions, Classification by relevance, Classification by performance, Illustration of the case retrieval process, Solution Transformation, Problem detection, Focusing on appropriate parts, Solution transformation, Evaluation and testing, Case Storing, A Framework for CBR in Engineering Design (CASETOOL), Case Retrieval, Solution Transformation, Case Storing, Architecture of CASETOOL, Application Example, Architecture of VASTU, CBR Process in VASTU.

UNIT 3   NATURAL LANGUAGE PROCESSING   9 Hrs.

Language Models, Text Classification, Information Retrieval, Information Extraction, phrase Structure Grammars, Syntactic Analysis, Augmented Grammars and Semantic Interpretation, Machine Translation, speech Recognition.

UNIT 4   CONSIDERING THE USES OF AI IN SOCIETY   9 Hrs.

AI uses in computer Applications: Introducing Common Application Types, Seeing How AI Makes Application Friendlier, Performing Corrections Automatically, Making Suggestions, considering AI based errors. Using AI to Address Medical Needs: Implementing Portable Patient Monitoring, Making Humans More Capable, Addressing Special Needs, Devising New Surgical Techniques, Performing Tasks Using Automation, combining Robots and Medical Professionals.

UNIT 5   WORKING WITH AI IN HARDWARE APPLICATIONS   9 Hrs.

Developing Robots: Defining Robot Roles, Overcoming the sci-fi view of robots, knowing why it's hard to be humanoid, working with robots, Assembling Basic Robot, Considering the components, Sensing the world, Controlling a robot Flying with Drones: Acknowledging the state of the art, Flying unmanned to missions, Meeting the quad copter, Defining Uses of Drones, Seeing drones in non-military roles, powering up drones using AI, Understanding regulatory issues, Utilizing the AI –Driven Car: Understanding the Future of Mobility, Getting into a self-driving car, Overcoming Uncertainty of Perceptions.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Demonstrate fundamental understanding of the history of artificial intelligence (AI) and Problem-solving search Techniques.

CO2 - Gathering the knowledge of case-based reasoning and its application.

CO3 - Apply the NLP concept to real time applications.

CO4 - Executing the AI concept into computer applications and medical fields.

CO5 - Implementing the AI function working with robots and drones.

CO6 - Interpret the AI Applications for various Engineering Field.

TEXT / REFERENCE BOOKS

1. Stuart Russell and Peter Norvig,"Artificial Intelligence a Modern Approach", Third Edition, Pearson Education Limited ,2016
2. Artificial Intelligence forDummies, John Wiley & Sons, Inc.,
3. C.S. Krishnamoorthy; S. Rajeev," Artificial Intelligence and Expert Systems for Engineers", CRC Press, LLC ISBN: 0849391253,1996.
4. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Pearson Education India; 1st edition, January 2004.
5. Introduction to Artificial Neural Systems, Jaico Publishing House; First edition, January 1994.
6. ARTIFICIAL INTELLIGENCE,3rd edition, McGraw Hill Education, July 2017.
7. Qiangfu ZHAO and Tatsuo Higuchi, "Artificial Intelligence: from fundamentals to intelligent searches", Kyoritsu, 2017,ISBN:978-4-320-12419

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3512	DISTRIBUTED SYSTEMS AND SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To introduce the fundamental concepts of distributed system and networking
➢ To identify the system security techniques and cryptography methods
➢ To understand the technical problems of implementing robust access controls
➢ To identify the social engineering attacks and the password protection
➢ To understand the concept of managing the development of secure system.
➢ To introduce the fundamental concepts of distributed system and networking

UNIT 1   DISTRIBUTED SYSTEM AND NETWORKING   9 Hrs.

Introduction to distributed systems – system models – architecture and fundamental models – types of networks – network principles – internet protocols – the API for internet protocols – external data representation and marshalling – client-server communication – group communication.

UNIT 2   SYSTEM SECURITY MANAGEMENT   9 Hrs.

Overview of security techniques – attacks and attackers – foundations of computer security – data vs information – principles of computer security - security management – risk and threat analysis - cryptographic algorithms – digital signatures – cryptography pragmatics.

UNIT 3   ACCESS CONTROL SYSTEMS   9 Hrs.

Operating system access controls – authentication and authorization – access operations – access control structures – ownership – hardware protection - intermediate controls – policy instantiation – comparing security attributes.

UNIT 4   IDENTIFICATION AND AUTHENTICATION   9 Hrs.

Username and password – bootstrapping password protection – guessing passwords – social engineering attacks – phishing countermeasures - spoofing – attacks on password entry – attacking on password storage - protecting the password file – single sign-on.

UNIT 5   MANAGING DEVELOPMENT OF SECURE SYSTEMS   9 Hrs.

Managing a security project – risk management – organizational issues – methodology – security requirements engineering – managing the team

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 -   Describe the fundamental concepts of Distributed system and networking.
CO2 -   State the system attacks and related security techniques.
CO3 -   Discuss on the system access controls.
CO4 -   Identify the attacks on password and its protection methods.
CO5 -   Identify the attacks on password and its protection methods.
CO6 -   Solve the methodological issues and apply to the security requirements engineering.

TEXT / REFERENCE BOOKS

1. George Coulouris, Jean Dollimore, and Tim Kindberg," Distributed Systems – Concepts and Design", Addison Wesley 4th Edition.
2. Ross Anderson, "Security Engineering: A guide to building dependable distributed systems", Wiley, 2nd Edition ,2008.
3. Dieter Gollmann," Computer Security", Wiley, 3rd Edition.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3716	OPEN SOURCE SYSTEMS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

 ➢ To understand open source licenses and learn the implications for users, developers and the software community.
 ➢ To Understand the motivation, theory, strengths and weakness of open source software.
 ➢ To become familiar with and become adapt using the tools of open source development.
 ➢ To learn GNU.
 ➢ To practice open source programming techniques.

UNIT 1   OVERVIEW OF FREE/OPEN SOURCE SOFTWARE   9 Hrs.

Overview of Free/Open Source Software - Definition of FOSS & GNU - History of GNU/Linux and the free software movement -Advantages of free software and GNU/Linux –Licensing - Types of licensing, Intellectual Proprietary Right, Commercial License vs. Open source license- Open Source Licensing, Contract and Copyright Law: Basic principles of copyright law, contract and copyright, open source software licensing, Issues with copyrights and patents, warranties. The FOSS Philosophy, usage -Trends and potential -global and Indian –. FOSS Licenses – GPL- AGPL- LGPL – FDL – Implications – FOSS examples. Review of common programming practices and guidelines for GNU/Linux and FOSS.

UNIT 2   LINUX   9 Hrs.

Linux OS Installation and Hardware Configuration - Configure disk partitions & file systems and install a GNU/Linux distribution -Basic shell commands - Logging in, Listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management User and group management -File ownerships and permissions -PAM authentication -Introduction to common system configuration files & log files -Configuring networking -Basics of TCP/IP networking and routing - Connecting to the Internet ,System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

UNIT 3   OPEN SOURCE TOOLS AND TECHNOLOGIES   FOR HARDWARE AND
            E-MAIL SERVER   9 Hrs.

Configuring additional hardware -Sound cards -Displays & display cards-Network cards-Modems -USB drives -CD writers The OS boot up process -Performing everyday tasks using GNU /Linux - Accessing the Internet -Playing music -Editing documents and spreadsheets -Sending and receiving email -Copy files from disks and over the network -Playing games - Writing CDs -X Window system configuration and utilities -Configure X windows -Detect display devices -Installing software From source code as well as using binary packages -Setting up email servers-Using postfix -(SMTP services) -Courier (IMAP & POP3 services) -Squirrel mail (web mail services) -Setting up web servers -Using apache (HTTP services) - PHP (server-side scripting) -Perl (CGI support) -Setting up file services -Using samba (file and authentication services for windows networks) –Using NFS (file services for gnu/Linux / Unix networks) - Setting up proxy services -Using squid (http / ftp / https proxy services) – Printer Installation.

UNIT 4   UNDERSTANDING GNU LIBC LIBRARIES, COMPILERS AND LINKER   9 Hrs.

GNU compiler tools - The C compiler (gcc) and the C++ compiler (g++) - Linking against object archives (.a libraries) and dynamic shared object libraries (.so libraries) -Generating statically linked binaries and libraries -Generating dynamically linked libraries -Using the GNU debugging tools -Gdb to debug programs -Graphical debuggers like ddd -Memory debugging/profiling libraries mpatrol and valgrind - Introduction to Bash, sed & awk scripting.

UNIT 5   OPEN SOURCE PROGRAMMING TECHNIQUES   **9 Hrs.**

Application Programming-Basics of the X Windows server architecture -Qt programming - Gtk+ programming -Python programming - Execution Environment - Programming GUI applications with localisation support, Open Source Equivalent of existing commercial software.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understands the importance of open source and how it can be used in efficient manure.

CO2 - Understands the importance of licensing, legal impacts.

CO3 - Configured Hardware using OPEN SOURCE TOOLS AND TECHNOLOGIES.

CO4 - Get experience with python programming language.

CO5 - Understand various system software tools.

CO6 - Implement various applications using open source software.

TEXT / REFERENCE BOOKS

1.   N. B. Venkateshwarlu (Ed), "Introduction to Linux: Installation and Programming", B S Publishers; 2005. (NRCFOSS Publication.

2.   Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", Sixth Edition, OReilly Media, 2009.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3676	SECURITY RISK MANAGEMENT	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

- To Understand the concepts and theories of security risk management.
- Develop skills to identify and access security risks.
- Learn how to develop and implement effective security risk management plans.
- Understand the role of technology in security risk management
- Analyze real-world security risk scenarios and propose appropriate solutions.

UNIT 1   INTRODUCTION TO SECURITY RISK MANAGEMENT   9 Hrs.

Definition of security risk management- Importance of security risk management -Legal and regulatory considerations Threat Assessment and Risk Analysis- Identifying potential threats and vulnerabilities- Identifying potential threats and vulnerabilities- Quantitative and qualitative risk analysis

UNIT 2   RISK MITIGATION STRATEGIES   9 Hrs.

Prevention, detection, and response Strategies-Physical Security Measures-Information Security Controls-Personnel security and awareness training.

UNIT 3   SECURITY RISK MANAGEMENT PLANNING   9 Hrs.

Developing a risk management Plan-Setting risk management Objectives-Establishing risk tolerances and acceptance criteria. Emergency Management and Business Continuity- Crisis management and response Planning-Business Continuity Planning-Disaster recovery strategies.

UNIT 4   SECURITY TECHNOLOGIES AND TOOLS   9 Hrs.

Surveillance Systems-Access control Systems-Intrusion Detection Systems-Security information and event management (SIEM) tools.

UNIT 5   ETHICAL AND LEGAL CONSIDERATIONS IN SECURITY RISK MANAGEMENT   9 Hrs.

Ethical responsibilities of security Professionals-Legal frameworks and Regulations-Privacy and data protection considerations. Emerging Trends and Future Challenges- Cybersecurity risks and trends- Risk management in a digital and interconnected world.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Understands the importance of Security management risk.
CO2 - Understands the importance of security risk management plans.
CO3 - Understands various technologies and tools.
CO4 - Understand the role of technology in security risk management.
CO5 - Understands security risk mitigation strategies and techniques.
CO6 - Learn real-world security risk scenarios and propose appropriate solutions.

TEXT / REFERENCE BOOKS

1. Evan Wheeler (Ed "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", Elsevier; 2011.
2. Carl A. Roper "Security Risk Management: A Practical Approach", CRC Press ,2018

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SECB7101	WIRELESS SENSOR NETWORK AND ARCHITECTURE	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To learn basics of Sensor and Network technology.
➢ Learn key routing protocols for sensor networks and main design issues.
➢ Learn transport layer protocols for sensor networks, and design requirements.
➢ Understand the medium access control protocols and address physical layer issues.
➢ To learn the security features in WSN.

UNIT 1   INTRODUCTION AND OVERVIEW OF WIRELESS SENSOR NETWORKS   9 Hrs.

Introduction - Brief Historical Survey of Sensor Networks - and Background of Sensor Network Technology - Ah-Hoc Networks - Applications of Wireless Sensor Networks: Sensor and Robots - Reconfigurable Sensor Networks – Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Wildfire Instrumentation – Habitat Monitoring - Another Taxonomy of WSN Technology - Basic Sensor Network Architectural Elements - Home Control – Medical Applications.

UNIT 2   ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS   9 Hrs.

Designing issues - classification of routing protocols - table driven routing protocols - on demand routing protocol – Hybrid routing protocol - Hierarchical routing protocols. Multicast routing in Ad Hoc wireless networks: Operations and classification of multicast routing protocols - Tree based multicast routing protocol - Mesh based multicast routing protocol.

UNIT 3   SYSTEM ARCHITECTURE AND DESIGN ISSUES   9 Hrs.

Design Constraints for Routing in Wireless Sensor Networks - Classification of Routing Protocols in Wireless Sensor-Networks-Hierarchy Role of Nodes in the Network - Data Delivery Model - Optimization Techniques for Routing in Wireless Sensor Networks - Application of the Optimization Techniques: Routing Protocols.

UNIT 4   ROUTING PROTOCOLS FOR WIRELESS SENSOR NETWORKS   9 Hrs.

Introduction - Data Dissemination and Gathering - Routing Challenges and Design Issues in Wireless Sensor Networks -Network Scale and Time-Varying Characteristics - Resource Constraints - Sensor Applications Data Models – Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques - Flooding and Its Variants - Sensor Protocols for Information via Negotiation - Low-Energy Adaptive Clustering Hierarchy - Power-Efficient Gathering in Sensor Information Systems - Directed Diffusion - Geographical Routing.

UNIT 5   TRANSPORT LAYER SECURITY PROTOCOLS FOR AD HOC
**   WIRELESS NETWORK   9 Hrs.**

Designing issues - classification of transport layer solutions - feedback based TCP - TCP bus - Ad Hoc TCP - Security in Ad hoc wireless networks - Issues and challenges in security provisioning - Key management - Secure routing in Ad hoc wireless networks. Quality of Service: Issues and challenges in providing QoS in Ad Hoc wireless networks - classification of QoS solutions

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - An Ability to understand the concepts of sensors.

CO2 - An Ability to analyse modelling and simulation of various communication networks.

CO3 - Demonstrate knowledge of MAC protocols developed for WSN.

CO4 - Demonstrate knowledge of routing protocols developed for WSN.

CO5 - Understand and explain mobile data-centric networking principles.

CO6 - An Ability to understand the security features in WSN.

TEXT / REFERENCE BOOKS

1. Ibrahiem M.M. El Emary, Ramakrishnan.S, "Wireless Sensor Networks from Theory to Applications", CRC Press, 2013.
2. Fei Hu, Xiaojun Cao, "Wireless Sensor Networks Principles and Practice", CRC Press, 2010.
3. Mounir Frikha, "Ad hoc Networks Routing, Qos and Optimization", Wiley, 2011.
4. Raheem, Beyah, Janise McNair, Cherita Corbett, Security in Ad hoc and Sensor Networks", World Scientific, 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3516	WEB SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ Students should be able to understand and implement web technology
➢ Students should understand how the security.
➢ Students should learn about authentication

UNIT 1   INTRODUCTION   9 Hrs.

Web Functionality Encoding Schemes Mapping the Application - Enumerating the Content and Functionality Analysing the Application Bypassing Client-Side Controls: Transmitting Data Via the Client Capturing User Data Handling Client-Side Data Securely - Input Validation, Blacklist Validation - Whitelist Validation - The Defence-in-Depth Approach - Attack Surface Reduction Rules of Thumb.

UNIT 2   WEB APPLICATION AUTHENTICATION   9 Hrs.

Authentication Fundamentals- Two Factor and Three Factor Authentication - Password Based, Built in HTTP, Single Sign-on Custom Authentication- Secured Password Based Authentication: Attacks against Password, Importance of Password Complexity - Design Flaws in Authentication Mechanisms - Implementation Flaws in Authentication Mechanisms - Securing Authentication.

UNIT 3   SESSION MANAGEMENT &WEB SECURITY PRINCIPLES   9 Hrs.

Need for Session Management Weaknesses in Session Token Generation Weaknesses in Session Token Handling Securing Session Management; Access Control: Access Control Overview, Common Vulnerabilities Attacking Access Controls Securing Access Control. Origin Policy, Exceptions Cross Site Scripting, Cross Site Forgery Scripting; File Security Principles: Source Code Security, Forceful Browsing, Directory Traversals- Classifying and Prioritizing Threats Origin Policy.

UNIT 4   WEB APPLICATION VULNERABILITY   9 Hrs.

Understanding Vulnerabilities in Traditional Client Server Application and Web Applications, Client State Manipulation, Cookie based Attacks, SQL Injection, Cross Domain Attack (XSS/ XSRF/ XSSI), HTTP Header Injection, SSL Vulnerabilities and Testing - Proper Encryption use in Web Application - Session Vulnerabilities and Testing - Cross-Site Request Forgery.

UNIT 5   CRYPTOGRAPHIC PROTOCOLS   9 Hrs.

Path Traversal - Finding and Exploiting Path Traversal Vulnerability Preventing Path Traversal Vulnerability Information Disclosure - Exploiting Error Messages Securing Compiled Applications Buffer Overflow Vulnerability Integer Vulnerability Format String Vulnerability. Path Traversal - Finding and Exploiting Path Traversal Vulnerability Preventing Path Traversal Vulnerability Information Disclosure - Exploiting Error Messages Securing Compiled Applications Buffer Overflow Vulnerability Integer Vulnerability Format String Vulnerability.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Students will be able to understand web security
CO2 - Students would be able authenticate for different application.
CO3 - Students would be able to implement sessions   and security principles
CO4 - By Analyzing the logic of any algorithm, students would be able know various threat
CO5 - Understand the detailed vulnerability in cryptography
CO6 - Apply the path traversal for real time application.

TEXT / REFERENCE BOOKS

1. B. Sullivan, V. Liu, and M. Howard, "Web Application Security", A B Guide. New York: McGraw-Hill Education, 2011.
2. D. Stuttard and M. Pinto,"2nd ed. Indianapolis", IN: Wiley, John Sons, 2011.
3. Hanqing and L. Zhao, Web Security: A Whitehat Perspective. United Kingdom: Auerbach Publishers, 2015.
4. M. Shema and J. B. Alcover," Hacking Web Apps: Detecting and Preventing Web Application
5. Security Problems. Washington", DC, United States: Syngress Publishing, 2014.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3773	CLOUD SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	3	3	100

COURSE OBJECTIVES
- To introduce the cloud computing concepts.
- To know map reduce programming model.
- To provide skills and knowledge about operations and management in cloud technologies.
- To implement large scale systems.
- To provide skills to design suitable cloud infrastructure that meets the business services and customer needs.

UNIT 1   FOUNDATIONS OF CLOUD   9 Hrs.
Inception and need for cloud computing: Motivations from distributed computing predecessors - Evolution - Characteristics - Business Benefits – Challenges in cloud computing - Exploring the Cloud Computing Stack - Fundamental Cloud Architectures – Advanced Cloud Architectures - Specialized Cloud Architectures.

UNIT 2   SERVICE DELIVERY AND DEPLOYMENT MODELS   9 Hrs.
Service Models (XaaS): Infrastructure as a Service (IaaS) - Platform as a Service (PaaS) - Software as a Service(SaaS) - Deployment Models: Types of cloud - Public cloud - Private cloud - Hybrid cloud – Service level agreements - Types of SLA – Lifecycle of SLA- SLA Management.

UNIT 3   CLOUD RESOURCE VIRTUALIZATION   9 Hrs.
Virtualization as Foundation of Cloud – Understanding Hypervisors – Understanding Machine Image and Instances - Managing Instances – Virtual Machine Provisioning and Service Migrations-Media Clouds - Security Clouds - Computing Clouds - Mobile Clouds – Federated Clouds – Hybrid Clouds.

UNIT 4   CLOUD COMPUTING: APPLICATIONS AND PARADIGMS   9 Hrs.
Existing Cloud Applications and Opportunities for New Applications - Architectural Styles for Cloud Applications - Workflows: Coordination of Multiple Activities - Coordination Based on a State Machine Model: The Zoo Keeper - The Map Reduce Programming Model - A Case Study: The Grep The Web Application.

UNIT 5   CLOUD PLATFORMS AND APPLICATION DEVELOPMENT   9 Hrs.
Comparing Amazon web services, Google App Engine, Microsoft Azure from the perspective of architecture (Compute, Storage Communication) services and cost models. Cloud application development using third party APIs, Working with EC2 API – Google App Engine API - Facebook API, Twitter API.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to

CO1 - Understand the evolution, principles, and benefits of Cloud Computing in order to assess existing cloud infrastructures to choose an appropriate architecture that meets business needs

CO2 - Decide a suitable model to capture the business needs by interpreting different service delivery and deployment models.

CO3 - Understand virtualization foundations to cater the needs of elasticity, portability and resilience by cloud service providers.

CO4 - Infer architectural style, work flow of real world applications and to implement the cloud applications using map reduce programming models.

CO5 - Design a cloud framework with appropriate resource management policies and mechanism.

CO6 - Compare operation and economic models of various trending cloud platforms prevailing in IT industry

TEXT / REFERENCE BOOKS

1. Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 1st Edition, 2013.
2. Sosinsk, Barrie, Cloud Computing Bible, John Wiley & Sons, 1 st Edition, 2011
3. Marinescu, Dan C. Cloud Computing: Theory and Practice. Morgan Kaufmann, 2017.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Mc Graw Hill Education, 1st Edition, 2017.
5. Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. Mastering Cloud Computing: Foundations and Applications Programming, Tata Mcgraw Hill, 1 st Edition, 2017.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3774	MOBILE AND WIRELESS SECURITY	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- ➢ To understand the Wireless technology and the threats.
- ➢ To learn wireless security protocols and cryptography.
- ➢ To apply the security for wireless devices.
- ➢ To explore the wireless technologies and applications.
- ➢ To learn to implement the wireless LANS.
- ➢ To understand the Wireless technology and the threats.

UNIT 1   INTRODUCTION AND WIRELESS THREATS   9 Hrs.
History of Wireless Technologies and Wireless Security, The Uncontrolled Terrain, Eavesdropping, Communications Jamming, Injection and Modification of Data, Rogue Client, Attacker Equipment, Covert Wireless Channels, Roaming Issues, Cryptographic Threats.

UNIT 2   INTRODUCTION TO WIRELESS SECURITY PROTOCOLS AND
CRYPTOGRAPHY   9 Hrs.
OSI Model, Internet Model, Wireless Local Area Network (LAN) Security Protocols, Cryptography, Secure Sockets Layer/Transport Layer Security (SSL/TLS), Secure Shell (SSH)- Protocol or Program, Terminal Access and File Transfer, Port Forwarding, Man-in-the-Middle (MITM) of SSL/TLS and SSH, WTLS, WEP, 802.1x, IP Security (IP Sec).

UNIT 3   SECURITY CONSIDERATIONS FOR WIRELESS DEVICES   9 Hrs.
Wireless Device Security Issues- Physical Security, Information Leakage, Device Security Features, Application Security, Detailed Device Analysis Laptops, Personal Digital Assistants (PDAs), Wireless Infrastructure, Handsets.

UNIT 4   WIRELESS TECHNOLOGIES AND APPLICATIONS   9 Hrs.
Cellular Networks- Security Threats- Types of Cellular Fraud, Combating Fraud, GSM Security, Wireless Data Networks- Cellular Digital Packet Data, CDPD Security, General Packet Radio Service (GPRS), GPRS Security Issues, GPRS Security, Wireless Standards and Technologies- IEEE 802.1x, Bluetooth, Home RF, Ultra wide band Radio.

UNIT 5   IMPLEMENTING WIRELESS LANS: SECURITY CONSIDERATIONS   9 Hrs.
Common Wireless Network Applications - Physical Security Considerations, Network Security Considerations, Application Security Considerations, Enterprise Campus Designs - Wireless ISP Design, Retail and Manufacturing Designs, Small Office/Home Office Design (SOHO)

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1   - Understand the basic concepts of Wireless technology and the threats
CO2   - Enhance the knowledge in wireless security protocols and cryptography.
CO3   - Apply the security for wireless devices.
CO4   - Explore the wireless technologies and applications.
CO5   - Implement the wireless LANS.
CO6   - Understand different security considerations.

TEXT / REFERENCE BOOKS
1. Merritt Maxim David Pollino, "Wireless Security", McGraw-Hill/Osborne New York Chicago San Francisco Lisbon London Madrid Mexico City Milan New Delhi San Juan Singapore Sydney Tokyo Toronto
2. Himanshu Dviwedi, Chris Clark and David Thiel, "Mobile Application Security", 1st Edition.
3. Himanshu Dviwedi, Chris Clark and David Thiel, "Mobile Application Security", 1st Edition.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SITB3006	UI / UX DESIGN	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To provide students with the knowledge of user-centered design, graphic design on screens, simulation and prototyping techniques, usability testing methods, interface technologies and user centered design in corporate perspective.

➢ The course is organized around a practical project with iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams.

➢ To convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.

UNIT 1   INTRODUCTION TO UI   9 Hrs.

What is User Interface Design (UI) -Relationship between UI and UX , Roles in UI/UX, A brief historical Overview of interface design, Interface conventions, Approaches to screen based UI, Template vs Content, Formal elements of interface design, Active elements of interface design, Composing the elements of interface design, UI design process, Visual communication design component in interface design.

UNIT 2   INTRODUCTION TO UX   9 Hrs.

UX Basics - Foundation of UX design - Good and poor design - Understanding your users - Designing the experience - Elements of user experience - Visual design principles - Functional layout - Interaction design - Introduction to the interface - Navigation design - User testing -Developing and releasing your design.

UNIT 3   WIREFRAMING FOR UI DESIGNERS   9 Hrs.

Wire framing - Why and how to create wireframes - Issues to solve steps in creating a wireframe Designing on a Grid System (like Bootstrap) - Get critiques incorporate feedback and improve your designs - Wireframe to refined design iterate and refine - Understanding the mobile experience.

UNIT 4   UI OR VISUAL DESIGN CONCEPTS   9 Hrs.

Color Harmonies - Creating contrast with color guidelines for proper color usage - Typography and Fonts Display Text (Such as Headings) versus Body Text Legibility Type Trends Typeface Selection and Pairing Where to Get Web Fonts Ideal Line Height Column Width (Line Length) Hyphenation and Justification Design Elements Proximity Similarity Continuity.

UNIT5   THE BUSINESS OF UX and UI DESIGN   9 Hrs.

UX and UI design industry getting into the business - Strategies and ideas - Resources - Creating your portfolio website - Examples of UX and UI portfolio websites - What you should include on your portfolio website - Get 1-on-1 feedback on your case studies and portfolio website -Resume development what you should include on your resume - Get 1-on-1 feedback on your resume.

Max. 45 Hrs.

COURSE OUTCOMES

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

CO1 - Understand the definition and principles of UI/UX Design in order to design with intention.

CO2 - Achieve a deep understanding of the entire life cycle of design—the process, purpose, and tools.

CO3 - Discover the industry-standard tools and specific project deliverables in UI/UX.

CO4 - Explain why you made design decisions, through presentations of assignments.

CO5 - Apply the user Interfaces to different devices and requirements,

CO6 - Create high quality professional documents and artifacts related to the design process.

TEXT / REFERENCE BOOKS

1.   Harvey and Paul Deiteland Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How to Program", 5th Edition, Pearson Education, 2011

2.   Achyut S Godbole and Atul Kahate, "Web Technologies", 2nd Edition, Tata McGraw Hill, 2012.

3.   Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", 3rd Edition, Tata McGraw Hill, 2013

4.   Jesse James Garrett , "The Elements of User Experience: User-Centered Design for the Web and Beyond", 2nd Edition, Pearson Education. 2011.

5.   Wilbert O. Galitz , "The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques", 3rd Edition, Wiley Publishing, 2007.

6.   Rex Hartson and Pardha S. Pyla, "The UX Book Process and Guidelines for Ensuring a Quality User Experience", Elsevier, 2012.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each - No choice   **20 Marks**

PART B : 2   Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

SCSB3855	VULNERABILITY ANALYSIS AND PENETRATION TESTING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To Understand the Penetration Testing, Methodologies.
➢ To Engage in An Authorized Penetration Test.
➢ To Conduct Online Intelligence Gathering.
➢ To Study of Phases of Penetration.
➢ To Understand About Penetration Testing with Internetworks.
➢ To Implement Penetration Test with Operating Systems.

UNIT 1   INTRODUCTION TO PENETRATION TESTING   9 Hrs.

Basic of cryptography -Introduction to Penetration Testing- What is Penetration Testing- Penetration Testing – Planning- Penetration Testing – Discovery- Penetration Testing - Additional Discovery Details- Penetration Testing – Attack- Penetration Testing – Reporting– tools.

UNIT 2   PENETRATION TESTING METHODOLOGIES   9 Hrs.

Penetration Testing - Planning resources-Discovery deeper dive -Hacking Techniques- Reporting Resources. Planning and Discovery Knowledge- Attack and Reporting Knowledge Check- Penetration testing tools.

UNIT 3   PHASES OF PENETRATION   9 Hrs.

Pre-engagement actions, reconnaissance, threat modelling and vulnerability identification, exploitation, post-exploitation, reporting, and resolution and re-testing.

UNIT 4   PENETRATION TESTING WITH INTERNETWORKS   9 Hrs.

Ethical requirements and legal issues - Penetration test report structure and components - Reconnaissance - DNS- web reconnaissance - TCP- UDP- connections - Scanning using Nmap - File transfer protocol: ftp- http- telnet - SSL and TLS encryption -NetBIOS and NFS - Encryption essentials.

UNIT 5   PENETRATION TEST IN LINUX, WINDOWS   9 Hrs.

Windows passwords- hashes - Rainbow tables- linux passwords- hashes with salt - Searching Linux and Windows file systems 15- Metasploit exploitation framework - Use of netcat and pivoting - Wireless networks and encryption - Lock picking- master keys- and oracle hacks - Cryptography weaknesses - Http- java script- and command injection.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concepts of Penetration Testing.

CO2 - Get knowledge of Penetration Testing, Network security and its protocols to protect applications.

CO3 - Test windows password strength.

CO4 - Implement open password- protected files.

CO5 - Design and implement subvert vulnerable software applications.

CO6 - Apply common phishing techniques.

TEXT / REFERENCE BOOKS

1. Patrick Engebretson," The Basics of Hacking and Penetration Testing Ethical Hacking and Penetration Testing Made Easy", Elsevier Inc.,2011.
2. Georgia Weidman," Penetration Testing: A Hands-On Introduction to Hacking", 1st Edition
3. Michael Rash, "Linux Firewalls", No Starch Press, ISBN: 978-1-59327-141-1, October 2007.
4. J. Michael Stewart- Jones & Bartlett," Network Security- Firewalls and VPNs- Learning", ISBN-10: 1284031675- ISBN-13: 978-1284031676,2013

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3871	DATA SECURITY SERVICES	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ Gain knowledge in corrupted systems
➢ Develop an understanding of security policies
➢ Familiar with cyber security landscapes
➢ Analyze and evaluate the cyber security needs
➢ Analyze software vulnerabilities and security solutions

UNIT 1 DATA SECURITY CONTROLS   9 Hrs

Factor Authentication, Adware, Botnet, Denial-of-Service Attack, Encryption, Exploit. Firewall, Hacker, Authentication, Access control, Backups & recovery, Encryption, Data masking, Tokenization, Deletions & erasure, data resiliency, data masking.

UNIT 2 DATA SECURITY STRATEGIES   9 Hrs.

Physical security of servers and user devices, Access management and controls, Application security and patching, Network and endpoint security monitoring and controls, Data security and BYOD, The insurance. Network security threats: spyware, search, denial of services, misrepresentation, playback and session hijacking, redirections, viruses, Trojan horses, and worms, defining a security policy.

UNIT 3 INFORMATION SYSTEM SECURITY AND PROTECTION OBJECTIVES   9 Hrs.

The development of the Internet and the role of the intranet and extranet. Control at the level of management: data control, data administration, security control, control at the management level, Software control.

UNIT 4 ACCESS CONTROL   9 Hrs.

Cryptography, identification numbers, digital signatures, security and credit card business. Input control, communication control, control of data processing, database control, output data control. Legal aspects of the security of information systems. Information systems security planning: security management information system, the reconstruction plan information system, ISO / IEC 17799: 2000.

UNIT 5 TOOLS FOR PROTECTING THE NETWORK AND OPERATING SYSTEM
             SERVICES   9 Hrs.

Protecting DNS, NIS, Proxy, e-mail, WWW, FTP, NFS. Firewalls, NAT. Security services and procedures: one-time passwords, token cards / soft tokens, TACACS +, RADIUS, KERBEROS, VPN, IKE / IP Sec. Secure data storage. Monitoring the performance of the system. Intrusion detection systems.
Reestablishment of network systems. Top data security tools Hashi Corp Vault, Forti Gate Next-Generation Firewall, Egnyte, Incydr, Cloud guard SaaS, Google Apigee Sense, Xplenty and Data Security

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Gain the core companies in Data security.

CO2 - Analyze and resolve security issues in networks.

CO3 - Understand to secure an IT infrastructure.

CO4 - Design, develop, test and evaluate secure software.

CO5 - Develop policies and procedures to manage security risks.

CO6 - Design a Security system

TEXT / REFERENCE BOOKS

1. Alan Calder,Steve Watkins ",IT Governance: An International Guide to Data Security and ISO27001/ISO27002", Sixth Edition, 2021.
2. Mostapha Zbakh, Mohammed Essaaidi, Pierre Manneback, Chunming Rong, "Cloud Computing and Big Data: Technologies, Applications and Security", 2019.
3. Sherri Davidoff, "Data Breaches: Crisis and Opportunity", Addison-Wesley Professional, 2020.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3020	SOCIAL NETWORK ANALYSIS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ Illustrate basic principles behind network analysis algorithms.
➢ To introduce to computational study of people's opinions, sentiments, emotions, moods, and attitudes
➢ Ability to solve problems such as emotion detection and opinion mining

UNIT 1   INTRODUCTION TO SOCIAL NETWORKS   9 Hrs.

Types of Social Networks: General Random Networks, Small World Networks, Scale-Free Networks; Examples of Information Networks; Network Centrality Measures; Strong and Weak ties; Homophily; Groups - Subgroups and Cliques, Clustering, Block models, Dyads and Individuals - Ego networks, Reciprocity, Social capital, structural holes, equivalence.

UNIT 2   STRUCTURES, MODELS AND PROCESSES OF A SOCIAL NETWORK   9 Hrs.

Models and Simulation of Network Evolution, Diffusion in Networks, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited; Small world experiments, small world models, origins of small world, Heavy tails, Small Diameter, clustering of connectivity, The Erdos Renyi Model, Clustering Models.

UNIT 3   NETWORKS AND LANGUAGE   9 Hrs.

Introduction: Integration of text and network analysis, Types of networks extracted from texts across disciplines, Natural Language Processing and Linguistics for Information and Relation Extraction – link prediction - Feature based Link Prediction - Event Detection: Classification of Text Streams, Event Detection and Tracking: Bag of Words, Temporal, location, ontology based algorithms, Evolution Analysis in Text Streams.

UNIT 4   SENTIMENT AND EMOTION DETECTION   9 Hrs.

Introduction, Sentiment analysis applications, Sentiment analysis research, Sentiment analysis as mini-NLP, Sentiment classification and clustering, Document Sentiment Classification, Supervised sentiment classification, Unsupervised sentiment classification, Sentiment rating prediction - Temporal sentiment analysis, differences between sentiment analysis and emotion detection.

UNIT 5   SOCIAL INFLUENCE ANALYSIS AND OPINION ANALYSIS   9 Hrs.

Influence measures, Social Similarity - Measuring Influence, Influencing actions and interactions. Influence maximization - Definition of opinion, Definition of opinion summary, different types of opinions, Opinion extraction - Irony detection in opinion mining.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 -   Comprehend different types of social networks
CO2 -   Design the structure of a social network.
CO3 -   Analyse real work networks.
CO4 -   Build the model for sentimental analysis
CO5 -   Mine the interest of the user using NLP techniques
CO6 -   Discover interesting patterns for opinion analysis.

TEXT / REFERENCE BOOKS

1. Sentiment Analysis in Social Networks By Federico Pozzi, Elisabetta Fersini, Enza Messina, Bing Liu · 2016
2. Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010
    Influence and Behavior Analysis in Social Networks and Social Media
3. Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3007	ETHICAL HACKING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVE

> ➢ To understand the basics of computer-based vulnerabilities.
> ➢ To explore different foot printing, reconnaissance and scanning methods.
> ➢ To expose the enumeration and vulnerability analysis methods.
> ➢ To understand hacking options available in Web and wireless applications.
> ➢ To explore the options for network protection.
> ➢ To practice tools to perform ethical hacking to expose the vulnerabilities.

UNIT 1   INTRODUCTION   9 Hrs.

Ethical Hacking Overview - Role of Security and Penetration Testers. - Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing. - Network and Computer Attacks - Malware - Protecting Against Malware Attacks. - Intruder Attacks - Addressing Physical Security.

UNIT 2   FOOT PRINTING, RECONNAISSANCE AND SCANNING NETWORKS   9 Hrs.

Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence - Footprinting through Social Engineering - Footprinting Tools - Network Scanning Concepts - Port-Scanning Tools - Scanning Techniques - Scanning Beyond IDS and Firewall.

UNIT 3   ENUMERATION AND VULNERABILITY ANALYSIS   9 Hrs.

Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS Vulnerabilities- Vulnerabilities of Embedded Oss.

UNIT 4   SYSTEM HACKING   9 Hrs.

Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade.

UNIT 5   NETWORK PROTECTION SYSTEMS   9 Hrs.

Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - Network Based and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - To express knowledge on basics of computer-based vulnerabilities

CO2 - To gain understanding on different foot printing, reconnaissance and scanning methods.

CO3 - To demonstrate the enumeration and vulnerability analysis methods

CO4 - To gain knowledge on hacking options available in Web and wireless applications.

CO5 - To acquire knowledge on the options for network protection.

CO6 - To use tools to perform ethical hacking to expose the vulnerabilities.

TEXT / REFERENCE BOOKS

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. The Basics of Hacking and Penetration Testing - Patrick Engebretson, SYNGRESS, Elsevier, 2013.
3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, DafyddStuttard and Marcus Pinto, 2011.
4. Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz, 2014

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3874	FIREWALL AND NETWORK PROTECTION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- ➢ To learn the fundamentals of system and network security.
- ➢ To understand the network security threats, security services and countermeasures.
- ➢ To acquire background on internet security protocols.
- ➢ To expose the varieties in computer attacks and other malicious software.
- ➢ To identify the intrusion detection and apply firewall techniques.

UNIT 1   NETWORK SECURITY   9 Hrs.
Concepts of system security – security services and mechanisms – security attacks – network security – protection methods – network concepts – threats in networks – network security controls.

UNIT 2   SYMMETRIC AND PUBLIC KEY ENCRYPTION   9 Hrs.
Symmetric Cipher model- substitution and transposition techniques -Data encryption standard (DES) algorithm, Double and Triple DES – Advanced encryption standard (AES) algorithm – Comparison of AES and DES – RSA algorithm – Diffie-Hellman Key Exchange - Digital signatures – certificates.

UNIT 3   INTERNET SECURITY   9 Hrs.
Cloud security – transport level security – wireless network security – Electronic mail security - IP security – web security – IOT security.

UNIT 4   MALICIOUS SOFTWARE   9 Hrs.
Types of malicious software – viruses, worms, SPAM, Trojans, system corruption, Zombie, Bots, keyloggers, Phishing, Spyware, Backdoors, Rootkits – Distributed Denial of service attacks – IP spoofing attacks – case study (cryptographic solutions).

UNIT 5   INTRUSION DETECTION AND FIREWALLS   9 Hrs.
Intruders - intrusion detection – password management - Need for Firewalls – characteristics – types of firewalls – firewall basing - firewall location and configurations.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1   -   Describe the concept of network security.
CO2   -   Explain the techniques in symmetric and public key encryption.
CO3   -   Evaluate practices, tools and technologies in internet security.
CO4   -   Describe the various types of malicious software and attacks.
CO5   -   Use the various tools for Intrusion detection mechanism.
CO6   -   Apply the various firewall techniques.

TEXT / REFERENCE BOOKS

1. William Stalling," Cryptography and Network Security: Principles and Practice", 6th Edition, Pearson, 2014, ISBN13:9780133354690.
2. AtulKahate, "Cryptography & Network Security", Tata Mc Graw Hill.
3. Behrouz Forouzan, "Cryptography & Network Security", McGraw-Hill.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3712	SECURITY IN AI	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

> ➢ To use Artificial Intelligence (AI) and Machine Learning (ML) tools to enhance security
> ➢ To understand and prevent various Malwares and Bot attacks using sophisticated AI and ML techniques
> ➢ To understand the applications of firewalls

UNIT 1   INTRODUCTION   9 Hrs.

Introduction – Understanding AI and ML – Automation – Limitations of Rules-based, Signature-based and Firewall solutions – Challenges in adopting AI and ML for security.

UNIT 2   THREATS AND CHALLENGES   9 Hrs.

Focusing on the Threat of Malicious Bots – Bots and Botnets – Remote Code Execution – Flexible Malicious Bots – Evolution of the Botnet – Bot Marketplace – AI and ML Adoption in Botnets.

UNIT 3   ANOMALIES DETECTION   9 Hrs.

AI and ML on the security front – Finding Anomalies – ML for Bot attack remediation – Supervised ML defenses for security events and log analysis – Malware detection – Identify Bots using AI.

UNIT 4   INSIDER THREAT TRACKING   9 Hrs.

Insider threat identification – Tracking Attacker Dwell Time – Orchestrating Protection – ML and AI in current Security Solutions.

UNIT 5   FIREWALLS   9 Hrs.

Managed Security Service Providers – MSSP in AI and ML Source – Cloud-Based Web Application Firewalls using AI and ML – Case Study: Global Media Company Fights Scraping Bots

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Have insight into the main security methods used in artificial intelligence (AI) and machine learning (ML)
CO2 - Understand the importance of AI and ML in security
CO3 - Understand and apply AI and ML techniques to solves cyber attacks
CO4 - Understand the adversaries benefit and challenges in using AI and ML
CO5 - Understand the concept of Managed Security Service Providers
CO6 - Apply security solutions to real time problems.

TEXT / REFERENCE BOOKS

1.   Gil, Laurent, and Allan Liska. Security with AI and Machine Learning. O'Reilly Media, Incorporated, 2019.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3876	CYBER THREAT INTELLIGENCE	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

> Understand the fundamentals of cyber threat intelligence and its importance in cybersecurity.
> Develop skills to collect, analyze, and interpret threat intelligence data.
> Gain knowledge of intelligence frameworks and models.
> Understand the role of threat intelligence in incident response and proactive defense strategies.
> Develop threat intelligence reports and communicate findings effectively

UNIT 1   INTRODUCTION TO CYBER THREAT INTELLIGENCE   9 Hrs.

Definition and importance of cyber threat Intelligence-Key stakeholders and their Roles-Intelligence-driven Cybersecurity Cyber Threat Landscape-Understanding the evolving cyber threat Landscape-Threat actors and their Motivations-Cyber-attack lifecycle.

UNIT 2   INTELLIGENCE ANALYSIS AND PROCESSING   9 Hrs.

Intelligence requirements and Prioritization-Structured Analytic Techniques-Threat modelling and Profiling-Data fusion and correlation. Threat Hunting and Indicator Analysis-Proactive threat detection Techniques-Indicators of compromise (IOCs) and their Analysis-Threat hunting Methodologies-Malware analysis and reverse engineering basics.

UNIT 3   ATTRIBUTION AND CYBER THREAT ACTORS   9 Hrs.

Attribution challenges and Techniques-Nation-state actors and their tactics-Organized cybercrime groups -Insider threats and internal actors

UNIT 4   THREAT INTELLIGENCE SHARING AND COLLABORATION   9 Hrs.

Information sharing platforms and Standards-Public-private Partnerships-Sharing best practices and indicators with the community. Incident Response and Threat Intelligence-Incorporating threat intelligence into incident response Processes-Threat intelligence-driven incident triage and Investigation-Threat intelligence platform (TIP) utilization

UNIT 5   THREAT INTELLIGENCE FOR PROACTIVE DEFENSE   9 Hrs.

Threat intelligence-led vulnerability Management-Security awareness and training based on threat intelligence-Deception techniques and honeypots. Ethical and Legal Considerations in Threat Intelligence- Ethics and responsible use of threat intelligence- Legal implications and privacy considerations-Compliance and regulatory requirements.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Understands the importance fundamentals of cyber threat intelligence and its importance in cybersecurity.
CO2 - Understands to develop skills to collect, analyze, and interpret threat intelligence data.
CO3 - Gain knowledge of intelligence frameworks and models.
CO4 - Understand the role of threat intelligence in incident response and proactive defense strategies
CO5 - Analyze real-world cyber threat scenarios and apply threat intelligence techniques.
CO6 - Learn techniques for threat hunting, indicator analysis, and attribution.

TEXT / REFERENCE BOOKS
1. Arun Vishwanath "Threat Intelligence: A Practitioner's Guide" Wiley, 2018
2. Scott Roberts, Rebekah Brown, and Tyler Hudak , "Threat Intelligence and Me: An Exploration into Threat Intelligence, Log Analysis, and Management", O'Reilly Media, 2020

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3875	BIOMETRICS	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To understand the concept of biometrics and brief functioning of biometric system.
➢ To know different types of biometrics and their benefits in identification system.
➢ To understand threats and increase the biometric system security.

UNIT 1   FUNDAMENTALS AND ARCHITECHTURE   9 Hrs.

Biometric Fundamentals: Introduction – Different authentication system technologies – Benefits of biometrics over traditional authentication systems – Biometric architecture – Modalities – Applications – Key terms and processes – Accuracy in biometric systems.

UNIT 2   RECOGNITION METHODS   9 Hrs.

Biometric systems based on fingerprint recognition – Iris recognition – Face identification and localization in images – Retina recognition methods – Human identification based on gait – Speech as biometric data – Signature recognition and keystroke dynamics.

UNIT 3   EVALUATION METRICES   9 Hrs.

Quantitative analysis on the biometrics – Performance evaluation in Biometrics – False acceptance rate – false rejection rate – Standards in Biometrics - Assessing the Privacy Risks of Biometrics – Designing Privacy - Sympathetic Biometric Systems.

UNIT 4   SYSTEM SECURITY   9 Hrs.

Multimodal Biometric systems: Theory and applications – Performance evaluation of multimodal biometric systems – Biometric System Security: Biometric attacks/tampering – Solutions – Biometric encryption.

UNIT 5   POLICY AND CASE STUDY   9 Hrs.

Privacy, Policy and Legal Concerns Raised by Biometrics: Biometrics and Privacy – Legal considerations of Government use of biometrics – Biometrics and the feasibility of a national ID card – Case studies on physiological, Behavioral and multifactor biometrics in identification systems.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Understand the basic Biometric and authentication system
CO2 - Study detailed face and human recognition methods.
CO3 - Analyse the different evaluation metrics of Biometric.
CO4 - Know the security and attacks of Biometric
CO5 - Understand privacy challenges in biometrics
CO6 - Understand the biometric technology for public policy matters involving security and privacy

TEXT / REFERENCE BOOKS

1. R. M. Bolle, J. H. Connell, S. Pankanti, N. K. Ratha, and A. W. Senior, "Guide to Biometrics", Springer, 2004.
2. Benjamin Muller, "Security, Risk and the Biometric State: Governing Borders and Bodies", Routledge, 1st Edition.
3. Anil K jain, Patrick Flynn, Arun A. (Eds.), "Handbook of Biometrics", Springer, 2008.
4. John D. Woodward, Jr. Nicholas M. Orlans Peter T. Higgins, "Biometrics", Dreamtech.
5. Samir Nanavathi, Michel Thieme, Raj Nanavathi," Biometrics -Identity verification in a network", Wiley Eastern.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB1513	HUMAN COMPUTER INTERACTION	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To learn the foundations of Human Computer Interaction.
➢ To become familiar with the design technologies for individuals and persons with disabilities.
➢ To be aware of mobile HCI.
➢ To learn the guidelines for user interface

UNIT 1   9 Hrs.

The Components theHuman: Human Memory – Thinking – Emotion – Individual Preferences – Psychology and Design of Interactive Systems. The computer: Text Entry Devices – Pointing Devices – Display Devices – Devices for Virtual Reality and 3D interaction – Physical Controls, Sensors and Special Devices – Memory – Processing and Networks.

UNIT 2   9 Hrs.

HCI in the software process: Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design Rules: Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – HCI patterns.

UNIT 3   9 Hrs.

Models and Theories HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements - Communication and collaboration models- Face-to face communication – conversation – text based – group working; Task analysis – difference between other techniques – task decomposition – Knowledge based analysis – ER based techniques –uses.

UNIT 4   9 Hrs.

Implementation support: Windowing system elements – using tool kits – user interface management; Evaluation techniques – goals – expert analysis – choosing a method; universal design principles – multimodal interaction; user support – requirements – Approaches – adaptive help systems – designing user support systems.

UNIT 5   9 Hrs.

Web Interface Design: Designing Web Interfaces – Drag and Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 - Design effective dialog for HCI.
CO2 - Design effective HCI for individuals and persons with disabilities.
CO3 - Assess the importance of user feedback.
CO4 - Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
CO5 - Develop meaningful user interface.
CO6 - Analyze and identify user models and the appropriate tools.

TEXT / REFERENCE BOOKS

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", Pearson Education, 3rd Edition, 2004.
2. Human Computer Interaction, Springer publications,2018.
3. Brian Fling, Mobile Design and Development, OReilly Media Inc., First Edition, 2009.
4. Bill Scott and Theresa Neil, Designing Web Interfaces, OReilly, First Edition, 2009.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3616	SOFT COMPUTING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To learn the various types of soft computing frameworks.
➢ To understand the knowledge about Genetic Algorithms.
➢ To design various types of neural networks.
➢ To understand the concepts of neuro fuzzy.
➢ To gain knowledge on Fuzzy Logic.

UNIT 1   NEURAL NETWORKS   9 Hrs.

Introduction to ANS - Adaline - Back propagation network - Hopfield network - Boltzmann machine - Self organizing maps Support Vector Machines-Spike Neuron Models.

UNIT 2   FUZZY LOGIC   9 Hrs.

Fuzzy sets - Fuzzy rules and fuzzy reasoning –Defuzzification- Fuzzy inference system - Mamdani fuzzy model – Sugeno fuzzy model - Tsukamoto fuzzy model

UNIT 3   NEURO FUZZY   9 Hrs.

Adaptive Neuro Fuzzy Inference System - Coactive neuro-fuzzy modelling - Classification and regression trees - Data Clustering Algorithm - Rule based structure - Neuro - Fuzzy control I - Neuro - Fuzzy control II - Fuzzy decision making.

UNIT 4   GENETIC ALGORITHM   9 Hrs.

Introduction - Implementation of GA - Reproduction - Crossover - Mutation - Coding - Fitness scaling - Application of GA.

UNIT 5   ARTIFICIAL INTELLIGENCE   9 Hrs.

Introduction - Searching techniques - First order Logic - Forward reasoning - Backward reasoning - Semantic – Frames.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1 -   Describe human intelligence and how intelligent system works.
CO2 -   Apply basics of Fuzzy logic and neural networks.
CO3 -   Discuss the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
CO4 -   Discuss about Neuro Fuzzy concepts.
CO5 -   Describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
CO6 -   Develop some familiarity with current research problems and research methods in Soft Computing Techniques.

TEXT / REFERENCE BOOKS

1. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.
2. S.R. Jang, C.T. Sun andE. Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
3. David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
4. Stuart J. Russel, Peter Norvig, "Artificial Intelligence a Modern Approach", 2nd Edition, Pearson Education, 2003.
5. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
6. S. Rajasekaran, G.A. VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3003	LINUX PROGRAMMING	L	T	P	EL	Credits	Total Marks
		3	1	*	0	3	100

COURSE OBJECTIVES

➢ To teach principles of operating system including File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.

➢ To familiarize fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.

➢ To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).

➢ To facilitate students in understanding Inter process communication.

➢ To facilitate students in understanding semaphore and shared memory.

➢ To facilitate students in understanding process.

UNIT 1   INTRODUCTION TO LINUX AND LINUX UTILITIES   9 Hrs.

Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text Processing utilities and backup utilities, tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

UNIT 2   INTRODUCTION TO SHELLS & FILTERS   9 Hrs.

Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

UNIT 3   GREP, SED, UNIX FILE STRUCTURE, & FILE MANAGEMENT   9 Hrs.

Operation, grep Family, Searching for File Content; Scripts, Operation, Addresses, commands, Applications, grep and sed; Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers; File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

UNIT 4   PROCESS AND SIGNALS   9 Hrs.

Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks.

UNIT 5   INTER PROCESS COMMUNICATION & SOCKETS   9 Hrs.

Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands; Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.

CO2 - Ability to write Shell Programming using Linux commands.

CO3 - Ability to design and write application to manipulate internal kernel level Linux File System.

CO4 - Ability to develop IPC-API's that can be used to control various processes for synchronization.

CO5 - Ability to develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

CO6 to prerequisite to pursue job as a Network administrator

TEXT / REFERENCE BOOKS

1. W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.
2. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
3. Linux System Programming, Robert Love, O'Reilly, SPD.
4. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
5. UNIX Network Programming, W.R. Stevens, PHI.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3713	DIGITAL IMAGE PROCESSING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- To understand and gain complete knowledge about the fundamentals of digital image processing
- To develop a theoretical foundation of image processing techniques
- Describe color image processing, image compression, image segmentation and representation
- To provide analytic skills to process the images

UNIT 1   INTRODUCTION   9 Hrs.
Image Representation, Components of Digital Image Processing Systems, Image Sensing and Acquisition, Elements of Visual Perception, Image formation model, Image Sampling and Quantization, Relationship between pixels.

UNIT 2   IMAGEENHANCEMENT   9 Hrs.
Enhancement by Point Processing, Histogram Processing, Arithmetic/Logic Operations, Image Averaging, Spatial Filters for Smoothing and Sharpening, Frequency domain filters for Smoothing and Sharpening; Image Degradation & Restoration Model, Noise Models, Inverse Filtering, Geometric Mean Filter.

UNIT 3   IMAGE SEGMENTATION   9 Hrs.
Detection of Discontinuities, Edge Linking and boundary Detection, Thresh holding, Region based Segmentation, Coding Redundancy, Inter pixel Redundancy, Image Compression model, Error Free Compression, Variable Length Coding, Lossy Compression.

UNIT 4   MORPHOLOGICAL AND COLOUR IMAGE PROCESSING   9 Hrs.
Dilation and Erosion, Opening and Closing, Basic Morphological Algorithms: Boundary Extraction, Region Filling, Thickening and Thinning; Colour Image Representation, Colour Models, Pseudo Colour Image Processing, Colour Transformations, Smoothing and Sharpening, Segmentation based on Colour.

UNIT 5   MEDICAL IMAGE PROCESSING   9 Hrs.
Noise Reduction in Nuclear Medicine Imaging, Contrast enhancement of mammograms, Detection of Spinal Canal, Detection of calcifications by multi-tolerance region growing, Shape analysis of calcifications, Analysis of Ligament Healing.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Understand the fundamentals of Digital Image Processing.
CO2 - Learn the image enhancement techniques in Spatial and Frequency Domain
CO3 - Model the Noises, Restoration and Compression.
CO4 - Analyze segmentation and compression techniques.
CO5 - Apply various algorithms for Colour Image Processing.
CO6 - Apply various algorithms for Medical Image Processing.

TEXT / REFERENCE BOOKS

1. Rafael C Gonzalez, Richard E Woods, "Digital Image Processing", 4th Edition, Pearson Education, 2017.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", 4th Edition, Cengage Learning, 4th Edition, 2014.
3. B. Chanda, D. Dutta Majumdar, "Digital Image Processing and Applications", Prentice Hall of India, 2011.
4. William K Pratt, "Digital Image Processing", 4th Edition, John Willey 2007.
5. Rangaraj M. Rangayyan, "Biomedical Image Analysis", CRC Press LLC, Boca Raton, FL, 2005
6. Jain A.K., "Fundamentals of Digital Image Processing", Pearson Education, 1989.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 questions of 2 marks each – No choice   **20 Marks**

PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SCSB3877	PENETRATION TESTING	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

UNIT 1   INTRODUCTION   9 Hrs.
Penetration Testing phases/Testing Process, types and Techniques, Blue/Red Teaming, Strategies of Testing, Non-Disclosure Agreement Checklist, Phases of hacking, Open-source/proprietary Pentest Methodologies.

UNIT 2   INFORMATION GATHERING AND SCANNING   9 Hrs.
Information gathering methodologies- Foot printing, Competitive Intelligence 3DNS Enumerations- Social Engineering attacks, Port ScanningNetwork Scanning Vulnerability Scanning- NMAP scanning tool- OS Fingerprinting- Enumeration.

UNIT 3   SYSTEM HACKING   9 Hrs.
Password cracking techniques- Key loggers- Escalating privileges- Hiding Files, Double Encoding, Steganography technologies and its Countermeasures. Active and passive sniffing- ARP Poisoning, MAC Flooding- SQL Injection - Error based, Union-based, Time-based, Blind SQL, Out-of-band. SQL Injection Prevention Techniques.

UNIT 4   ADVANCED SYSTEM HACKING   9 Hrs.
Broken Authentication, Sensitive Data Exposure, XML External Entities, Broken Access Code, XSS - Stored, Reflected, DOM Based.

UNIT 5   WIRELESS PENTEST   9 Hrs.
Wi-Fi Authentication Modes, Bypassing WLAN Authentication, Types of Wireless Encryption, WLAN Encryption Flaws, AP Attack, Attacks on the WLAN Infrastructure, DoS-Layer1, Layer2, Layer 3, DDoS Attack, Client Mis association, Wireless Hacking Methodology, Wireless Traffic Analysis.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - To understand penetration testing phases and methods.
CO2 - To learn the concepts information gathering and Vulnerability Scanning and attacks.
CO3 - Demonstrate the different SQL injection techniques and password cracking techniques.
CO4 - Have practical exposure to the concepts of authentication advance hacking methods.
CO5 - To understand wireless pen test and types of encryption attacks.
CO6 - Apply the concepts of WLAN attacks and methodology for analysis.

TEXT / REFERENCE BOOKS
1. Kali Linux Wireless Penetration Testing Beginner's Guide by Vivek Ramachandran, Cameron Buchanan,2015 Packt Publishing.
2. SQL Injection Attacks and Defense 1st Edition, by Justin Clarke-Salt, Syngress Publication
3. Mastering Modern Web Penetration Testing By Prakhar Prasad, October 2016 Packt Publishing.
4. Kali Linux 2: Windows Penetration Testing, By Wolf Halton, Bo Weaver, June 2016 Packt Publishing.
5. Kali Linux Revealed: Mastering the Penetration Testing Distribution - June 5, 2017, by Raphael Hertzog (Author), Jim O'Gorman (Author), Offsec Press Publisher.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 questions of 2 marks each – No choice   **20 Marks**
PART B: 2 questions from each unit of internal choice; each carrying 16 marks   **80 Marks**

SBAB4001	PRINCIPLES AND PRACTICES OF MANAGEMENT	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES

➢ To analyse how the field of Management has evolved and its significant contributions
➢ To analyse and apply the critical role of managers in modern organizational settings.
➢ To illustrate and evaluate the importance of planning, organizing, directing and controlling in decision making.

UNIT 1   INTRODUCTION   9 Hrs.
Definition, Functions, Process, Scope and Significance of Management. Nature of Management, Managerial Roles, Managerial Skills and Activities, Difference between Management and Administration. Significance of Values and Ethics in Management.

UNIT 2   SCHOOLS OF MANAGEMENT   9 Hrs.
Evolution of Management Thought - Contributions of F.W. Taylor, Henry Fayol, Elton Mayo, Approaches of Management Thought (including MBO and MBE) Functions of Management. Concept of Leadership-Theories and Styles.

UNIT 3   PLANNING AND ORGANIZING   9 Hrs.
Nature, Scope, Objective and Significance of Planning, Elements and Steps of Planning, Decision Making Organizing Principles, Span of Control, Line and Staff Relationship, Authority, Delegation and Decentralization. Effective Organizing, Organizational Structures, Formal and Informal Organizations, Staffing.

UNIT 4   DIRECTING   9 Hrs.
Effective Directing, Supervision, **Motivation**: Different Theories of Motivation - Maslow, Herzberg, Mc Clelland, Vroom, Porter and Lawler, Job Satisfaction. **Communication** Process, Channels and Barriers, Effective Communication.

UNIT 5   CONTROLLING AND COORDINATING   9 Hrs.
Elements of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles and Techniques of Coordination, Concept of Managerial Effectiveness.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Understanding of basic management concepts, principles, and practices.
CO2 - Develop planning and decision-making strategies in an organization.
CO3 - Summarize the concept and complete the process of organizing.
CO4 - Develop an understanding of staffing, leadership, directing and motivation in an organization.
CO5 - Predict the dynamics of controlling and its emerging issues in management.
CO6 - Assess managerial practices and choices relative to ethical principles and standards.

TEXT / REFERENCE BOOKS

1. Stephen P. Robbins, David A. Decenzo, Fundamentals of Management, Pearson Education, 9th Edition.
2. Harold Koontz, O'Donnell and Heinz Weihrich, Essentials of Management. New Delhi, 9th edition, Tata McGraw Hill.
3. Management Fundamentals: Concepts, Applications, and Skill Development, 6th edition, Sage.
4. Richard L. Daft, Principles of Management, Cengage Learning.
5. Prasad, L.M. Principles and Practice of Management, Sultan Chand.
6. Jhunjhunwala J Mohanty, Management Principles and Applications, Himalaya Publishing House.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each-No choice   **20 Marks**
PART B : 2 Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

S41BPB41	VENTURE CREATION	L	T	P	EL	Credits	Total Marks
		2	0	0	3	3	100

COURSE OBJECTIVES

➢ To develop an entrepreneurial mindset, understand the concept of entrepreneurship and identify personal strengths and weaknesses.

➢ To understand the design thinking process and apply design thinking to real-world problems.

➢ To identify problems and opportunities and develop ideas for new ventures by assessing market potential.

➢ To develop a value proposition, business model canvas, build MVP to create sustainable differentiation for the venture with a well-structured business plan, unit economics, go-to-market strategies and funding plan for managing business growth.

➢ To build an idea pitch and deliver it with confidence to potential stakeholders.

UNIT 1   INTRODUCTION TO ENTREPRENEURSHIP   9 Hrs.

Defining Entrepreneurship, evolution the concept and Emerging Trends in Entrepreneurship (Domain specific), Understanding the unique opportunities; Why be an Entrepreneur? Entrepreneurship in Indian Scenario and Its role in economic development; Success stories of Entrepreneur (Domain specific); Entrepreneurial style assessment tool; Developing the Entrepreneurial mindset- Attributes and skills, recognizing your sweet spot for starting up; Principles of Effectuation; Myths about Entrepreneurship; Types of Entrepreneurs; Entrepreneur vs Intrapreneur; Role of Entrepreneurial Teams.

UNIT 2   DESIGN THINKING and OPPORTUNITY DISCOVERY   9 Hrs.

Introduction to Design Thinking for startups; Design Thinking principles and process; Define the problem using Design thinking principles and validate Problem; Generation of ideas, Idea generation techniques and evaluating creative ideas; Identify problem worth solving; Sharpen your Problem Pitch.

UNIT 3   CUSTOMER, MARKETS AND CREATING A SUSTAINABLE
**   DIFFERENTIATION   9 Hrs.**

Differentiate between a customer and a consumer; Who is your customer and what is your segment ; Customer Job, Pains, and Gains using Value proposition Canvas; Build solution using Value Proposition Canvas; Market Estimation-TAM,SAM,SOM; Competitive analysis; Minimum viable product – what is MVP: Build - Measure - Learn, differentiate between solution Demo and MVP; How to validate MVP-Achieve a Product – Market fit.

UNIT 4   BUSINESS MODEL, BUSINESS PLANNING AND GO TO MARKET
**   STRATEGIES   9 Hrs.**

Introduction to Business model, Business plan ; Lean approach 9 block lean canvas model; Financial feasibility: Costs, revenue streams, Pricing, Financial Projections, Key Financial Metrics using financial template, Managing growth and targeting scale, Unit economics; Selecting the Right Channel; Introduction to Digital Marketing and tools; Branding strategy.

UNIT 5   FUNDING STRATEGY   9 Hrs.

Sources of funds: Debt and Equity ; Map the Start-up Lifecycle to Funding Options; Build an Investor ready pitch deck.

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - To define entrepreneurship and explain emerging trends in entrepreneurship.

CO2 - To identify and evaluate business opportunities and assess market potential.

CO3 - To conduct customer discovery, market research, build a lean canvas, develop a business plan and marketing strategies.

CO4 - To identify sources of funding and develop a funding strategy, understand basic legal requirement for starting and running a business.

CO5 - To build an idea pitch and deliver it with confidence to various stakeholders.

CO6- To apply design thinking principles and processes to real world problems, generate creative ideas, and develop a problem pitch for potential solutions

TEXT / REFERENCE BOOKS

1. Hisrich, R. D., Peters, M. P., and Shepherd, D. A. Entrepreneurship (10th ed.). McGraw-Hill Education. (2017).
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business. (2011).
3. Blank, S. G., and Dorf, B. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. KandS Ranch. (2012).
4. Roy, R. Indian Entrepreneurship: Theory and Practice. New Delhi: Oxford University Press. (2017).
5. Chandan, J. S., and Rana, S. S. Entrepreneurship Development and Management. New Delhi: McGraw Hill Education. (2019).
6. Sinek, S. Start with Why: How Great Leaders Inspire Everyone to Take Action. Portfolio. (2011).
7. Choudhary, R., and Mehta, N. From Zero to One: How to Build a Successful Startup in India. Notion Press. (2019).
8. Osterwalder, A., and Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game   Changers, and Challengers. John Wiley and Sons. (2010).
9. Mitra, P., and Banerjee, A. Startup Minds: The Entrepreneur's Journey from Idea to Success. SAGE Publications India. (2019).
10. Thiel, P. Zero to One: Notes on Startups, or How to Build the Future. Crown Business. (2014).
11. Zappos, T. Delivering Happiness: A Path to Profits, Passion, and Purpose. Business Plus. (2010).

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A: 10 Questions of 2 marks each-No choice   **20 Marks**

PART B: 2 Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

SCSB4006	SOFTWARE PROJECT MANAGEMENT	L	T	P	EL	Credits	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVES
- To understand the fundamental principles of software project management.
- To have a good knowledge of responsibilities of project manager.
- To be familiar with the different methods and techniques used for project management

UNIT 1   INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT   9 Hrs.
Introduction to Software Project Management - Activities covered by Software Project Management – Plans - Methods and Methodologies - Categorizing Software Projects - Project Evaluation and Programme Management - Project Portfolio Management - Evaluation of Individual Projects –Cost benefit evaluation techniques - Risk evaluation - Programme management - Managing the allocation of resources within programme management - An overview of project planning.

UNIT 2   SELECTION OF APPROPRIATE PROJECT APPROACH, EFFORT ESTIMATION   9 Hrs.
Selection of an appropriate project approach - Choosing methodologies and technologies - Software processes and process models - Choice of process models, Structure versus speed of delivery - Software effort estimation - Problems with over and under-estimates - Software effort estimation techniques - Bottom-up estimation - Top-down approach and Parametric models, Expert judgment - Estimating by analogy - COCOMO model, Cost estimation, Staffing pattern, Effect of schedule compression.

UNIT 3   ACTIVITY PLANNING AND RISK MANAGEMENT   9 Hrs.
Activity Planning, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Risk Management, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management, Boehm's Top 10 Risks and Counter Measures, Resource Allocation, Nature of Resources, Identifying Resource Requirements, Scheduling Resources, Creating Critical Paths, Counting the Cost.

UNIT 4   MONITORING AND CONTROL   9 Hrs.
Monitoring and Control, Creating the Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Software Configuration Management, Managing Contracts, Managing People in Software Environments, Understanding Behavior, Organizational behavior, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldham–Hackman Job Characteristics Model, Stress Management.

UNIT 5   SOFTWARE QUALITY   9 Hrs.
Software Quality, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product versus Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to

CO1 - Apply project management concepts and techniques to an IT project.
CO2 - Identify issues that could lead to IT project success or failure.
CO3 - Explain project management in terms of the software development process.
CO4 - Describe the responsibilities of IT project managers.
CO5 - Apply project management concepts through working in a group as team leader
CO6 - Be an active team member on an IT project.

TEXT / REFERENCE BOOKS
1.   Bob Hughes, Mike Cotterell, Rajib Mall, "Software Project Management", TMH Edition 6, 2018.
2.   Walker Royce, "Software Project Management", Pearson Edition, 2005.
3.   Stellman and Greene, "Applied Software Project Management ",1st Edition, Kindle Edition.
4.   Richard Thayer, Edward Yourdon, "Software Engineering Project Management", WILEY.
5.   Jack Marchewka, "Information Technology Project Management providing measurable organizational value", 5th Edition, Wiley, 2016.

END SEMESTER EXAM QUESTION PAPER PATTERN
Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each - No choice   **20 Marks**
PART B : 2   Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

SCSB1714	SMART PRODUCT DEVELOPMENT	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES
- To introduce basic working principles of sensor devices.
- To educate different interface medium for communication.
- To impart knowledge on different automation system.

UNIT 1 INTRODUCTION TO SENSOR DEVICES 9 Hrs.
Piezoresistive pressure sensor- Piezoresistive Accelerometer - Capacitive Sensing- Accelerometer and Microphone - Resonant Sensor and Vibratory Gyroscope – Low power, low voltage sensors- Micro electro mechanical systems analysis and design of MEMS devices- Nano sensors.

UNIT 2 INTERFACING SENSOR INFORMATION AND MCU 9 Hrs.
Amplification and signal conditioning - Integrated signal conditioning- Digital conversion- MCU control MCUs for sensor interface techniques and system considerations- Sensor integration.

UNIT 3 CONTROL TECHNIQUES AND STANDARDS 9 Hrs.
Control of sensors using State Machines, Fuzzy Logic, Neural Networks, Adaptive Control.
Control Application using - CISC, RISC, DSP Control and IEEE 1451 Standards.

UNIT 4 COMMUNICATION FOR SMART SENSORS 9 Hrs.
Wireless data communications- RF Sensing- Telemetry- Automotive Protocols- Industrial Networks Home Automation- MCU Protocols

UNIT 5 SMART CITIES USES CASE 9 Hrs.
Smart adaptive advertising - Customized digital experience, Disaster prevention, Smart Agriculture - Smart Health, Smart Security and Surveillance, Smart Virtual Assistance – Leadership and Policy Maker - Challenges and Solutions in Building AI, IoT - Case study: IoT Application for Water and Waste Management.

Max.45 Hrs.

COURSE OUTCOMES
On completion of the course the student will be able to
CO1 - Comprehend the requirements of product design.
CO2 - Analyse the different designs.
CO3 - Develop different interfaces.
CO4 - Work in different communication medium.
CO5 - Understand the automation process.
CO6 - Develop applications using AI technique.

TEXT / REFERENCE BOOKS
1.   Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014.
2.   Krzysztof Iniewski, "Smart Sensors for Industrial Applications (Devices, Circuits, and Systems)"
         CRC Press, 2017.
3.   Anbazhagan k, "IOT Google, Amazon Alexa, Signal Jammer, ESP 8266 NodeMCU and
         Location Tracker :New model technology development", 2019 .

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each - No choice   **20 Marks**
PART B : 2   Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**