INVERTIS
UNIVERSITY BAREILLY
Established by Govt. of U.P. u/s 2F of UGC Act, 1956 vide U.P. Act 22 of 2010.

Scheme of Instruction & Syllabi
of
Bachelor of Technology
(Computer Science and Engineering)
With specialization in Cloud Computing

(With effect from academic session 2023-24)

(Dr. Gaurav Agarwal)
HOD CSE

(Prof. R.K. Shukla)
Dean Engineering & Technology

(Prof. Y D S Arya)
Vice- Chancellor

Department of Computer Science and Engineering
INVERTIS UNIVERSITY
Invertis Village, Bareilly-Lucknow NH-24, Bareilly,
243123 U. P.

INVERTIS UNIVERSITY BAREILLY
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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering with specialization in Cloud Computing
YEAR I, SEMESTER I

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Ability Enhancement	ENG105	English	2	1	0	25	50	75	3
2	Science	MAT 102	Engineering Mathematics-I	3	1	0	30	70	100	4
3	Science	PHY 105	Physics for Engineers–I	3	1	0	30	70	100	4
4	Engineering	BEE 101	Basic Electrical and Electronics	3	1	0	30	70	100	4
5	Engineering	BCSI101	Problem Solving and Programming in C	3	0	0	25	50	75	3
6	Engineering Science Course	IIOT1	Introduction to IOT Foundation	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
6	Science	PHY 106	Physics for Engineers Lab–I	0	0	2	10	15	25	1
7	Engineering	BEE 102	Basic Electrical and electronics lab	0	0	2	10	15	25	1
8	Engineering	BCSI102	Problem solving and Programming in C lab	0	0	2	10	15	25	1
9	Engineering	BME101	Workshop practice	0	0	2	10	15	25	1
10	Engineering	BCSI103	IT Workshop	0	0	2	10	15	25	1
11	Skill Enhancement	ENG 113	Soft Sills and Self Awareness	0	0	2	10	15	25	1
			Total	**18**	**4**	**12**	**230**	**470**	**750**	**28**

L-Lecture, **T**- Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE**- End Semester Examination

[Revised after the inclusion of Skill and Entrepreneurship Courses effective from the session 2022-23]

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering
with specialization in Cloud Computing
YEAR I, SEMESTER II

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Ability Enhancement	ENG106	Professional English	2	1	0	25	50	75	3
2	Science	MAT103	Engineering Mathematics–II	3	1	0	30	70	100	4
3	Science	PHY107	Physics for Engineers–II	3	1	0	30	70	100	4
4	Science	CHY103	Environmental Science	2	0	0	15	35	50	2
5	Engineering	BCSI201	Design Thinking	3	0	0	25	50	75	3
6	Engineering	BCSI202	Web Designing	3	0	0	25	50	75	3
7	Engineering Science Course	IIOT2	Communication and Standard Interfaces	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Ability Enhancement	ENG107	Communication Techniques lab	0	0	2	10	15	25	1
8	Science	PHY108	Physics for Engineers lab –II	0	0	2	10	15	25	1
9	Engineering	BCSI203	Web Designing lab	0	0	2	10	15	25	1
10	Engineering	BCSI204	Computer Aided Graphics	0	0	2	10	15	25	1
11	Skill Enhancement	ENG114	Soft Skills and Communication	0	0	2	10	15	25	1
12	Skill Enhancement	SEP200	Extra-curricular Activity (NSS/NCC/Scouting/ Club Activity)	0	0	2	10	15	25	1
			TOTAL	20	3	12	240	485	725	29

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ENG 105: ENGLISH

Unit 1: Prose- A Cup of Tea by Katherine Mansfield, The Piece of String by Guy De Maupassant, Text of Steve Jobs' Commencement address -2005.
Poems: Ode to the skylark – by P B Shelley, Where the Mind Is Without Fear – by Rabindranath Tagore, The Road Not Taken- Robert Frost.

Unit 2: **Grammar & Vocabulary-** Tenses and the concept of time, Verb Types, Active and Passive Voice, Narration, Prepositions, Conditionals, Modal Auxiliaries, Conjunctions, One-word substitutions, Synonyms and Antonyms.

Unit 3: Writing Skills- Writing Paragraph, Essay, Writing Articles for Newspapers & Magazines, Writing Applications, Resumé Writing.

Unit 4: Reading Skills- Reading Comprehension, Summarizing and Note making.

Unit 5: Speaking Skills- Conversations- Introduction, Purpose, Features, Delivering Speeches- Welcome, Introductory, Vote of Thanks, Farewell Speech, Indianism.

Text/Reference Books

1. Communication Skills, Pushp Lata & Sanjay Kumar, Oxford Higher Education/Oxford University Press.
2. Technical Communication; Principles and Practice, Meenakshi Raman & Sangita Sharma, Oxford University Press.
3. Effective Technical Communication, M Ashraf Rizvi, Tata Mcgraw Hill.

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MAT 102: ENGINEERING MATHEMATICS-I

Unit 1: Differential Equation I- Differential equations of first order and first degree - Linear differential equations, Reducible to linear form, Exact Form, Reducible to Exact Form, Linear Differential Equations of Higher Order with Constant Coefficients Only.

Unit 2: Differential Equation II- Second order ordinary differential equations with variable coefficients-Homogeneous form, Exact form, Change of Dependent Variable, Change of Independent Variable, Normal form, Variation of Parameters.

Unit 3: Differential Calculus I- Partial Differentiation, Euler's Theorem on Homogeneous Functions, Approximate Calculations, Maxima and Minima of two and more independent variables, Lagrange's Method of Multipliers.

Unit 4: Differential Calculus II- Asymptotes (Cartesian co-ordinates only), Curvature, Concavity, Convexity and Point of Inflexion (Cartesian co-ordinates only), Curve Tracing (Cartesian and Standard Polar Curves).

Unit 5: Integral Calculus- Area of Curves, Rectification, Surface and Volume of Solids of Revolution, Double and Triple Integrals, Double Integral by changing into polar form, Area and Volume by Double Integration, Change of Order of Integration, Beta Function and Gamma Function (Simple Properties).

Text/Reference Books

1. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition
3. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House(New Delhi)
4. Integral Calculus, Shanti Narayan, S. Chand.
5. Differential Calculus, Shanti Narayan, S. Chand.
6. Ordinary and Partial differential equations, M. D. Raisinghania, S. Chand.
7. Calculus, Thomas & Finney, Narosa Publishing House(New Delhi).

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PHY 105: PHYSICS FOR ENGINEERS –I

Unit I: Basic Optics: Reflection of light, Refraction of light, total internal reflection and its applications, Refraction and dispersion of light through a prism. Wave front and Huygens's principle, reflection and refraction of plane wave at a plane surface using wave fronts. Young's double slit experiment and expression for fringe width, coherent sources. Optical fiber as optical wave-guide. Numerical aperture and maximum angle of acceptance.

Unit II: Interference of Light: Michelson's Interferometer: Production of circular & straight-line fringes, Determination of wavelength of light. Determination of wavelength. Newton's rings and measurement of wavelength of light. Elementary idea of anti-reflection coating.

Unit III: Polarization of Light: Plane circular and elliptically polarized light on the basis of electric (light) vector, Malus law. Double Refraction: Qualitative description of double refraction phase retardation plates, quarter and half wave plates, construction, working and use of these in production and detection of circular and elliptically polarized light. Optical Activity: Optical activity and law of optical rotation, specific rotation and its measurement using the bi-quartz device.

Unit IV: Diffraction of Light: Single slit diffraction: Quantitative description of single slit, position of maxima / minima and width of central maximum, intensity variation. Diffraction Grating: Construction and theory. Determination of wavelength of light using plane transmission grating. Resolving power: Geometrical & Spectral, Raleigh criterion, Resolving power of diffraction grating.

Unit V: Coherence & Laser: Spatial and temporal coherence, Coherence length, Coherence time and 'Q' factor for light. Temporal coherence and spectral purity, Theory of laser action: Einstein's coefficients, Components of a laser. Theory, Design and applications of He-Ne and semiconductor lasers.

Text/Reference Books

1. Optics, Ajay Ghatak, Tata McGraw Hill(Noida).
2. Optics, N. Subrahnmanyam & Brij Lal, S. Chand (New Delhi).
3. Feynman Lectures on Physics, Volume I, II & III, Perseus Books Group California Institute of Technology.
4. Fundamental of optics, white & jenkins , Tata McGraw Hil.
5. Optics, Eugene Heceht, Schaum series.

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BEE 101: BASIC ELECTRICAL AND ELECTRONICS

Unit 1:

Basic Electrical Quantities: -Basic concept of charge, current, voltage, resistance, power, energy and their units, Conversion of units of work, power and energy from one form to another. Electrical Energy: Difference between ac and dc and their applications, Classification of two terminal elements, Energy Sources, Source Transformation, ideal independent two terminal electrical sources.

DC Networks: Ohm's law, resistances, capacitances & inductors in series and parallel, Kirchhoff's laws and their applications in solving electrical network problems, Node Voltage and Mesh Current Analysis, Star-delta transformation.

Unit 2: Network theorems: Thevenin Theorem, Norton Theorem and Superposition Theorem, Statement and applications including dependent sources.

Transformer: Faraday's Law of Electromagnetic Induction, Construction and Operation of Single-Phase Transformer, EMF Equation, Voltage & Current Relationship and Phasor Diagram of Ideal Transformer.

Unit 3: AC Fundamentals: Concept of alternating current and voltage, Generation of Single -Phase AC Voltage, EMF Equation, Average, RMS and Effective Values Representation of alternating sinusoidal quantities by vectors, Phasor algebra (addition, subtraction, multiplication and division of complex quantities). RL, RC & RLC Series-Parallel Circuits, Complex Representation of Impedances, Reactance, Phasor Diagram, Power and Power Factor.

Unit 4: Review of Semiconductors: Semiconductors, conductors and insulators, intrinsic and extrinsic semiconductors and conduction in semiconductors**.**

Semiconductor Physics: Basic material properties of semi-conductors, governing factors for Fermi-level, carrier concentration and carrier mobility, recombination and carrier lifetime, carrier drift, diffusion, Hall effect and continuity equation.

Unit 5: Junction Diodes: Introduction, forward and reverse biasing of diode, voltage current characteristic of diode, diode models, half wave rectifier, full wave rectifier, Zener diode and its application.

Bipolar Transistor: Transistor structure, basic transistor operation, common base configuration and its characteristics, transistor amplifying action, common emitter configuration and its characteristics, common collector configuration, limit of operation, the dc operating point and biasing techniques (fixed bias, voltage divide bias, voltage feedback type, current feedback type, and combination of voltage and current feedback types)

Text/Reference Books

1. Integrated Electronics Analog and Digital Circuits & Systems, J. Millman & C.C. Halkias, McGraw Hill.
2. Electronic Devices and Integrated Circuits, B. P. Singh & Rekha Singh, Pearson Education.
3. Theory and problems of Basic Electrical Engineering, D.P. Kothari & I. J. Nagrath, PHI.
4. Basic Electrical Engineering, V.N. Mittal & A. Mittal, TMH.
5. Solutions of problems in Electrical Engineering, Smith Parker, CBS Publisher.
6. Electronics Devices & Circuit Theory, Boylestad & Nashelskey, Prentice Hall of India.

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BCSI101: Problem Solving and Programming in C

Unit 1: Introduction: -What is a program? What is a programming language? Steps in Programming, Skills needed to do programming, A little introduction to C, writing a Program, Fundamentals of a Programming Language, Different Programming Techniques, Procedural Programming, Modular Programming, Object Oriented Programming, Getting started with compiler**.** Words and Sentences in C Language: Alphabets in C, Keywords in C, Rules of forming Words in C language, Data Variables, Data Types and Rules for naming and declaring data, variables, Basic Data Types in C, Constants, Comments in C.

Unit 2: Instructions and Rules for Writing: -Types of instructions, Data Manipulation Instructions, Input/output Instructions, Flow Control Instructions: Decision Control Instructions, If, if-else, If-else-if, Nested if-else, Loop Control Instructions, For Loop, While Loop, Do While, Selection Instructions.

Unit 3: Functions: -Why use Functions, Components of Function, Name of a function, Body of a function, Local variables of a function, Parameters or Arguments to a function, Return Values, Prototype of a function. **Arrays:** What is an array? Array Declaration, Array Initialization, accessing individual elements of an array, Two Dimensional Arrays, passing an array element to a function, Rules of using an array.

Unit 4: Pointers: -What is a pointer? Declaring a Pointer variable, initializing a pointer variable, Using a Pointer Variable, Pointer Arithmetic, Pointers and array, passing an entire array to a function.
Strings: What are strings? String I/O, String Manipulation Functions.

Unit 5: Structures: -Declaring and Accessing Structure, variables Uses of Structures, Unions Storage Classes and Scoping: Automatic, Register, External, Static, Scope of a Variable File Input/Output: Command-line arguments, File Input and Output, Combining Command-line Arguments and File I/O.

Text/Reference Books

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice-Hall (New Delhi).
2. C Programming: A Modern Approach, K. N. King, Prentice-Hall (New Delhi).
3. C Primer Plus, Stephen Prata, Sams.
4. Practical C Programming, Steve Oualline, O'Reilly Media.
5. Let us C, Yashwant Kanetkar, BPB Publications.
6. Pointers in C, Yashwant Kanetkar, BPB Publications.

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PHY106: PHYSICS FOR ENGINEERS LAB–I

1. To determine the wavelength of sodium light by Newton's Ring.
2. To determine the wavelength of sodium light by Michelson Interferometer.
3. To determine coherent length and coherent time of laser using He-Ne Laser
4. To determine the specific rotation of Glucose (Sugar) solution using a Polari meter.
5. To determine the dispersive power of material of a prism for violet, red and yellow Color of Mercury light with the help of a spectrometer
6. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
7. To determine and verify the dispersive power of the plane transmission grating
8. To measure the Numerical Aperture of an Optical Fiber
9. To study the production of PPL, CPL and EPL light
10. Verification of resolving power of a telescope.

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BEE 102: BASIC ELECTRICAL AND ELECTRONICS LAB

Electrical Lab:

1. To verify Ohm's Law
2. Verification of Kirchoff's Law applied to the DC circuits.
   (a) Parallel and Series combination
   (b) Identification of node points
   (c) Algebraic sum of current at node points
   (d) Algebraic sum of e.m.f.s and voltage drops.
3. To construct a RLC series circuit and measure its impedance, inductive (X_L) and capacitive reactance (X_C), measure phase angle between voltage and current.
4. Make house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions.
5. Study the construction & basic working of ceiling fan. Connect ceiling fan along with regulator through auto-transformer to run and vary speed.
6. Study the construction and connection of single-phase transformer and auto-transformer. Measure input and output voltage and fin turn ratio.
7. Study the construction, circuit, working and application of the following lamps.

(a) Fluorescent Lamp, (b) Sodium Vapour Lamp (c) Mercury vapour lamp (d) Halogen Lamp

Electronics Lab:

1. Study the following devices:

(a) Analog & digital multimeters (b) Function/ Signal generators

(c) Regulated d. c. power supplies (constant voltage and constant current operations)

(d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.

2. Identification, testing and applications of Resistors, Inductors, Capacitors, PN-diode, SCR,TRAIC, Photo Diode, Zener diode, LED, LCD, BJT, Photo Transistor.
3. Plot V-I characteristic of P-N junction diode & Zener diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances. Application of Diode as clipper & clamper.
4. Plot input and output characteristics of BJT in CE configurations. Find its h parameters. Plot gain-frequency characteristic of emitter follower & find out its input and output resistances.
5. Study half wave rectifier and bridge rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.

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BCSI102: Problem Solving and Programming in C

Basic Calculation:

1. Write a c program to display your Name, address and city in different lines.
2. Write a c program to perform all arithmetic operations.
3. Write a c program to convert the Fahrenheit into centigrade. Formula c= (F-32)/1.8
4. Write a c program to calculate the simple interest.
5. Write a c program to calculate the compound interest.
6. Write a program in C to display sum of first N natural numbers.
7. Write a c program to find the roots of the quadratic equation.

Conditional Statements

1. Write a C – program which used to determine type of triangle based on sides. Measure of sides input by the user. To check whether the triangle is isosceles, scalene or equilateral triangle. Hint: If all the sides are equal than equilateral, If any two sides are equal than isosceles otherwise scalene.
2. Write a program in C to which allow user to enter any arithmetic operator (+ - * /) and two integer values and display result according to selection of operator.
3. Write a program in C to calculate gross salary of employee using : 1. Gross Salary = Basic Pay + DA + HRA – PF. 2. DA = 30% If Basic Pay < 5000 otherwise DA = 45% of the Basic Pay. 3. HRA = 15% of Basic Pay. 4. PF = 12% of Basic Pay. Only basic pay will input by the user. Display Gross salary – DA – HRA – PF and basic salary
4. Student should fulfill the following criteria for admission: Mathematics >= 50 Physics >= 45 Chemistry >= 60 Total of all subject >= 170 OR Total of Mathematics + Physics >= 120 Accept the marks of all the three subjects from the user and check if the student is eligible for admission.
5. Write a program in C for grade calculation using if…else if ladder and switch Statement. Accept marks of 3 subjects calculate total and based on it calculate Grade.

Loop Programs

1. Program to display first N prime numbers. N is input by the user.
2. Program to display A to Z in upper case or lower case according to user selection.
3. Program which used to print A to Z and Z to A.
4. Program which ask for party to user until the user say yes
5. Program which ask for party to user until the user say yes
6. Program which check that whether the given number is palindrome or not.
7. Program to check that the given number is Armstrong or not.
8. Program which will display next nearest prime number of given integer number. For example next nearest prime of 5 is 7, for 8 is 11, for 7 is 11 (Using Do while)

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BME 101: WORKSHOP PRACTICE

Carpentry Shop

1. T – Lap joint
2. Cross lap joint

Welding Shop

1. Gas welding practice by students on mild steel flat
2. Lap joint by gas welding
3. Arc welding practice by students
4. Square butt joint by Arc welding

1. Job on lathe with one step turning and chamfering operations
2. Job on lathe with Facing and knurling operations
3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping
4. Grinding a corner of above job on bench grinder

1. Finishing of two sides of a square piece by filing
2. To cut a square notch using hacksaw and to drill three holes on PCD and tapping

Text/Reference Books

1. Workshop Practice, K. C. JOHN, PHI Learning Pvt. Ltd.
2. Modern Workshop Technology, Henry Wright, BAKER Cleaver-Hume Press.
3. Workshop Technology, Hajra, Chaudhary, Media promotors & publishers pvt. Ltd.
4. Workshop Technology, B.S. Raghhuwanshi, Dhanpat Rai & Company (p) Limited.
5. Workshop Technology, Virendra Narula, Kataria & sons publications.
6. Comprehensive Workshop Technology, S.K. Garg, Laxmi Publications.

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BCS1103: IT WORKSHOP

List of Practical

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. DOS Basic Commands
4. Exercises on entering text and data (Typing Practice)
5. Installation of Windows Operating System using pen- drive, CD & Virtual Machine
6. MS-WORD
    a. File Management: Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, giving password protection for a file
    b. Page set up: Setting margins, tab setting, ruler, indenting
    c. Editing a document: - Entering text, Cut, copy, paste using tool- bars
7. Work books:
    a. Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula, creation and links, controlling calculations, working with arrays
    b. Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet.
    c. Creating a chart: -Working with chart types, changing data in chart, formatting a chart, use chart to analyze data

8. MS-Excel: -
    a. How to change view of worksheet, outlining a worksheet, customize workspace, using templates to create default workbooks, protecting work book
    b. Exchange data with other application: linking and embedding, embedding objects, linking to other applications, import, and export document.

9. Internet and its Applications
    (a) Log-in to internet
    (b) Navigation for information seeking on internet
    (c) Browsing and down loading of information from internet
    (d) Sending and receiving e-mail

- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another Conversion between different text editors, software and MS word

8. MS-EXCEL

- Starting excel, open worksheet, enter, edit, data, formulas to calculate values, format data, create chart, printing chart, save worksheet, switching from another spread sheet

- Menu commands- create, format charts, organize, manage data, solving problem by analyzing

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ENG 113: Soft skills and Self Awareness

1. Self-Awareness

What is Self-Awareness? Introspection, Guide to Self-Awareness and Self Analysis, SWOT Analysis on self

2. Confidence Building

What is Confidence? Important of Confidence Building, 6-steps guide on building Self – Confidence

3. Goal Setting

Purpose of Goal Setting, Importance of Goal Setting, SMART Goals, Performance Goals and Result Goals

4. Professional Grooming and Basic Etiquette

First Impressions, Importance of Professional Grooming, Grooming Guide – Men/ Women, Introduction to Basic Etiquette, Classroom Etiquette/Restroom Etiquette/Telephone Etiquette, General Etiquette

1. Sentence Formation

Using Noun/Types of Noun, Verbs & its usage, Tense chart using Verbs, Subject-Verb Agreement

2. Paragraph Writing

Three Essential Elements, Illustration & Application of the Three Elements, how to write an Effective paragraph.

What is Rapid Reading? Importance of Rapid Reading, Simplifying Rapid Reading, Rapid Reading Passages

Why is Public Speaking important? Three parts to Public Speaking explained, Guide to successful Public Speaking

What is Time Management? Importance of Time Management, Managing Time Effectively, Blocks to Effective Time Management

Stress and its Causes, Symptoms of Unmanaged Stress, Managing Stress, Benefits of Stress Management

7. Presentation Skills

Types of Presentation Communication, A Beginner's Guide to PowerPoint 2013, 4 P's, Delivering

8. The Colorful World of Adjectives

Types of Adjectives, Use of Adjective in Sentences, Descriptive Adjective for You.

Text/Reference Books

1. Business communication Design, Angell, Pamela, Mcgraw-Hill, New York.
2. Grammar Finder, Eastwood, John, Oxford university press.
3. Effective technical communication, Mitra, K. Barun, Oxford university press.
4. Communicate to conquer: A handbook of group discussion and interviews, PHI learning, New Delhi.

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ENG 106: PROFESSIONAL ENGLISH

Unit 1: Fundamentals of Communication- Introduction, Definition, Process, Importance, Different Forms and Purpose of Communication, Barriers to Communication, Organizational and Interpersonal Communication

Unit 2: Group Discussion- Introduction to Group Discussion, Types, Roles and Functions in Group Discussion, Difference between GD and Debate, Preparation Strategy, Tips for a good GD.

Unit 3: Presentation- Fundamentals of Presentation, Audience Analysis, Organizing Material, Visual Aids and Nuances of Delivery, Body language and Effective Presentation, Question- Answer Session

Unit 4: Professional Writing- Official Correspondence – Drafting E- mails, Memorandum, Notice, Agenda, Minutes, Circulars, Business Correspondence-Business letter writing- Sales letters, Enquiry letters and replies to enquiry (enquiry about a product, service or information, asking for a quotation, placing an order and replies to the same) letters of Claim and Adjustment

Unit 5: Technical Writing- Report Writing- General and Technical report, Definition, Types, structure, Technical proposals- Definitions, Types and Format

Text/Reference Books

1. Communication Skills, Pushp Lata & Sanjay Kumar.Oxford Higher Education/Oxford University Press.
2. Technical Communication; Principles and Practice, Meenakshi Raman & Sangita Sharma,Oxford University Press.
3. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw-Hill Education
4. Basic Communication Skills for Technology, Andrea J. Rutherford, Peerson Education Asia

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MAT 103: ENGINEERING MATHEMATICS II

Unit 1: Matrices- Rank of a matrix, Rank of matrix by reducing to normal forms, Consistency and redundancy of systems of simultaneous linear equations and its solution, Eigen values and Eigen vectors, Cayley- Hamilton theorem (without proof), Diagonalization of matrix.

Unit 2: Differential Equations- Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (complementary functions only), Partial Differential Equations of First Order: Lagrange's Form, Standard Forms, Charpit's Method.

Unit 3: Coordinate Geometry of Three Dimensions- Equation of a sphere, Intersection of a sphere and a plane, tangent plane, Intersection of two spheres, orthogonality of two spheres, Right circular cone, Right circular cylinder.

Unit 4: Vector Calculus- Scalar and vector fields, Differentiation and Integration of vector functions, Directional derivatives, Gradient, Divergence and Curl.Line, Surface and volume Integrals. Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications

Unit 5: Statistics and Probability- Elementary theory of probability, Baye's theorem with simple applications, theoretical probability distributions: Binomial, Poisson and Normal.

Text/Reference Books

1: Analytic Solid Geometry, Shanti Narayan (S.Chand).
2: Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9thEdition.
3: Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.
4: Advanced Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya.
5: Vector Analysis, M.D.Raisinghania (S.Chand).
6: Advanced Engineering Mathematics, Jain and Iyenger, Narosa.
8: Probability,Statistics and Queueing theory:Allen.
9: Statistical Methods (Vol. I & II), N.G.Das, TMH.
10: Schaum's Outline Series for Vector Calculus.
11: Schaum's Outline Series for Matrices.
12: Engineering Mathematics-II by C.B. Gupta and A .K. Malik, New Age International Pvt. Ltd.
13: Higher Engineering Mathematics, B.V.Ramana, Tata McGraw Hill.14: Probability, Statistics and Queueing theory, V.Sundrapandian, PHI.

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PHY 107:PHYSICS FOR ENGINEERS -II

Unit I: Special Theory of Relativity: Postulates of special theory of relativity, Lorentz transformations, Relativity of length, mass and time. Relativistic velocity addition, mass-energy relation. Relativistic Energy and momentum.

Unit II: Quantum Mechanics: Compton Effect & quantum nature of light. Schrodinger's Wave Equation: Time dependent and time independent cases. Physical interpretation of wave function and its properties, boundary conditions.
Applications of Schrodinger's Equation: Particle in one-dimensional box. Particle in three-dimensional boxes. Degeneracy, Barrier penetration and tunnel effect, Alpha Decay.

Unit III: Metals and Superconductors: Summerfield's Free electron gas model: Postulates, Density of energy states, Fermi energy level, Band Theory of solids.
Superconductivity: Qualitative study of the phenomenon-meissner's effect-Josephson effect Type I & II super conductor.

Unit IV: Electro Dynamics: Scalar and Vector fields, Definitions of gradient Divergence and curl, Maxwell's Equations.

Unit V: Nuclear Radiations Detector: - Nuclear radiations detector: Principle of Gas filled detector. Proposnal counter,G M counter,Scintillation counter.

Text/Reference Books

1. Concept of Modern Physics, Arthur Beiser, Tata McGraw Hill (Noida).
2. Introduction to Solid State Physics, C. Kittel, Wiley Editions(New Delhi).
3. Introduction to Electrodynamics, John D. Griffith, Tata McGraw Hill(Noida).
4. Electromagnetics, Sadiku, Oxford university Press(New Delhi).
5. QuantumMechanics, Ghatak & Loknathan,Tata McGraw Hill (Noida).

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CHY 103: ENVIRONMENTAL SCIENCE

Unit 1: Introduction and natural resources: Multidisciplinary nature and public awareness, renewable and nonrenewable resources and associated problems, forest, water, mineral, food, energy and land resources. Introduction to natural resources, conservation of natural resources and human role.

Unit 2: Ecosystem: Ecological concepts, concept of ecosystems, types of ecosystems, ecosystem structure and functioning, energy flow, food chains and food webs, ecological pyramids.

Unit 3: Biodiversity and Conservation: Definition, genetic species and ecosystem diversity biogeographically, classification of Indian value of biodiversity at national and local levels, India as a mega-diversity nation, treats to biodiversity and endangered and endemic species of India, need for conservation of biodiversity.

Unit 4: Environmental pollution: Definition, causes, effect and control of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, electromagnetic pollution, nuclear hazards, human role in prevention of pollution, solid waste management, disaster management, floods, earthquake, cyclone, and landslide

Firework Safety: Combustion of firework and pollution (noise, smoke, fireworks fallout and residue pollution), heavy metal toxicity due to fireworks and associated health effects.

Unit 5: Social Issue and Environment: Unsuitable to suitable development, urban problem related to energy and water conservation, environment protection act, wild life protection act, forest conservation act, environmental issues, population explosion, and family welfare programme. Environmental and human health HIV, women and child welfare, role of information technology on environment and human health.

Corruption: definition and reasons, details of organizations/agencies working against corruption, role of individual against corruption and mode of action.

Ethics : Meaning , nature, determinants and objectives of ethics, ethics and its relation to values norms and morals, Indian ethos, Swami Vivekananda and ethics.

Text/Reference Books

1. Fundamentals of Environmental Biology, K. C. Agrawal, Nidhi Publishers(Bikaner).
2. Fundamentals of Ecology, E.P. Odum, W.B. Saunders Co. (USA).
3. Fundamentals of Ecology, E. P. Odum, Natraj Publisher (Dehradun).
4. Ecology: Principles and Applications, J. L. Chapman & , M. J. Reiss, Cambridge University Press.
5. Atmospheric pollution, W. Buch , Tata McGraw Hill(TMH)
6. Professional Ethics and Human Values, M. Govindarajan, PHI Learning Private Limited (Delhi).
7. Corruption and Reform in India, Jennifer Bussell , Cambridge University Press.

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BCSI201: DESIGN THINKING

Course Objectives:

- The human centered design process focuses on understanding and empathizing with the users and the context, and then on defining the users' needs in an actionable way.
- After developing a design paradigm, the process engages the first of many cycles of rapid experimentation, prototyping, and testing with users to drive the evolution of a solution that most effectively satisfies user's needs.

Course Outcomes:

Understand how teaching and learning occurs in the design process

- Recognize the ethical and social dilemmas and obligations of the practice of design
- Diagnose common adoption barriers in individuals, groups and organizations.
- Develop a design theory from independent and qualitative research and observations.
- Participate in and lead innovation in creative and collaborative settings
- Undertake complex and unstructured problem-solving challenges in unfamiliar domains

Unit I: Design Thinking

Foundations of Human Centered Design, Barriers to Innovation and Adoption, Learning by Doing, Understanding Needs in Context.

Unit II: Design Needs and Interventions

The Ethics of Design Interventions, Design Needs in Education, Engineering and Health & Society.

Unit III: Empathy in Design

Discovering Explicit and Latent Needs, Qualitative Research: Watching and Listening, Point of View & Problem Reframing, Developing Grounded Theory, Design for Usability

Unit IV: Ideation, Experimentation and Evolution

Generating and Developing Ideas, Creativity as Teaching and Learning, Prototyping and testing Learning Through Things & Interactions, Express, Test, Cycle

Unit V: Design Documentation

Representing Design Knowledge, Diffusion of Innovation, Design as research

Textbooks:

1. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value,byThomas Lockwood,Allworth Press, 2010.
2. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization Book by Vijay Kumar.

Reference Books:

1. Design Thinking: Understand – Improve – Applyedited by Hasso Plattner, Christoph Meinel, Larry Leifer, Springer Science & Business Media, 2010

***Latest editions of all the suggested books are recommended.**

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BCSI202: Web Designing

UNIT I

Introduction to the Internet and the World Wide Web

Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture

Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST.

UNIT II

HTML & CSS

Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.

Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing.

UNIT III

XML and HTML5, CSS3

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.

UNIT IV

Introduction to HTML5, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers.

UNIT V

PHP Server side scripting

Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment & environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples.

Books:

1. Practical Web Design for Absolute Beginners, Adrian W. West. Apress 2016
2. Introducing Web Development, Jorg Krause. Apress 2017.
3. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010
4. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O'Reilly
5. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009.
6. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
7. HTML5 & CSS3 for the Real World, 2 Edition, Alexis Goldstein, Estelle Weyl, Louis Lazaris. Apress 2015.
8. HTML5 & CSS3 for Dummies, Andy Harris. Wiley 2014.
9. Learning PHP A Gentle Introduction to the Web's Most Popular Language, David Sklar. O'Reilly 2016.
10. Build Your Own Database Driven Web Site Using PHP & MySQL, Kevin Yank. Sitepoint , 4th Edition, 2009.

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ENG 107: COMMUNICATION TECHNIQUES LAB

1. Phonetic Symbols and Transcriptions
2. Methods of Word Formation
3. Reading, Listening and Speaking Skills
4. Seminar Presentation
5. Group Discussion
6. Job Interview

Text / Reference Books

1. Advanced Manual for Communication Laboratories and Technical Report Writing, D.Sudha Rani, Pearson,(New Delhi)
2. A Course in Phonetics and Spoken English, J. Sethi & P.V. Dhamija, PHI Learning Pvt. Ltd.
3. English Language Laboratories: A Comprehensive Manual, Nira Konar, PHI Learning Pvt. Ltd.
4. Oxford English Learning Package (with CDs: Headway Series)
5. Tata McGraw Hills English Learning Package (with CDs)
6. Oxford Advanced Learners' Dictionary, Oxford University Press (New Delhi)

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PHY 108: PHYSICS FOR ENGINEERS LAB–II

1. To study the charging and discharging of a condenser and hence determine time Constant (both current and voltage graphs are to be plotted).
2. To determine the high resistance by method of leakage, using a Ballistic Galvanometer.
3. To study the variation of semiconductor resistance with temperature and hence determine the band gap of semiconductor in the form of reverse biased P-N junction diode.
4. To determine the ferromagnetic constants retaintivity, coercivity, permeability, susceptibility by tracing I.H. curve using C.R.O.
5. Frequency Determination - Melde's Method.
6. To determine the specific resistance of the material by Carey Foster Bridge.
7. To convert a Galvanometer in to an ammeter of given range and calibrate it.
8. To convert a Galvanometer in to a voltmeter of given range and calibrate it.

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BCSI203: WEB DESIGNING LAB

Practical website development

1. Design a simple web page with head, body and footer, with heading tags, image tag
2. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page.
3. Design a page to display the product information such as name, brand, price and etc with table tag
4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.
5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.
6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.
7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division using form elements and Java Script.
8. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements and display them into other pages using Java Script.
9. Design a web page to display timer in the left side of the web page using Java Script.
10. Design a web page to capture the student details such as student number, name, age, marks using Java Script Object.
11. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.
12. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Product details page
13. Design a web site for Student details using PHP, web site should contain the following web pages.
    - Home page
    - Login page
    - Signup page
    - Student details page

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BCSI204: COMPUTER AIDED GRAPHICS

Introduction: Principles of drawing, conventional representation of machine components and materials,
lines, types of lines, dimensioning types, rules of dimensioning, Computer aided drafting: Introduction to computer aided drafting, advantages and applications of CAD, concepts of computer aided drafting using AutoCAD, basic drawing and modify commands.
[Discuss on AutoCAD software and to draw in Sketch book]

Isometric Projections: Isometric projection of planes and solids. [At least 3 Problems in AutoCAD and 3 problems in Sketch book]

Orthographic Projection: Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection.
[At 4 problems on AutoCAD and 4problems in sketch book]

Section of solids: Introduction to sectional views, Section of right solids by normal and inclined planes. [At least 2 problems on AutoCAD and 2problems in sketch book]

Conventional representation of materials: Common features, Springs, Gear Assemblies, Materials, Interrupted views and Braking of Shaft, Pipe, Bar, Surface finishing & Machining Symbols
[At least 2 problems on AutoCAD and 2 problems in sketch book]

Miscellaneous: Welded joints, riveted joints, Belt and pulleys, screw fasteners, Bearings; Ball, roller, needle, foot step bearing Belt and pulleys, pipe joints.
[At least one problem from each on AutoCAD and sketch book preparation of all topics]

Text/Reference Books

1. N.D. Bhatt, Elementary Engg. Drawing, Chartor Pub. House, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..
3. P.S. Gill, Engineering Graphics.
4. N.D. Bhatt, Machine Drawing, Chartor Publishing house, Anand, India.
5. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
6. Fredderock E. Giesecke, Alva Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing.

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ENG 114: SOFT SKILLS AND COMMUNICATION

1. Communication for Impact

Importance and Types of Communication, 6 Steps Model of Communication, Guide to Effective Communication – Listening Skills, Successful Communication at Workplace.

2. Interpersonal Relationship Management

Importance of Interpersonal Relationship (IPR), Benefits of IPR, Developing Interpersonal Abilities.

3. Team Building

Definition and Types, Team work skills, Qualities of a Team Player.

4. Leadership

Understanding the qualities of a Good Leader, 4 Factors of Leadership, Bring out the Leader in You.

5. Resume Writing

Concepts of Resume, Curriculum Vitae and Bio-data, Resume – Information and Details, Sample Resume and Template.

6. Cover Letter

Cover letter Writing, Sample Cover letter and Template.

7. Personal Grooming and Interview Etiquette

Basic Personal Hygiene, Professional Attire – Men, Professional Attire – Women, Interview Etiquette Guide.

8. Telephonic Interview

Importance and Preparation, Advantages and Disadvantages, Things to Remember.

9. Video Interview

Preparation and Practice, Guide to a Successful Video Interview.

10. Group Discussion

Group Discussion Guide, Topics for Group Discussion, Mock GD.

11. Personal Interview

Importance and Types of Personal Interviews, FAQs with Answers.

12. Extempore

Guide to a Successful Extempore, Extempore Topics.

Text/Reference Books

1. Business communication Design, Angell, Pamela, Mcgraw-Hill, New York.
2. Grammar Finder, Eastwood, John, Oxford university press.
3. Effective technical communication, Mitra, K. Barun, Oxford university press.
   Communicate to conquer: A handbook of group discussion and interviews, PHI learning, New Delhi.

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Scheme of Instruction & Syllabi
of
Bachelor of Technology
(Computer Science and Engineering)
With specialization in Cloud Computing

(With effective from academic session 2023-24)

(Dr. Gaurav Agarwal)
HOD CSE

(Prof. R.K. Shukla)
Dean Engineering & Technology

(Prof. Y D S Arya)
Vice- Chancellor

Department of Computer Science and Engineering
INVERTIS UNIVERSITY
Invertis Village, Bareilly-Lucknow NH-24, Bareilly,
243123 U. P.

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering
with specialization in Cloud Computing
YEAR II, SEMESTER III

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Basic Science Course	BCSI301	Statistics and Probability	3	1	0	30	70	100	4
2	Engineering Science Course	BCSI302	Digital Electronics	3	1	0	30	70	100	4
3	Professional Core	BCSI303	Data Structures using C	3	0	0	25	50	75	3
4	Professional Core	BCSI304	Object Oriented Programming with Java	3	0	0	25	50	75	3
5	Professional Core	BCSI305	Database Management System	3	0	0	25	50	75	3
6	Engineering Science Course	IIOT3	Smart Industrial Connectivity	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
6	Humanities & Social Sciences including Management	BCSI306	Communication Skills	0	0	2	10	15	25	1
7	Professional Core	BCSI307	Data Structures using C Lab	0	0	2	10	15	25	1
8	Professional Core	BCSI308	Object Oriented Programming with Java Lab	0	0	2	10	15	25	1
9	Professional Core	BCSI309	Database Management Systems Lab	0	0	2	10	15	25	1
10	ST	BCSI310	Summer Project Seminar-I	0	0	2	10	15	25	1
			TOTAL	19	2	10	215	435	650	26

L-Lecture, **T**- Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE**- End Semester Examination

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering with specialization in Cloud Computing
YEAR II, SEMESTER IV

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Professional Core	BCSI401	Design and Analysis of Algorithms	3	0	0	25	50	75	3
2	Professional Core	BCSI402	Operating System	3	0	0	25	50	75	3
3	Professional Core	BCSI403	Computer Organization and Architecture	3	0	0	25	50	75	3
4	Professional Core	BCSI404	Computer Networks	3	0	0	25	50	75	3
5	Professional Core	BCSICT401	Information Security	3	0	0	25	50	75	3
6	Professional Core	BCSICT402	Storage and Datacenter	3	0	0	25	50	75	3
7	Engineering Science Course	IIOT4	Data Analytics for IIOT	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Professional Core	BCSI405	Design and Analysis of Algorithms Lab	0	0	2	10	15	25	1
8	Humanities & Social Sciences including Management	BCSI406	Employability Skills	0	0	2	10	15	25	1
9	Professional Core	BCSI407	Computer Network Lab	0	0	2	10	15	25	1
10	Professional Core	BCSI408	Operating System Lab	0	0	2	10	15	25	1
11	Professional Core	BCSICT403	Storage and Datacenter Lab	0	0	2	10	15	25	1
			TOTAL	22	0	10	230	445	675	27

L-Lecture, **T**- Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE**- End Semester Examination

BCSI301: STATISTICS AND PROBABILITY

L T P C
3 1 0 4

Course Objective:

- To understand the basic concepts of statistics and probability.
- To understand the description of data using statistical techniques
- To understand the statistical methods involved in hypothesis testing
- To understand the difference between parametric and non-parametric tests
- To understand the random variables, statistical expectation and its statistical and mathematical properties.
- To understand the concepts of regression and correlation analysis.

UNIT -I

Introduction to Statistics and Probability

History and evolution of statistics, types of data, important terminologies, contingency table, frequency and cross table, graphs, histogram and frequency polygon, Random variables, statistical properties of random variables, Expectation, , jointly distributed random variables, moment generating function, characteristic function, limit theorems, probability, trial, events, types of events, apriori probability, limitations of classical probability, statistical or empirical probability, axiomatic approach to probability, probability function, theorems on probabilities of events, law of probability theory, Bayes theorem, application of Bayes Theorem

UNIT- II

Measures of Central Tendency and Dispersion

Descriptive Statistics, Mean: Arithmetic, Geometric and Harmonic means, mathematical relationship among different means, median for raw data and grouped data, mode for raw data and grouped data, relationship among mean, median and mode, measure of dispersion – standard deviation, variance, covariance and its properties, coefficient of variation, quartiles, quartile deviation and mean deviation, Mean absolute deviation.

UNIT -III

Testing of Hypothesis:

Introduction to testing of hypothesis, Statistical assumptions, Level of significance, confidence level, Type I Error, Type II error, Critical value, power of the test, Application of small sample test – t and F test, Large Sample test – Z test in Data Science Industry with small use cases (application oriented).

UNIT -IV

Analysis of Variance (ANOVA):

Introduction to general linear model, assumptions of ANOVA, factors and levels in ANOVA, layout of one way ANOVA, skeleton of one way ANOVA, multiple comparison of sample means, one way analysis of variance with unequal sample sizes, two factor

analysis of variance – introduction and parameter estimation, two way analysis of variance with interaction, Post ANOVA: testing of hypothesis for significance of mean using Fishers Least Significance Difference test (lsd), Tukeys test, Dunnet test, Duncan Multiple Range test.

UNIT -V

Regression and Correlation:
Introduction to linear model, concepts of factor, effect, residuals, dependency, independency, assumptions of linear model, estimation of parameters using OLS, properties of regression coefficients, Spurious regression concepts, significance of regression coefficients using t test and F test, concepts of auto correlation, multiple linear regression analysis, multi collinearity, heteroscedasticity, significance of estimated parameters in multiple linear regression, partial test for the individual significance, correlation analysis, properties of correlation coefficients, significance of single correlation coefficient, significance of multiple correlation coefficients, concepts of multiple correlation and partial correlation.

Text Books:

1. *Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi.*

Reference Books:

1. *Introduction to probability Models, Ninth Edition – Sheldon M. Ross, Elsevier Publication, Academic Press, UK*
2. *Introduction to Probability and Statistics for Engineers and Scientists, Third Edition - Sheldon M. Ross, Elsevier Publication, Academic Press, UK.*
3. *An introduction to Probability and Statistical Inference – George Roussas, Academic Press.*

Course Outcome:

- Understand the importance of statistics in different research areas.
- Understand the basic concepts of Statistics and its evolution.
- Understand the suitable statistical measures to describe and summarize the data.
- Understand the application of statistical test to appropriate research environment.
- Understand the basic concepts of probability and its applications.
- Understand the application of regression analysis in finding the expected values.

BCSI302: Digital Electronics

L T P C
3 1 0 4

Course Objective:

- Understand concepts of combinational and sequential circuits.
- Analyze the synchronous and asynchronous logic circuits.
- Understand concepts of memory, programmable logic and digital integrated circuits.
- Design Combinational and sequential systems.

UNIT -I

Basic Concepts, Boolean algebra, Theorems and Functions

Number Systems: Decimal number system, binary number system, octal number system, hexadecimal number system, BCD number system, Excess-3 code, Gray code, Alpha numeric code, error detecting and error correcting codes. Arithmetic: Arithmetic number representation, Binary arithmetic, Hexadecimal arithmetic, BCD arithmetic. Boolean algebra and Theorems: Logic gates and logic operations, Boolean theorems and postulates, SOP's & POS's, Minterms and Maxterms. Minimization of Boolean Functions: Algebraic simplification, Karnaugh map simplification, Quine-Mc Cluskey or Tabulation method.

UNIT- II

Logic Gates

Logic Families: Metal Oxide Semiconductor logic families- switching properties of NMOS and PMOS transistors, static NMOS, dynamic NMOS, Static CMOS and dynamic CMOS logic families, CMOS Transmission gate circuits, Bipolar logic families- switching properties of NPN and PNP transistors, TTL, Schottkey TTL, Comparison of MOS logic circuits(CMOS) with that of a TTL digital circuit, Tristate gates. Electrical characteristics: Meanings of speed, propagation delay, operating frequency, and power dissipated per gate, supply voltage levels, operational voltage levels of various logic families.

UNIT -III

Combinational Systems

Binary arithmetic units (Adder, Subtractor, n-bit parallel adder & Subtractor, look ahead carry generator), decoder, encoder, multiplexer, Demultiplexer, code converters, Magnitude comparators, parity generators. Implementation of combinational logic by standard IC's.

UNIT -IV

Sequential Systems

Flip-flop and Latch: SR latch, JK flip-flop, T flip-flop, D flip-flop and latch, Master-slave RS flip-flop, Masterslave JK flip-flop, asynchronous inputs. Registers & Counters: Shift registers (SISO, SIPO, PISO, PIPO), universal shift register. Counters Asynchronous/Ripple counters, Synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter, asynchronous clear, preset and load in a counter, synchronous clear, preset and load in a counter, typical IC's for counters. Synchronous (Clocked) sequential circuits: Moore and Mealey state machine circuits, Analysis & design of synchronous sequential

circuits – State machine design with SM charts.

UNIT -V

Memory and Programmable Logic

RAM, memory decoding, ROM, PROMs, PAL & PLA, Sequential Programmable Devices (discuss three major devices without going into their detailed construction).

Text Books:

1. *Morris Mano M, Michael D. Ciletti, "Digital Design", Pearson Education, 4th Edition, 2007.*
2. *Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", Cengage Learning India Edition, 5th Edition, 2010.*
3. *Floyd and Jain, "Digital Fundamentals", Pearson Education, 8th Edition, 2007.*

Reference Books:

1. *Ronald J. Tocci, "Digital Systems: Principles and Applications", Pearson Education, 10th Edition, 2009.*
2. *Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications", Tata McGraw Hill, 6th Edition, 2008.*

Course Outcome:

- Understand different number systems and its inter-conversions.
- Understand the concept of Boolean algebra and its different theorems, properties etc.
- Understand simplification of Boolean functions.
- Understand the construction and working of different combinational circuits etc.
- Understand different flip-flops and its applications.
- Understand different sequential logic circuits and basic design of sequential circuits and counters.
- Understand different types of memories and its applications.

BCSI303: Data Structures using C

L T P C
3 0 0 3

Course Objective:

- A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently.
- Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks.
- This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

UNIT -I

Introduction to Data structures
Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: Malloc(), Calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

UNIT- II

Searching and Sorting
Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort.

UNIT -III

Stack and Queue
Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (DEQUE), Priority queue, Operations on all types of Queues.

UNIT -IV

Linked List
Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

UNIT -V

Tree Graphs and their Applications:

Definition: Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Pre-order, In-order and post-order. Graphs, Application of Graphs, Depth First search, Breadth First search.

Text Books:

1. *Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001.*
2. *Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill.*
3. *Robert Kruse Data Structures and program designing using 'C'.*
4. *Trembley and Sorenson Data Structures.*

Reference Books:

1. *E. Balaguruswamy Programming in ANSI C.*
2. *Bandyopadhyay, Data Structures Using C Pearson Education, 1999*
3. *Tenenbaum, Data Structures Using C. Pearson Education, 200*
4. *Kamthane: Introduction to Data Structures in C. Pearson Education 2005.*
5. *Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006.*
6. *Langsam, Ausenstein Maoshe & M.Tanenbaum Aaron Data Structures using C and C++ Pearson Education.*

Course Outcome:

- Students will benefit from the knowledge of Data Structures and different operating one can perform on these like searching, sorting, stacking and etc.
- This forms a very strong foundation for programming in different languages that the students will take up in subsequent semesters or in any other course.

BCSI304: Object Oriented Programming using Java

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Course Objective:

- Object oriented programming is the most efficient and proven technique for developing reliable software.
- It provides features such as increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent.
- There are many languages which used the object-oriented concepts and techniques to develop real time software. Such programming languages are C++, Java, Smalltalk, Objective-C, etc.
- This course provides students with an understanding of the object-oriented concepts which helps in the field of programming, management of data, etc.

UNIT -I

Introduction to Java

Introduction, installing java, JRE and JDK, Byte Code, JVM; Simple Java program. Creating Objects, Data types, Operators: Arithmetic Operators, Bitwise operators, Relational operators, Logical Operators, The Assignment Operator, ternary operator; Operator Precedence, Access specifiers. Type casting; Strings. Control Statements: conditional statements, looping statements, jumping statements, methods, static methods, and static block, Arrays

UNIT- II

Classes, Inheritance, package and Interface

Classes: Classes in Java; declaring a class; constructors, method overloading, Object Class.
Inheritance: Simple Inheritance, Super class and sub class, super keyword multiple, and multilevel inheritance; Overriding.
Packages and Interfaces: Packages, Defining Packages, access protection, Importing Packages. Abstract Methods, Abstract Classes, Defining Abstract Classes, Extending Abstract Classes, Defining Interfaces, Implementing Interfaces Lambda Expressions Introducing Lambda Expressions, Lambda Expression Fundamentals, Functional Interfaces, Some Lambda Expression Examples, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments.

UNIT -III

Thread Programming, Exceptions and I/O

Thread Programming: What are threads? Thread life cycle, Extending Thread class, implementing runnable interface, Synchronization, Deadlock, Manipulation Thread states.
Exception Handling: Fundamentals, Exception Types, try and catch, multiple catch clauses,

nested try statements, throw, and throws, finally, built in exceptions, user defined exceptions and chained exceptions.

I/O: Introduction, stream classes, Byte Streams, Character Streams, Reading Data from Keyboard, Folders and Folder Operations, Files and File Operations, Serialization and Deserialization.

UNIT -IV

Networking and JDBC

Networking: Introduction, Socket, Client/Server architecture, Reserved Sockets, Proxy Servers, Internet Addressing, Factory Methods, Instance Methods, TCP/IP Client Sockets : URL,URL Connection, TCP/IP Server Sockets, Datagrams, Datagram Sockets, Inet4Address and Inet6Address, RMI: Stub, Skelton.

Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: types and methods. An example - JDBC application to query a database

UNIT -V

GUI Programming with AWT and JavaFX

AWT: GUI Programming, AWT Basics, AWT package: Layouts, Label, TextField, Button, Events, TextArea, CheckBox, CheckBoxGroup, List, Canvas, Menus, Pop Menus, Panel, And Dialog. Listeners: ActionListener, MouseListener, ItemListener, KeyListener, WindowListener JavaFX: Basic Concepts, JavaFX Packages, Stage and Scene Classes ,Nodes and Scene Graphs, Layouts, Application Class and the Lifecycle Methods, Compiling and Running a JavaFX Program, JavaFX Control: Label, Buttons and Events, Event Handling, Button, ToggleButton, RadioButton, Image, ImageView, ListView, Combo-Box, Menus, Toolbar, Case Study .

Text Books:

1. *Herbert Schildt: Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.*
2. *Jim Keogh: J2EE The Complete Reference, Tata McGraw Hill, 2007.*

Reference Books:

1. *Y. Daniel Liang: Introduction to JAVA Programming, 6th Edition, Pearson Education, 2007.*
2. *Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education, 2006.*

Course Outcome:

- Read and understand Java-based software code of medium-to-high complexity.
- Use standard and third party Java's API's when writing applications.
- Understand the basic principles of creating Java applications with graphical user interface (GUI).
- Understand the fundamental concepts of computer science: structure of the computational process, algorithms and complexity of computation.
- Understand the basic approaches to the design of software applications.
- Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes.

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BCSI305: Database Management System

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Course Objective:

- A database management system (DBMS) is collection of software meant to manage a Database.
- Many popular databases currently in use are based on the relational database model.
- RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more.
- The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

UNIT -I

Introduction

Purpose of Database System -– Views of data – Data Models – Database Languages — Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases.

UNIT -II

Relational Model-I

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals. Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables. Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL.

UNIT -III

Relational Model-II

Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User Integrity – Triggers - Security – Advanced SQL features –
Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases.

UNIT -IV

Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT -V

Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery – Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock-Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

Text Books:

1. *Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006*
2. *Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley, 2007.*

Reference Books:

1. *Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.*

Course Outcome:

- Students will learn how to write queries, transactions and different modeling techniques in relational database.

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BCSI306: Communication Skills

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List of Activities:

Sl. No.	Particulars	Purpose
01	Work on Vocabulary	To have the knowledge of essential vocabulary
02	Correct Grammar	To practice the use of correct Grammar
03	Communication Circles	To highlight that there are different levels of sharing information and that you need to decide which level is the most appropriate for any given situation.
04	Circle, Square, Triangle or Z	To allow students to share a little about themselves with the group as part of the introductions to one another.
05	Colour Block	To emphasize what happens when we are presented with too many contradictory messages at the same time.
06	Power of Body Language	To enhance the importance of Non-verbal communication
07	Repeat the question	To illustrate how our expectations concerning communications can sometimes cause us to say the wrong things
08	Quick Answers	To illustrate how we sometimes jump to incorrect conclusions because of the way that information is presented to us
09	Creative Fairy Tale	To challenge the creativity of students to come up with a solution that would be acceptable to each person involved in the issue
10	Communication Shutdowns	To emphasize how certain statements can have a negative effect on any discussion or further meaningful communications that may have otherwise followed.
11	Drafting a Memo/Notice	Identify the need for good writing skills for effective communication at the workplace
12	Report Writing	Identify the need for good writing skills for effective communication at the workplace
13	Resume Writing	What and how to create an effective resume
14	Correspondence for job	How and what to write while doing correspondence related to job

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BCSI307: Data structures using C Lab

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List of Experiments:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort.

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BCSI308: Object Oriented Programming with Java Lab

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List of Experiments:

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc.)
11. Write a program to find out total memory, free memory and free memory after executing garbage collector (gc).

Part B

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number of lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a text field that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

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BCSI309: Database Management Systems Lab

L T P C
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List of Experiments:

1. Perform following actions using SQL statements
    a. Create a new user with name “shiva” and password “kumar@1”
    b. Assign the following privileges
        i. Create and drop tables
        ii. Create and drop users
        iii. Allow to assign above privileges to new users
        iv. List all tables in the database
        v. List all users in the database
        vi. Logout from current user and log in as “shiva”
2. Create following tables and insert minimum 10 rows in to each table
    a. Department table with following columns with appropriate data types
        i. DeptId
        ii. DeptName
        iii. DeptLoc
    b. Employee table with following columns with appropriate data types
        i. EmpId
        ii. EmpName
        iii. DOB
        iv. DOJ
        v. Job
        vi. Salary
    c. Product table with following columns with appropriate data types
        i. ProdId
        ii. ProdName
        iii. Price
    d. Sales table with following columns with appropriate data types
        i. SalesId
        ii. Date
        iii. Quantity
3. Update above tables with following features using SQL statements
    a. Make DeptId in Department table as Primary Key
    b. Make EmpId in Employee table as Primary Key
    c. Add DeptId column to the Employee table and make it foreign key from Department table and update the values
    d. Add EmpId and ProdId to the Sales table and make them foreign key from Employee and Product table and update the values
    e. Update all columns in all tables with appropriate constraint such as not null, check and so on

4. Perform the following SQL statements
    a. Create a view "EmpDeptView" from Employee and Department table which contains following columns
        i. EmpName
        ii. DOB
        iii. Salary
        iv. DeptId
        v. DeptName
        vi. Loc
    b. Retrieve all employees whose salary between 25,000 to 30,000
    c. Retrieve all employees who is working in Accounts department (If it is not there add this row to Department table)
    d. Retrieve all employees who is working other than Accounts department
    e. Retrieve all employee who is working in Sales department and Bangalore location
    f. Retrieve all employees who completed minimum 5 years
    g. Retrieve all employees who completed minimum 5 years and salary less than 30,000
5. Perform the following SQL statements
    a. Retrieve all employees whose salary more than 30,000
    b. Retrieve employee details who is getting maximum salary
    c. Retrieve employee details who is getting minimum salary
    d. Retrieve employee details who is getting 3rd maximum salary
    e. Retrieve employee details who is getting 5th minimum salary
    f. Retrieve total number of employees in each department in Bangalore location
    g. Retrieve total number of employees in each location
    h. Retrieve total number of employees in each location in Accounts department
    i. Retrieve total number of employees who complete more than 10 years in each department.
6. Write a PL/SQL Procedure to find prime number from 1 to n, n is a user input or parameter.
7. Write a PL/SQL Functions to return number of days an employee working using EmpId.
8. Write a PL/SQL Procedure to find sum of salaries of all employee working in a particular location.
9. Write a PL/SQL Function to return sum of sales by ProdId.
10. Write a PL/SQL Function to return sum of sales by EmpId.
11. Write a PL/SQL Procedure to generate Employee Report department wise as follows:

DeptName EmpName Job Location Salary Cumulative_Salary

12. Write a PL/SQL Trigger to insert row into OldEmployee table when a employee deleted from Employee table (Create OldEmployee table).
13. Write a PL/SQL Trigger not to delete more than 2 employees at a time
14. Write a PL/SQL Trigger not to update employee salary if it cross 67000
15. Write a PL/SQL Package with following procedures and functions
    a. Procedures
        i. Print Total Quantity Sales Summary Report(SalesId, Date, Quantity and Total Quantity)
        ii. Print Total Quantity Sales Summary Report by Date wise
    b. Functions

i. Return employee name who made maximum sales till date
ii. Return product name soled maximum quantity till date

BCSI310: Summer Project Seminar-I

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Course Objective:

- The objective of Summer Project is to enable the student to take up investigative study in field of Computer application with emphasis on their specialization.
- This is expected to provide a good initiation for the student(s) in Industry practices.
- The students are expected to investigate, model and present their work either individually or in groups (to be decided by the department) to the departmental committee.

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BCSI401: Design and Analysis of Algorithms

L T P C
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Course Objective:

- Algorithms are core or fundamentals for design and develop any kind of software (program), algorithms gives clear picture of the program about running time and complexity of the program, these helps us to find the performance of the program.
- Algorithms basically contain steps to run the program and calculate time to run the program.
- This subject covers various design and analysis paradigms of algorithms and data structures to improve the performance of a program.

UNIT 1:

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT II:

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

UNIT III:

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT IV:

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

UNIT V:

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE.

Text Books:

1. *Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.*
2. *Fundamentals of Algorithms – E. Horowitz et al.*

Reference Books:

1. *Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.*
2. *Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.*
3. *Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison- Wesley, Reading, MA.*

Course Outcomes

- For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic- programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
- For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
- Explain the ways to analyze randomized algorithms (expected running time, probability of error).
- Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

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BCSI402: Operating Systems

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Course Objective:

- The operating system is the most important program that runs on a computer. Every general- purpose computer must have an operating system to run other programs.
- Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.
- This course covers the concept of operating system and its applications.

UNIT- I

Introduction to Operating System

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

UNIT- II

Process Management

Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT- III

Storage Management

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface**: File concept, Access Methods, Directory structure, File- system Mounting, File

sharing, Protection and consistency semantics.

UNIT- IV

File-System Implementation:

File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Managemen**t: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

UNIT- V

Protection and Security

Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Acess Matrix, Revocation of Access Rights, Capability- Based Systems, and Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

Text Books:

1. *Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.*
2. *Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.*
3. *Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication).*

Reference Books:

1. *William Stallings, Operating System, 4th Edition, Pearson Education.*
2. *H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education.*
3. *Nutt: Operating Systems, 3/e Pearson Education 2004.*

Course Outcome:

- After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS, students will continue to more significant functions of OS like Process management, storage and memory management etc.
- This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications and etc.

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BCSI403: Computer Organization and Architecture

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Course Objective*:*

- To understand the fundamentals of computer organization and architecture and to relate these to contemporary design issues.
- Understanding the performance characteristics of computer system.

UNIT- I

Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtrator, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.

UNIT- II

Basic Computer Organization

Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions.

UNIT- III

Micro Programmed Control Unit

Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes.

UNIT- IV

Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors.

UNIT- V

Modes of Data Transfer and Memory Organization

Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Text Books:

1. *Computer System Architecture by Morris Mano, PHI*
2. *Computer Organization and Architecture by William Stallings, PHI*

Reference Books:

1. *Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH.*
2. *PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010.*
3. *Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons.*
4. *Fundamental Of computer Organization by Albert Zomaya, 2010.*

Course Outcome:

- Explain the use of basic concepts of Computer components.
- Discuss the Register Transfer and different Micro-operations.
- Illustrate the flowchart for Instruction cycle.
- Describe the function of Control Unit and Central Processing Unit.
- Explain the characteristics of multi-processors.
- Discuss the modes of Data transfer and Memory organization.

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BCSI404: Computer Networks

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Course Objective:

- To understand the basics of networking and its underlying principles.
- This course enables learners to understand computer networking concepts, how they work, operate, communicate with ports and Protocols. Standards and models associated with networking technology and their troubleshooting mechanisms.

UNIT- I

Networking Fundamentals

Basics of Network & Networking, Advantages of Networking, Types of Networks, Types of Network Architecture, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling, media connectors, Introduction of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, Comparison between OSI model & TCP/IP model.

UNIT- II

Basics of Network Devices

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, Modem, Ethernet standards, Ethernet Components, Point-to-Point Protocol, Address Resolution Protocol, Message format, transactions, Benefits of Wireless Technology, Types of Wireless Networks, Wireless network Components, wireless LAN standards, wireless security Protocols.

UNIT- III

Basics of Network, Transport and Application Layers

Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 and IPv6 Datagram Format, IPv4 addressing, IPv4 Subnetting, CIDR and VLSM, IPv6 Addressing, , Internet Control Message Protocol , Internet Group Management Protocol ,Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer Protocols

UNIT- IV

WAN Technology

Introduction to WAN, WAN Switching techniques, connecting to the Internet, Satellite-Based Services, Cellular Technologies, Technologies used for Connecting LANs, Remote Access Connections and technologies, Authentication and Authorization, Tunneling and Encryption Protocols, Security Appliances and Security Threats.

UNIT- V

Troubleshooting Network

Trouble Shooting Networks: Command-Line Interface Tools, Network and Internet Troubleshooting, Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

Text Book:

1. *CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011.*
2. *CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013.*

Reference Books:

1. *Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008*
2. *CCNA Exploration Course Booklet: Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010*

Course Outcome:

After completion of the course the student will be able to:

- Explain the types of Network and its architecture
- Identify the function of each layer in OSI and TCP/IP Models
- Describe the Ethernet and wireless standards
- Discuss the functionality of Networking devices
- Demonstrate the IPv4 and IPv6 addressing types
- List the WAN Technologies
- Practice Network troubleshooting.

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BCSICT401: Information Security

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3	0	0	3

Course Objective:

- To help students understand foundational concepts of information security
- To make it possible for students to appreciate the need for securing information from threats and risks.
- To facilitate students to gain knowledge on how network infrastructure and connectivity can be secured.

UNIT- I

Introduction to Information Security

Overview of Information security, Threats, Type of Vulnerabilities and Risk, Business Requirements, Information Security Definitions – Security Policies – Tier 1 (origination Level), Tier 2 (Functional Level), Tier 3 (Application or Device Level), Procedures, Standards, Guidance. Role of Governance in Information Security, Develop a Risk Management Program, Risk Management Process, Best Practices for IT Governance, Case study.

UNIT- II

Information Asset Classification

Classification of Information, Information Assets – Owner, Custodian, User, Information Classification in terms of Secret, Confidential, Private and Public, Declassification. Retention and Disposal of Information Assets. Provide Authorization for Access – Owner, Custodian and User, Case study.

UNIT- III

Access Control

User Identity and Access Management- Account Authorization, Access and Privilege Management, System and Network Access Control. Operating Systems Access Controls, Monitoring Systems Access Controls, Intrusion Detection System, Event logging, Cryptography. Physical Security: Identify Assets to be Protected, Perimeter Security, Firewalls, Prevention and Detection Systems, Safe Disposal of Physical Assets. Email Security: PGP, MIME, IP Security: IP security overview, Case study.

UNIT- IV

Introduction to Cryptography

Introduction to Advanced Cryptography and Cryptanalysis, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Permutation Method. Advanced Encryption Techniques and Security Issues – RC4, One-time Pad, RSA, DES, Triple DES, AES and Diffie Hellman, Case study.

UNIT- V

Conventional Encryption

Confidentiality using conventional encryption – Placement of Encryption, Traffic Confidentiality, Key Distribution and Random Number Generation. Key management – Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys, Updating Keys, Storing keys, Backup keys, Compromised Keys, Lifetime of Keys, Destroying Keys and Public-Key Management, Case study.

Text Book:

1. *Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009)*
2. *Cryptography and Information Security by V. K. Pachghare, Prentice-Hall of India Pvt.Ltd; 2nd Revised edition edition (30 March 2015)*
3. *Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012*
4. *Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017)*
5. *Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008*
6. *Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)*
7. *Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)*

Reference Book:

1. *Applied Cryptanalysis – Breaking Ciphers in the Real World Stamp, Richard M.Low*
2. *Serious Cryptography: A Practical Introduction to Modern Encryption Kindle Edition by Jean-Philippe Aumasson.*

Course Outcome:

After completion of the course the student will be able to:

- Explain basic concepts and importance of information security
- Identify threats to information security, analyse their impact and propose suitable countermeasures
- Describe various aspects of securing network infrastructure and importance of classifying information.

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BCSICT402: Storage & Datacenter

L T P C
3 0 0 3

Course Objective:

- To impart the basic concepts of Storage systems and Datacenter environment.
- To understand concepts about RAID techniques.
- To understand basic concepts about NAS and SAN.
- To understanding about taking backup and restoring the data with the help of Business Continuity and Disaster Recovery concepts and tools.
- To understand about Data Center Consolidation and Clustering.

UNIT- I

Introduction to Storage System

Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.

Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application.

Data Protection (RAID): RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.

UNIT- II

Storage Networking Technologies

Network-Attached Storage: General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization.

Fibre Channel Storage Area Networks: Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN.

IP SAN and FCoE: iSCSI, FCIP, FCoE.

UNIT- III

Backup and Disaster Recovery

Introduction to Business Continuity: Information Availability, BC Terminology, BC

Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

Backup and Archive: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.

UNIT- IV

Data Center Consolidation

Reasons for Data Center Consolidation: Reasons for Data Center Consolidation, Consolidation Opportunities.

Data Center Consolidation Phases: Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated.

Best Practices in IT: Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.

UNIT- V

Data Center Clusters

Cluster Architecture: Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices.

Cluster Requirements: Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist.

Designing Cluster-Friendly Applications: Automating Operations, Controlling Application Failover Time, Reducing Data Loss during Failover, Minimizing Application Failures, Designing Node- Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.

Text Books:

1. *Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by Somasundaram Gnanasundaram Alok Shrivastava.*
2. *Administering Data Centers: Servers, Storage, and Voice over IP By Kailash Jayaswal ISBN- 13: 978-0471771838.*

Reference Books:

1. *Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens.*
2. *Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.*
3. *Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock.*

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BCSI405: Design and Analysis of Algorithms Lab

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0	0	2	1

LIST OF EXPERIMENTS:

1. Write a program to sort a set of elements by implementing Merge sort.
2. Write a program to sort the array elements recursively using the quick sort.
3. Create a Graph class to implement an adjacency list representation of a graph. Devise an appropriate input method for populating the Graph. Also implement the following method for Graph:
   BFSPath(s,t) – finds a path from node s to the node t using BFS.
4. Create a Graph class to implement an adjacency list representation of a graph. Devise an appropriate input method for populating the Graph. Also implement the following method for Graph:
   DFSPath(s,t) – same as BFS Path except that it uses DFS to look for a path.
5. Implement a program for prim's algorithm to find out the minimum cost spanning tree
6. Implement a program for kruskal's algorithm to find out the minimum cost spanning tree.
7. Write a program to implement greedy topological sorting algorithm to find a topological sequence for the completion of a set of given tasks.
8. Implement a Roadster package that has a network of nodes (locations) and edges (roads) between pairs of nodes with the distances between the end nodes as the weights. I should be able to query Roadster with any pair of nodes and it should return the shortest path between the two (Dijkstra's)
9. Write a program to implement Radix sort.
10. Implement a program for Floyds all pair shortest path algorithm and wars hall's all pair shortest path algorithm.
11. Implement a non-recursive version of the Euclid's GCD algorithm.
12. Implement Binomial co –efficient problem using the by dynamic programming.
13. Implement a program to solve knapsack problem by dynamic programming.

Course Outcome:

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

- Know the running time of algorithm.
- Know the implementation and comparison of problem like kruskal and prim, recursive algorithm.
- Able to understand the working of various problem

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BCSI406: Employability Skills

L	T	P	C
0	0	2	1

List of Activities:

Speaking Skills	a) Group Discussion b) Panel Discussion c) Debate d) Personal Interview
Etiquette and Mannerism	a) Professional etiquette- Etiquette at meetings, Dining, Involuntary Awkward Actions b) Technology Etiquette- Phone, Email, Social Media, Video Conferencing, Web Interview
Professional Presentations	a) Nature of Oral Presentation b) Planning a Presentation c) Preparing the Presentation d) Delivering the Presentation
Resume & Job Application	a) Resume vs CV b) What is a scannable resume; c) How to develop an impressive resume; d) Different formats of Resume; e) Job application or cover letter
Job Interviews	a) Definition of interview, Background information, Types of interviews; b) Preparatory steps for Job interviews; c) Interview Skill tips; d) Changes in the interview process, e) Frequently asked questions during interviews

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BCSI407: Computer Networks Lab

L	T	P	C
0	0	2	1

List of Experiments:

1. Switch Configuration - Basic Commands and Switch Port Security.
2. Router – Configuration and Setting up of Passwords.
3. PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication.
4. A configuration of default, Static and Dynamic Routing.
5. VLAN Configuration.
6. Configuration of Access-lists - Standard and Extended ACLs.
7. DHCP, DHCP Relay and DHCP Exclusions.
8. Configuring Logging to a Remote Syslog Server.
9. Design and analyse network with a router, Switch and Hub to find the number of broadcast domains and collision domain using packet tracer.
10. Configure a wireless network for ad-hoc and infrastructure mode.
11. Configure point to site and site to site VPN.
12. Perform network troubleshooting using ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat.

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BCSI408: Operating System Lab

L	T	P	C
0	0	2	1

List of Experiments:

1. Installing Linux Operating System
    a. Boot, reboot, and shut down a system normally.
    b. Boot systems into different run levels manually.
2. Login to OS and monitoring the performance
    a. Use single-user mode to gain access to a system.
    b. Identify CPU and memory-intensive processes, adjust process priority with renice, and kill processes.
    c. Locate and interpret system log files
3. Manage Users and Groups
    a. Create, delete, and modify local user accounts.
    b. Change passwords and adjust password aging for local user accounts.
    c. Create, delete, and modify local groups and group memberships.
4. Working with files
    a. Archive, compress, unpack, and uncompress files using tar, star, gzip, and bzip2.
    b. Create and edit text files.
    c. Create, delete, copy, and move files and directories.
    d. Create hard and soft links.
    e. List, set, and change standard ugo/rwx permissions.
    f. Locate, read, and use system documentation including man, info, and files in/usr/share/doc.
5. List, create, delete, and set partition types for primary, extended, and logical partitions.
6. Create and remove physical volumes, assign physical volumes to volumes groups, and create and delete logical volumes
7. Create; mount; unmount; and use ext2, ext3, and ext4 file systems.
8. Create and manage access control lists (ACLs).
9. Diagnose and correct file permission problems.
10. Configure network and hostname resolution statically or dynamically

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BCSICT403: STORAGE AND DATA CENTER LAB

L	T	P	C
0	0	2	1

List of Experiments:

1. Configuring the Directly Attached Disks for Basic and Dynamic Disks
2. Creating and configuring the disk partitions and volumes for the disk in Windows/Linux System
3. Creating and Configuring the RAID 0, 1 and RAID5 in windows server 2012 R2
4. Configuring the Network Share using Windows Server 2012 R2
5. Configuring the File Server in Windows Server 2012 R2
6. Configuring NFS in Linux Server
7. Configuring the iSCSI in Windows Server 2012 R2
8. Configuring FCOE in Windows Server 2012 R2
9. Creating a System Backup and Restoring in Windows Server and Linux System
10. Creating and Restoring the Snapshot for Virtual Machines in Hyper-V
11. Installing and configuring the NLB in Windows Server 2012 R2
12. Installing and configuring Failover Clustering in Windows Server 2012 R2

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Scheme of Instruction & Syllabi
of
Bachelor of Technology
(Cloud Computing)

(With effective from academic session 2023-24)

(Dr.Gaurav Agarwal)
HODCSE

(Prof. R.K.Shukla)
Dean Engineering &Technology

(Prof. Y D S Arya)
Vice- Chancellor

Department of Computer Science and Engineering

INVERTIS UNIVERSITY

Invertis Village, Bareilly-Lucknow NH-24, Bareilly,
243123 U. P.

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
BTech. in Cloud Computing
YEAR III, SEMESTER V

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Professional Core	BCSI501	Theory of Computation	3	1	0	30	70	100	4
2	Professional Core	BCSICT501	Cloud Computing	3	0	0	25	50	75	3
3	Professional Core	BCSICT502	Network Security	3	0	0	25	50	75	3
4	Professional Core	BCSICT503	Principles of Virtualization	1	0	0	10	15	25	1
5	HSM	BCSICT504	Humanities II	3	1	0	30	70	100	4
6	Professional Elective		Elective-I	3	0	0	25	50	75	3
7	Engineering Science Course	IIOT5	Machine Learning for IIOT	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Professional Core	BCSICT508	Network Security Lab	0	0	2	10	15	25	1
8	Professional Core	BCSICT509	Principle of Virtualization Lab	0	0	2	20	30	50	2
9	Summer Training	BCSI502	Summer Project Seminar-II	0	0	2	20	30	50	2
			TOTAL	20	2	6	225	450	625	27

L-Lecture, **T**- Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE**- End Semester Examination

Cloud Computing

L*-Lecture* , T*-Tutorial, P*-Practical

COURSE CODE	Elective - I
BCSICT505	Security Architecture
BCSICT506	Database Security

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B.Tech. in Cloud Computing
YEAR III, SEMESTER VI

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Professional Core	BCSI601	Artificial Intelligence	3	0	0	25	50	75	3
2	Professional Core	BCSICT601	Linux Administration	1	0	0	10	15	25	1
3	Professional Core	BCSICT602	Ethical Hacking	3	1	0	30	70	100	4
4	Professional Core		Elective -II	3	1	0	30	70	100	4
5	Professional Core	BCSICT608	Incident Response Management	2	0	0	15	35	50	2
6	Open Elective		Open Elective-I	3	0	0	25	50	75	3
7	Engineering Science Course	IIOT6	Artificial Intelligence for IIOT	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Professional Core	BCSICT612	Exploring Software as a Service (SaaS) Lab	0	0	2	20	30	50	2
8	Professional Core	SICT615	Linux administration Lab	0	0	2	20	30	50	2
9	Professional Core	SICT616	Ethical Hacking Lab	0	0	2	10	15	25	1
10	Project	BCSICT617	Project-I			4				
			TOTAL	19	2	12	215	435	650	26

L-Lecture, **T-** Tutorial , **P-** Practical ,**CA-** Continuous Assessment, **EE-** End Semester Examination

Course code	Open Elective - I
BCSICT609	UI/UX Fundamentals
SICT610	Mobile Application Development
BCSICT611	Business Intelligence

Course code	Elective – II lab

BCSICT612	Exploring Software as a Service (SaaS) Lab
BCSICT613	Cloud Migration Lab
BCSICT614	Cloud Scripting using PaaS Lab

Syllabus
5TH Semester

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BCSI501 Theory of Computation

L	T	P	C
3	1	0	4

MODULE -I

Regular languages : Introduction; Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA), State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Equivalence of NFA and DFA, Minimization of Finite Automata, Regular expression (RE): Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine

MODULE- II

Context free grammar (CFG) and Context Free Languages (CFL): Definition, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.. Push Down Automata (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA

MODULE -III

Turing machines (TM): Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Universal Turing machine and undecidable problems , Rice's theorems for RE sets , Linear bounded automata and context sensitive languages Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidablity, Undecidable problems about TMs. Universal Turing machine and undecidable problems, Post correspondence problem (PCP), Modified PCP,Introduction to recursive function theory.

Text Books:

1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata, Languages and

Computation", PHI
2. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
3. Peter Linz "An Introduction to Formal Languages and Automata" Narosa Publishing House Fourth Edition

Reference Books:

1. Y.N.Singh "Mathematical Foundation of Computer Science", New Age International.
2. Papadimitriou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI Learning Private Limited, Delhi India.
3. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation; Pearson Education.
4. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd.
5. Micheal Sipper, "Introduction of the Theory and Computation", Thomson Learning

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BCSICT501 Cloud Computing

L T P C
3 0 0 3

MODULE-I

Introduction to Cloud Computing–Definition of Cloud, Evolution of Cloud computing, Underlying Principles of Parallel and Distributed Computing ,Cloud Characteristics , Elasticity in Cloud, On-demand Provisioning. Service Oriented Architecture, REST and Systems of Systems Web Services, Publish-Subscribe Model, Basics of Virtualization, Types of Virtualization Implementation Levels of Virtualization, Virtualization Structures Tools And Mechanisms, Virtualization of CPU, Memory I/O Devices, Virtualization Support and Disaster Recovery

MODULE-II

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds laaS, PaaS, SaaS, Architectural Design Challenges, Cloud Storage Storages-a-Service, Advantages of Cloud Storage ,Cloud Storage ProvidersS3.Need for Virtualization Pros and cons of Virtualization Types of Virtualization –System VM, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - supervisors Xen, KVM, VMware, Virtual Box, Hyper-V, Major Players in Cloud Computing issues in Clouds - Eucalyptus - Nimbus - Open Nebula, CloudSim

MODULE-III

Security Standards. Security, Standards and Applications: Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud. Service providers- Google, Amazon, Microsoft Azure, IBM, Sales force

Text Books:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, ―Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

BCSICT 502 - Network Security

L T P C
3 0 0 3

MODULE-I

Computer Network System Security Introduction: Introduction, What is computer Network security, Sample Attacks Computer Network, The Marketplace for vulnerabilities, Error 404 Hacking, Security Policies and Security Handshake Pitfalls, What is security policy, high and low level policy, Protocol problems, assumptions, shared secret protocols, public key protocols, mutual authentication, reflection attacks, use of timestamps, nonce and sequence numbers, session Keys, one-and two-way public key based authentication, Authentication of People: Verification techniques, passwords, length of passwords, password distribution, smart cards, and biometrics

MODULE-II

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange (IKE).Transport-Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security, HTTPS standard, Secure Shell (SSH) application. Malicious Software: Viruses, Worms, System Corruption, Attack Agents, Information Theft Key loggers, Phishing, Spyware Payload Stealthing, Backdoors, Rootkits, Distributed Denial of Service Attacks, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development.

MODULE-III

Basic cryptography: Public key cryptography ,RSA public key crypto ,Digital signature Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security. Basic security problems, Routing security, DNS revisited, Summary of weaknesses of internet security, .Link layer connectivity and TCP IP connectivity, Packet filtering firewall, Intrusion detection.

Text books:

1. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.
2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.
3. William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press, 2001

BCSICT503 - Principles of Virtualization

L T P C

1 0 0 1

Course Objective:

This course gives students an insight into the basics of cloud computing along with virtualization, Cloud computing is one of the fastest growing domain from a while now. It will provide the students Basic understanding about cloud and virtualization along with it how one can migrate over it

MODULE-I

Introduction to Virtualization: Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations Types of hardware virtualization: Full virtualization - partial virtualization - Para virtualization
Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization)

MODULE-II

Hypervisors and Virtual machines Server Virtualization: Understanding Server Virtualization, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types Virtualization Solutions Understanding Microsoft's Virtualization solutions: Microsoft's Infrastructure Optimization Model, Virtualization and the Infrastructure Optimization Model, Benefits of Virtualization, Achieving the Benefits of Datacenter Virtualization, Achieving the Benefits of Client Virtualization, Achieving the Benefits of Cloud Virtualization

MODULE-III

Migrating into a Cloud Introduction, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration Risks and Mitigation, Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, Adoption and Consumption Strategies, issues for enterprise applications on the cloud

Text & References:

Text:

1. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware an Microsoft Platform in the Virtual Data Center, Acerbic
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg Andrzej Goscinski, John Wiley & Sons, Inc. 2011
4. Cloud computing a practical approach - Anthony T.Velte, Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

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BCSICT504 – Humanities II Engineering & Managerial Economics

MODULE-I

Introduction: Meaning, Nature and Scope of Economics, Meaning of Science, Engineering and Technology. Managerial Economics and its scope in engineering perspective.

MODULE-II

Basic Concepts Demand Analysis, Law of Demand, Determinates of Demand, Elasticity of Demand-Price, Income and cross Elasticity. Uses of concept of elasticity of demand in managerial decision

MODULE-III

Demand forecasting Meaning, significance and methods of demand forecasting, production function, Laws of returns to scale & Law of Diminishing returns scale. An overview of Short and Long run cost curves – fixed cost, variable cost, average cost, marginal cost, Opportunity cost

MODULE-IV

Market Structure Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

MODULE-V

National Income, Inflation and Business Cycles Concept of N.I. and Measurement. Meaning of Inflation, Type causes & prevention methods, Phases of business cycle

Reference Books:-

1. Koutsoyiannis A: Modern Microeconomics, ELBS.
2. Managerial Economics for Engineering: Prof. D.N. Kakkar
3. Managerial Economics: D.N. Dwivedi
4: Managerial Economics: Maheshwari.

Elective-I

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BCSICT505 Security Architecture

MODULE-I

Introduction to Cloud Computing and Security: Understanding Cloud Computing - The IT Foundation for Cloud- overview of Security Architecture, Cloud Computing Architecture: loud Reference Architecture-Control over Security in the Cloud Model- Cloud Deployment & Services Models- Key Examples

MODULE-II

Cloud Computing: Security Concerns- Risk Tolerance- Legal and Regulatory Issues, Security Requirements for the Architecture-Security Patterns and Architectural Elements- Cloud Security Architecture-Key Strategies for Secure Operation

MODULE-III

Overview of Data Security in Cloud Computing-Common Risks with Cloud Data Security- Data Encryption: Applications and Limits- Errors with Data Encryption- Cloud Data Security: Sensitive Data Categorization, Cloud Data Storage-Roach Motel Syndrome, Overall Strategy: Effectively Managing Risk, Overview of Security Controls, Overview of Security Controls, The Limits of Security Controls,
Best Practices, Security Monitoring

MODULE-IV

Private Clouds: Motivation and Overview-Security Implications: Shared versus Dedicated Resources, Security Criteria for Ensuring a Private Cloud - Network Considerations- Data Center Considerations- Operational Security Considerations- Regulation, Selecting a CSP: Overview of Assurance, Overview of Risks, and Security Criteria- Revisiting Defense-in-depth- Additional Security relevant Criteria.

MODULE-V

Evaluating Cloud Security, Checklists for Evaluating Cloud Security- Foundational Security- Business Considerations- Defense-in-depth- Operational Security, Operating a Cloud: From Architecture to Efficient and Secure Operations, Bootstrapping Secure Operations, Security Operations Activities- Business Continuity, Backup, and Recovery- Managing Changes in Operational Environments - Information Security Management - Vulnerability and Penetration Testing, Security Monitoring and Response

TEXT BOOKS

Vic (J.R.) Winkler, “Securing the Cloud: Cloud Computer Security Techniques and Tactics”, Elsevier,2011.

REFERENCE BOOKS

1. Sushil Jajodia, Krishna Kant, “Secure Cloud Computing”, Elsevier,2014. 2. Curtis Franklin, Jr. ,Brian J. S. Chee, “Securing the Cloud: Security Strategies for the Ubiquitous Data Center”, CRC Press, 2019.

EBOOk

1. https://solutionsreview.com/cloud-platforms/free-cloud-computing-ebooks/

MOOC

1 https://www.coursera.org/learn/cloud-computing-security

Elective-I

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BCSICT506 Database Security

MODULE-I

Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models - Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

MODULE-II

Security Models - Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model the Lattice Model for the Flow Control conclusion Security Mechanisms Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation

MODULE-III

Security Software Design Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

MODULE-IV

Private Clouds: Motivation and Overview-Security Implications: Shared versus Dedicated Resources, Security Criteria for Ensuring a Private Cloud - Network Considerations- Data Center Considerations- Operational Security Considerations- Regulation, Selecting a CSP: Overview of Assurance, Overview of Risks, and Security Criteria- Revisiting Defense-in-depth- Additional Security relevant Criteria.

MODULE-V

Models For The Protection Of New Generation Database Systems -1 Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases

BOOKS AND REFERENCES

TEXT BOOKS:

1. Database Security and Auditing, Hassan A. Anyone, India Edition, CENGAGE Learning, 2009.
2. Database Security, Castagno, Second edition, Pearson Education.

REFERENCE BOOK:

1. Database security by Alfred baste, Melissa goal, CENGAGE learning

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BCSICT508 PC Network Security Lab

LIST OF EXPERIMENTS:

1 Create type 2 virtualization in VMWARE. Allocate memory and storage space as per requirement. Install Guest OS on that VMWARE.

2 Adding a New Virtual Disk to a Virtual Machine. Convert basic disc to dynamic disc and vice versa

3 a. Shrink and extend virtual disk

b.Create, Manage, Configure and schedule snapshots

c. Create Spanned, Mirrored and Striped volume

4 Sharing and data transfer between the virtual machines

5 a. Desktop Virtualization using VNC

B.Desktop Virtualization using Chrome Remote Desktop

6 Create type 2 virtualization on ESXI 6.5 server

7 Access ESXI server from another VM and create multiple OS on top of ESXI 6.5 server

8 Create ESXI servers as Bare metal OS

9 Create a VLAN in CISCO packet tracer

10 Install KVM in Linux

11 Create a VPN from one virtual machine to another virtual and pass data secure way

12Create Nested Virtual Machine (VM under another VM)

Syllabus
6TH Semester

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BCSI601 PC Artificial Intelligence

MODULE-I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

MODULE-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning

MODULE-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

MODULE-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,.

MODULE-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering

Reference Books:-

Text books:
1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India.

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BCSICT601 PC Linux Administration

MODULE-I

Introduction to Linux The Linux File system, The Shell, The Linux Utilities Using the Command Line Working as root, working with the Shell, Using Bash to Best Effect, Managing Bash with Key Sequences, Performing Basic File System Management Tasks, Working with Directories, Working with Files, Viewing the Content of Text Files, Finding Files That Contain Specific Text , Creating Empty Files, Piping and Redirection, Piping, Redirection, Finding Files, Working with Vi Editor: Vi Modes, Saving and Quitting, Cut, Copy, and Paste, Deleting Text. Getting Help: Using man to Get Help, Getting Information on Installed Packages.

MODULE-II

System Administration Software Management, Software Repositories and Package Databases, Package Management Utilities, Using apt, Installing Software from Tarballs, Configuring a Graphical User Interface, Creating Backups, Making File Backups with tar, Making Device Backups Using dd, Configuring Logging, Configuring syslog

MODULE-III

File System Management Mounting Disks, Using the mount Command, Unmounting Devices, Automating Mounts with /etc/fstab, Checking File System Integrity, Working with Links: Working with Symbolic Links, Working with Hard Links. Configuring Storage, Comparing File Systems, Creating File Systems, Working with Logical Volumes

MODULE-IV

Configuring Server for Security Setting Up User Accounts, Commands for User Management, Managing Passwords, Modifying and Deleting User Accounts, Configuration Files, Creating Groups, Commands for Group Management, /etc/group, Using Group Passwords, Managing the User's Shell Environment, Configuring Permissions, Read, Write, and Execute: The Three Basic Linux Permissions, Permissions and the Concept of Ownership

MODULE-V

Working with Advanced Linux Permissions, Setting Permissions, Using unmask to Set Default Permissions for New Files, Working with Access Control Lists, Preparing the File System for ACLs, ACL Limitations, Applying File Attributes, Apply Quota to Allow a Maximum Amount of Files, Installing the Quota Software, Preparing the File System for Quota, Initializing Quota, Setting Quota for Users and Groups, Configuring Administrator Tasks

Reference Books:-

1– Linux For Beginners by Jason Cannon.
2 – The Linux Command Line : A Complete Introduction by William Shotts.
3 – Linux Pocket Guide : Essential Commands by Daniel J. .
4 – Linux Network Administration Guide by Tony Bautts.
5 – How Linux Works, 2nd Edition by Brian Ward....
6 – Linux Bible by Christopher Negus.

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BCSICT602 PC Ethical Hacking

MODULE-I

Cyber Ethical Hacking ,What is Cyber Attack,Types of Cyber Attack,Phase of hacking,Information Gathering,Scanning,Google Hacking Database,type of Virus,type of Worms ,Virus ,Trojans and Backdoors,Sniffers and keyloggers,Social Engineering,Email, DNS, IP spoofing ,System Hacking and Security,HoneyPots

MODULE-II

Footprinting and Reconnaissance ,Scanning Networks,Enumeration,System Hacking,Malware Threats,Sniffing,Social Engineering, Denial of Service, Session Hijacking Hacking Web Servers, Hacking Web Applications,SQL Injection ,Hacking Wireless Networks, Hacking Mobile Platforms, Evading IDS, Firewalls and Honey pot

MODULE-III

Ethical Hacking Cloud Computing, Ethical Hacking Cryptography, Denial of Service, Hacking Mobile Platforms, Hacking Web Servers, Session Hijacking, Scanning Networks, Social Engineering, Malware Threats,Footprinting and Reconnaissance,SQL Injection, Evading IDS, Firewalls and Honey pots Enumeration,IoT and OT Hacking

Reference Books:-

1. Hands-on Ethical Hacking and Network Defense.
2. The Basics of Hacking and Penetration Testing - Patrick Engebretson.
3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws.
4. Black Hat Python: Python Programming for Hackers and Pentesters.
5. Hacking: The Art of Exploitation by Jon Erickson.

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BCSICT605 Cloud Scripting using PaaS

COURSE DESCRIPTION

This course provides a hands-on comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). IaaS topics start with a detailed study the evolution of infrastructure migration approaches from VMWare/Xen/ KVM virtualization, to adaptive virtualization, and on-demand resources provisioning. PaaS topics cover a broad range of Cloud vendor platforms including Google App Engine, Microsoft Azure, OpenStack and others as well as a detailed study of related platform services such as storage services that leverage Google Storage, Amazon S3, Amazon Dynamo, or other services meant to provide Cloud resources management and monitoring capabilities. The SaaS and PaaS topics covered in the course will familiarize students with the use of vendor-maintained applications and processes available on the Cloud on a metered on-demand basis in multi-tenant environments. The course also covers the Cloud security model and associated challenges and delves into the implementation and support of High Performance Computing and Big Data support capabilities on the Cloud. Through hands-on assignments and projects, students will learn how to configure and program IaaS services.

COURSE OBJECTIVES

learn cloud computing delivery model IaaS
learn cloud computing delivery model PaaS
learn cloud computing delivery model SaaS.

COURSE OUTCOMES
On completion of this course, the students will be able to
understand Cloud delivery models in details
understand briefly Cloud Computing Reference Architecture.

MODULE-I

Introduction of delivery models in Cloud Computing: Introduction to cloud delivery models, List various cloud delivery models, Advantages of delivery models in cloud, trade-off in cost to install versus flexibility, Cloud service model architecture.

MODULE-II

Infrastructure as a Service (IaaS): Introduction to Infrastructure as a Service delivery model, characteristics of IaaS, Architecture, examples of IaaS, Applicability of IaaS in the industry.

MODULE-III

Platform as a Service (PaaS):Introduction to Platform as a Service delivery model, characteristics of PaaS, patterns, architecture and examples of PaaS, Applicability of PaaS in the industry

MODULE-IV

Software as a Service (SaaS):Introduction to Software as a Service delivery model, characteristics of SaaS, Architecture, examples of SaaS, Applicability of SaaS in the industry..

MODULE-V

Cloud computing Reference Architecture (CCRA): Introduction to Cloud computing reference architecture (CCRA), benefits of CCRA, Architecture overview, versions and application of CCRA for developing clouds, Type causes & prevention methods, Phases of business cycle

TEXT BOOKS

Cloud Computing Architecture (IBM ICE)
REFERENCE BOOKS

1: Cloud computing for Dummies (November 2009) Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Helper
2: IBM Cloud computing http://www.ibm.com/cloud-computing/us/en/
3: Wikipedia page on Cloud Computing http://en.wikipedia.org/wiki/Cloud_computing..

BCSICT608 Incident Response Management(Cyber Security)

MODULE-I

Need for CSIRM Differences between an event, incident and disaster, what are cyber security incidents, need for CSIRM, policy, plan and procedure, importance of communication protocol, key internal and external stakeholders, law enforcement, role of media, team structure and roles – important considerations.

MODULE-II

Handling a Cyber Security Incident Incident response lifecycle, incident handling infrastructure and facilities requirements, detection and analysis, process, tools and techniques, attack vectors, recognizing signs of an incident, precursors, indicators and historical organization data, incident correlation, review of logs and vital system parameters, incident handling checklist, documentation and reporting

MODULE-III

Recovering from Cyber Security Incidents Nature of incidents and the type of resources it affects, assessment of an incident's impact on business, IT operations and information, determining the amount of time and resources needed in recovering from an incident, prioritization, incident notification structure, containment, eradication and recovery – choosing a containment strategy, evidence gathering and handling, identifying the attack hosts, eradication and recovery, post-incident analysis, evidence retention and lessons learned

MODULE-IV

Preventing Cyber Security Incidents Incident analytics as input to proactive security measures to prevent incidents, risk assessment, host security, network security, malware prevention, user awareness and training, analysis of cost of control versus cost of incident impact, best practices.

MODULE-V

Cyber Security Incidents Analysis through Scenarios Flow chart of scenario questions, scenarios – DoS attack on DNS server, worm and DDoS agent infestation, military-classified documents stolen by an insider, compromised database server, unauthorized access to payroll records, identities and credentials stolen by hackers, antisocial propaganda in media through compromised home wifi network, personal files stored in Cloud are compromised, remote hacking of smart home network, malware infection in home and office network simultaneously, large scale of citizens' biometric data stolen by cyber war groups

Reference Books:-

Reference Books:

1. NIST SP 800-61r2 – Computer Security Incident Handling Guide

2. Computer Incident Response and Product Security (Networking Technology: Security) by DamirRajnovic 1st, Kindle Edition
3. Intelligence-Driven Incident Response: Outwitting the Adversary 1st Kindle Edition
4. The Computer Incident Response Planning Handbook: Executable Plans for Protecting Information at Risk by N.K. Mccarthy, Matthew Todd, Jeff Klaben, McGraw-Hill Education, 2012
5. Tools and Techniques for Fighting Malicious Code: Malware Analyst's Cookbook by Michael Hale Ligh, Steven Adair, Blake Hartstein, Matthew Richard, Wiley, 2010
6. Incident Response: A Strategic Guide to Handling System and Network Security Breaches by E. Eugene Schultz, Russell Shumway, Sams, 2001
7. The Effective Incident Response Team by Julie Lucas, Brian Moeller, Addison Wesley, 2003
8. Information Security: Incident Response and Disaster Recovery by Michael E. Whitman, Herbert Mattford, Cengage Learning India Pvt Ltd, 2009
9. Crafting the InfoSec Playbook: Security Monitoring and Incident Response Master Plan 1st Kindle Edition by Jeff Bollinger, Brandon Enright, Matthew Valites, 2015
10. Incident Management and Response Guide: Tools, Techniques, Planning, and Templates Kindle Edition by Tom Olzak, Erudio Security, 2017
11. Cyber Security by Nina Godbole, SunitBelapure, Wiley, 2011
12. Incident Response & Computer Forensics by Jason T. Luttgens, Matthew Pepe, Kevin Mandia, McGraw-Hill Education; 3rd edition, 2014
13. Principles of Incident Response and Disaster Recovery by Michael Whitman, Herbert MattordDelmar Cengage Learning; 2nd Revised edition, 2013
14. Computer Incident Response and Forensics Team Management: Conducting a Successful Incident Response by Leighton Johnson, Syngress, 2013
15. Cyber Incident Response: Bridging the Gap Between Cybersecurity and Emergency Management by Response, and Communications and the Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies of the Committee on Homeland Security House of Representatives Subcommittee on Emergency Preparedness, CreateSpace Independent Publishing Platform (8 May 2014)

Open Elective-I

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BCSICT609 UI/UX Fundamentals

Course Description: The increasing possibilities with interactive technology as opened to virtual classrooms for teaching and educating the students. Research has proven that interactive teaching using such visual technologies is much more effective than the traditional methods which help students understand and gain knowledge better. Virtual reality is used in many training scenarios as it consists of a wide range of benefits for academia and industrial needs. Course Objectives: Students will get to know about various techniques of Graphic Design and UI/UX and will develop skills to become a professional designer. They will be taught to enhance their knowledge and master tools producing good industry standard designs. Students will be able to work on advertisements, website, and app designs.

Course Outcomes (COs): At the end of this course students will be able to:
CO 1. Create Graphic Design artworks of your own.
CO 2. Explain the functionality of different design related software
CO 3. Use learned skills to solve problems of various layouts
CO 4. Test own's skill and knowledge for a better workflow
CO 5. Select best output and what works for a particular given project
CO 6. Develop ideas and various app designs and website pages..

MODULE-I

Unit 1: Computer Fundamentals & Digital Illustration, Introduction to Graphic Design and Its Uses, Raster & Vector Graphics, Drawing Vector Shapes and Illustrations, Art & Sketching, Drawing Techniques, Conceptual Thinking in Creativity, Developing a Personal Illustration Style, Color Modes, Schemes, Design, Image Retouching and Color Balancing, Using Filters Corporate Identity Design Designing Brochures & Catalogues Layouts for Newspapers, Designing Magazines, Visual Design Principles

MODULE-II

UI design fundamentals, Evolution of user interfaces, Interaction with physical components, Flat design, Role of UI in UX,Laws of digital interface design, Understand user experience,VIMM model, Know your user, user research, Difference between design and art, emotional design, designing for mental models, Importance of presentation, content, interactions, screen elements, accessibility, and global standards

MODULE-III

Typography, Types of typefaces, Typography Terminology, Guidelines for proper type selection, Typography design, Analyzing Aesthetics as per laws of Design principles, Alignment, Spacing, Lighting & Shadows, Grids,Consistency

MODULE-IV

Design Language & Rapid Prototyping • In-depth study of Design languages for different Google material platforms • Style guides and its importance • Apple Human centered Design guidelines measurements of UI components • Design for platforms: Mobile, Web, Tablet, Responsive, Smart Watch • Mood boards • UX design principles and laws • Introduction to Adobe XD • Creating low and high-fidelity prototypes

MODULE-V

UX & its elements of design • What is User Interaction • What is Cognitive Model • What is Mental Model

• UX design laws and its uses • Elements used in User Experience Design • How it works together • What is Big Picture? • What is Persona in UX Design

Textbook & References:

1. Weathers David. (2021). "UX/UI Design 2021 For Beginners: A Simple Approach to UX/UI Design for Intuitive Designers" (ISBN-13:979-8719605470)
2. Branson Steven (June 2020) "UX / UI Design: Introduction Guide To Intuitive Design And User-Friendly Experience" (ISBN-13:979-8653877315)
3.Anderson Gail. (2016). "The Typography Idea Book: Inspiration from 50 Masters" (ISBN10 :1780678495,ISBN-13:978-1780678498)
4.Slade-Brooking Catharine (2016). "Creating a Brand Identity: A Guide for Designers: (Graphic Design Books, Logo Design, Marketing".(ISBN-10:1780675623, ISBN-13:978-1780675626)

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BCSICT611 Business Intelligence

Purpose
This subject will be exploring concepts onWave Analytic basics, Wave Desktop Exploration, Wave App Basics, Sales Wave App, and Service Wave App.
Objective
After completing this subject the student will gain the knowledge of Business Intelligence using which they can convert raw data into pictorial format and analyse it to predict the future business.

MODULE-I

Wave Analytic basics ? Exploring Wave Analytics, Setup Wave analytics,Creating wave analytic App

MODULE-II

Wave Desktop Exploration- Data Explorer, Analyse Data Explorer, Compare Table. Wave Mobile Exploration: Mobile Data Explorer, Mobile Exploration interface

MODULE-III

Wave App Basics: Creating Wave App basics, setting up Wave app Licenses and Permissions , Sales Wave app ? Creating and Analysing Sales wave using Wizard, Sales wave on Mobiles

MODULE-IV

Service Wave App ? Creating Service Wave using wizard, Service wave to Manage Service Load, Basic Wave Dashboard Customization..

References Book:

Introduction to Salesforce Analytics - Building Reports and Dashboards: Class Slides & Workbook for Sprd-101 by Steve Wasula (Author)

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BCSICT610 Mobile ApplicationDevelopment

MODULE-I

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file..

MODULE-II

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

MODULE-III

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

MODULE-IV

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources. UNIT - V Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World..

TEXT BOOKS: 1.

T1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

R1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
R2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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BCSICT615 PC Linux Administration Lab

1.Installation of Red HAT Linux operating system.
a. Partitioning drives
b. Configuring boot loader (GRUB/LILO)
c. Network configuration
d. Setting time zones
e. Creating password and user accounts
f. Shutting down

2.Software selection and installation

3.Basic Commands of linux and unix

4.Do the following changes in Grub file
a. Write the path where the grub file is located.
b. Change the timeout and title of the system.

5.Setting up Samba Server

6.Configuring dhcp server and client

7.Configure a DNS Server with a domain name of your choice.

8.Configure a Linux server and transfer files to a windows client .
(Setting up NFS File Server)

9.Connecting to the internet
a. Setting up linux as a proxy server
b. Configuring mozilla or firefox to use as a proxy.

10.Configuring Mail Server.

11.Configure FTP on Linux Server. Transfer files to demonstrate the working of the same.

12.Using gcc compiler (Programming using C).

13.Using gcc ++ compiler (Programming using C++).

14.Configuring Apache Web Server.

15.Linux system administration
a. Becoming super user
b. Temporarily changing user identity with su command
c. Using graphical administrative tools
d. Administrative commands
e. Administrative configuration files

16. Using java compiler

BCSICT616 PC Ethical Hacking Lab

Course Objectives:

Introduces the concepts of Ethical Hacking

Gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security Practically apply Ethical hacking tools to perform various activities.

Course Outcomes:

After completion of course, students would be able to:

Understand the core concepts related to vulnerabilities and their causes

Understand ethics behind hacking and vulnerability disclosure

Appreciate the impact of hacking

Perform the lab Experiments based on the following facts.(Develop your own set of lab experiments)

1 Google Hacking

2 Scanning

Locating Open Ports

Network mapping

OS Fingerprinting

3 Gaining and Maintaining Access

4 Passwords hacking

5 Password Cracking Methods

6 Password Cracking Software

7 Man-in-the-Middle

8 Backdoors

9 Denial of Service

10 Covering tracks

11 Intrusion Detection Systems

12 Intrusion Prevention Systems

13 Anti-viruses

14 Malware

15 Viruses

Scheme of Instruction & Syllabi of

w.e.f session 2021-2022

Bachelor of Technology
(Cloud Computing)

(With effect from academic session 2023-24)

(Dr.Gaurav Agarwal)
HODCSE

(Prof. R.K.Shukla)
Dean Engineering &Technology

(Prof. Y D S Arya)
Vice- Chancellor

Department of Computer Science and Engineering
INVERTIS UNIVERSITY

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243123 U. P.

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
BTech. in Cloud Computing
YEAR IV, SEMESTER VII

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Professional Elective		Elective-IV	3	0	0	25	50	75	3
2	Professional Elective		Elective-V	3	0	0	25	50	75	3
3	Professional Elective		Elective-VI	3	0	0	25	50	75	3
4	Open Elective		Open Elective-II	3	0	0	25	50	75	3
5	Humanities & Social Science	BCSICT 701	Economics for Engineers	3	0	0	25	50	75	3
PRACTICALS AND PROJECTS										
6	Professional Elective		Elective-IV lab	0	0	2	10	15	25	1
7	Project	BCSICT702	Project -II	0	0	10	25	100	125	5
8	Summer Training	BCSICT703	Summer Project Seminar-III	0	0	2	10	15	25	1
			TOTAL	19	0	14	200	450	650	26

L-Lecture, **T**- Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE**- End Semester Examination

[

Course code	Elective – IV
BCSICT701	Cyber Forensics
BCSICT702	Web Security and SDLC
BCSICT703	Cloud Security

Course code	Elective - V
BCSICT704	Hybrid Cloud Computing
BCSICT705	Cloud Web Services
BCSICT706	Cloud Computing Solutions

Course code	Elective – VI
BCSICT707	Cloud Architectural Patterns
BCSICT708	Automation and Configuration Management
BCSICT709	Infrastructure Containers

Course code	Open Elective - II
BCSICT710	Artificial Intelligence
BCSICT711	Big Data Analytics
BCSICT712	Data Science

Course code	Elective – IV Lab
BCSICT713	Cyber Forensics Lab
BCSICT714	Web Security and SDLC Lab
BCSICT715	Cloud Security Lab

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
BTech. in Cloud Computing
YEAR III, SEMESTER VIII

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
PRACTICALS AND PROJECTS										
1	Summer Training	BCSAI 801	Industrial Training/Internship	0	0	12	50	100	150	6
2	Project	BCSAI802	Project	0	0	12	50	100	150	6
3	Professional Elective	BCSAI803	Elective VII	3	0	0	25	50	75	3
			TOTAL	**3**	**0**	**24**	**125**	**250**	**375**	**15**

L-Lecture, **T-** Tutorial , **P**- Practical ,**CA**- Continuous Assessment, **EE-** End Semester Examination

	Elective-VII
BCSAI803	Agile Technology
BCSAI804	Metaverse
BCSAI805	Blockchain Technology

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BCSICT701 Cyber Forensics

Module-I

Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling,
electronic media, collection, searching and storage of electronic media, introduction to internet crimes,
hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes
and modules.

Module-II

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12,
FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications

Module-III

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability
Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information,
process of computer forensics and digital investigations, processing of digital evidence, digital images,
damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

Text & References:

C. Altheide& H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011. ISBN: 9781597495868.
Selected readings from various sources as assigned
Online Course management System: https://esu.desire2learn.com/

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BCSICT702 Web Security and SDLC

MODULE I

Introduction to Security and its type, Security ,Web vulnerabilities and its type,
Web Basics: HTML, CSS, HTTP, Navigation,,how to build secure web applications,Detecting and Defending Against Third-Party Tracking on the Web

MODULE II

Network Attacks & HTTPS X-Domain communication ,Limitations of HTTPS, Cross-site Scripting (XSS), SQL Injection, OS Command Injection, HTTP Header Injection,Automated Discovery of Parameter Pollution Vulnerabilities in Web Applications

MODULE III

Request Authorization Flaws,Insecure Web Logic, Logic Flaws, HTTP Pollution, HTTP Parameter Tampering,Cookie Flaws and Server Misconfiguration, Attacks on User Interfaces,web exploitation, web browser design flaws,User Privacy Flaws, Browser & Device Fingerprinting, User Tracking Flaws, Browser Caching Flaws, Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

BCSICT703 Cloud Security

Course Objectives:

CO1	To introduce fundamental concepts of symmetric and asymmetric cipher models
CO2	To introduce fundamental concepts of authentication.
CO3	To introduce network security and web security protocols.
CO4	To understand DES, AES
CO5	To understand Discrete Logarithmic Problem

MODULE I

SECURITY CONCEPTS :Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems- Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL

MODULE II

MULTI-TENANCY ISSUES : Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues- e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery; Virtualization System Vulnerabilities- Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

MODULE III

VIRTUALIZATION SYSTEM-SPECIFIC ATTACKS :Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyperjacking

TECHNOLOGIES FOR VIRTUALIZATION-BASED SECURITY ENHANCEMENT :IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management, Data Loss Prevention. Location of the Perimeter

LEGAL AND COMPLIANCE ISSUES :Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer

REFERENCES

1. Tim Mather, Subra Kumaraswamy, ShahedLatif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance” O'Reilly Media; 1 edition [ISBN: 0596802765], 2009.
2. Ronald L. Krutz, Russell Dean Vines, “Cloud Security” [ISBN: 0470589876], 2010. 3. John Rittinghouse, James Ransome, “Cloud Computing” CRC Press; 1 edition [ISBN: 1439806802], 2009. 4. J.R. ("Vic") Winkler, “Securing the Cloud” Syngress [ISBN: 1597495921] 2011

Cloud Security Alliance, “Security Guidance for Critical Areas of Focus in Cloud Computing” 2009.
6. Vmware “VMware Security Hardening Guide” White Paper, June 2011 .
7. Cloud Security Alliance 2010, “Top Threats to Cloud Computing” Microsoft 2013. 8. Timothy

Grance; Wayne Jansen;NIST "Guidelines on Security and Privacy in Public Cloud Computing", 2011. 9. Evelyn Brown NIST "Guide to Security for Full Virtualization Technologies", 2011.
10. Peter Mell, Timothy Grance, NIST "The NIST Definition of Cloud Computing " 2011.
11. William Hau, Rudolph Araujo et al "How Virtualization Affects PCI DSS", www.foundstone.com.
12. Chenxi Wang "Compliance with Clouds: Caveat Emptor", www.forrester.com/2010.

Course Outcomes (COs): At the end of this course students will be able to:

CO 1. Create Graphic Design artworks of your own.
CO 2. Explain the functionality of different design related software
CO 3. Use learned skills to solve problems of various layouts
CO 4. Test own's skill and knowledge for a better workflow
CO 5. Select best output and what works for a particular given project
CO 6. Develop ideas and various app designs and website pages..

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CSICT704 Hybrid Cloud Computing

MODULE-I

Books

1. “Hybrid Cloud Computing” by Gerard Blokdyk, Createspace Independent Pub, 2017

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BCSICT705 Cloud Web Services

Course Objectives:

CO1	To introduce fundamental concepts of symmetric and asymmetric cipher models
CO2	To introduce fundamental concepts of authentication.
CO3	To introduce network security and web security protocols.
CO4	To understand DES, AES
CO5	To understand Discrete Logarithmic Problem

MODULE I

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study.Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management And Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts.[8]

MODULE II

Introduction To EC2, Instance Types And Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Elastic IPS, Elastic Load Balancing[7]

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MODULE III

Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation, Introduction to CloudWatch, Describe Amazon Cloud Watch metrics and alarms, AWS Messaging Services(SNS,SQS,SES).Introduction to AWS Security, Describe Amazon Identity and Access Management (IAM), AWS Directory Service, AWS Key Management Service, Securing
Data at Rest and In Motion[9]

MODULE IV

Amazon Storage, S3 Storage Basics, Buckets and Objects, Creating A Web Server Using S3 Endpoints, Managing Voluminous Information with EBS, Glacier Storage Service , Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance.[8]

MODULE V

Introduction to AWS Networking , Access Control Lists (ACLs), Setting Up a Security Group, Setting Up VPC And Internet Gateway, Setting Up A VPN,Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web),Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension Of Your Corporate Network),Route53 for DNS System, Cloud front, Case Study[8]

]

Reference Books:

1. Joe Baron, HishamBaz , Tim Bixler , Biff Gaut , Kevin E. Kelly , Sean Senior , John Stamper , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017
2. YohanWadia , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016
3. Bernald Golden, "Amazon Web Services for Dummies", John Wiley & Sons, 2013

Course Outcomes (COs): At the end of this course students will be able to:

CO 1. Create Graphic Design artworks of your own.
CO 2. Explain the functionality of different design related software
CO 3. Use learned skills to solve problems of various layouts
CO 4. Test own's skill and knowledge for a better workflow
CO 5. Select best output and what works for a particular given project
CO 6. Develop ideas and various app designs and website pages..

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BCSICT 706 Cloud Computing Solutions

MODULE I

Introduction to cloud computing, Cloud Computing Architetcure, Virtualization environment in cloud computing, classification of virtualization environment.

MODULE II

Cloud computing data storage, Cloud database, Cloud-Based data storage, Cloud computing implementation, security and application, Security paradigms in cloud computing, Application of wireless sensor network in cloud, Applications of mobile cloud computing, Big data in cloud computing.

MODULE III

Cloud computing simulator tools, CloudSim, Open FaaS, OpenNebula, OpenStack, Euclayptus

Books

1. "Cloud Computing Solutions: Architecture, Data Storage, Implementation and Security", by Souvik Pal,Dac-Nhuong Le,Prasant Kumar Pattnaik, Wiley 2022

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BCSICT707 Cloud Architectural patterns

Module I

Scalability Primer, Horizontally Scaling Compute Pattern, Queue-Centric Workflow Pattern, Auto-Scaling Pattern

Module II

Eventual Consistency Primer, MapReduce Pattern, Database Sharding Pattern,
Multitenancy and Commodity Hardware Primer, Busy Signal Pattern, Node Failure Pattern

Module III

Network Latency Primer, colocate pattern, Valet Key Pattern, CDN Pattern, Multisite Deployment Pattern

Books

1. "Cloud Architecture Patterns" by Bill Wilder, O'Reilly 2012
2. "Cloud Computing Patterns" by "Christoph Fehling,Springer

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BCSICT708
Automation and Configuration Management

Module I

Introduction to AWS Systems Manager, Using SSM RUN command for EC2 configuration Management, Using SSM session manager for EC2 console access, Overview on SSM Patching and Automation, Introduction to AWS Simple Storage Service(S3), Introduction to Elastic File System (EFS), Introduction to Storage Gateway and Deploying it, Introduction to AWS Glacier and creating vaults, Introduction to FSx and AWS Backup

Module II

Introduction to AWS IAM (Identity & Access Management), Creating Users, Roles, Groups and Security Policies, Restricting User Access and Cross Account Roles, Deploy AWS AD Directory Service, Create AWS Organization, Integration AWS Active Directory Service with Single Sign On, Introduction to AWS Resource Access manager(RAM), Inspector and Guard Duty, Introduction AWS Certificate Manager

Module III

Introduction to Automation & Configuration Tools, Introduction to Terraform., Understanding Terraform Vs CloudFormation, Deploying & Destroying AWS environment with Terraform., Introduction to Packer.

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BCSICT709 Infrastructure Containers

Module I

Introduction to Container Services, Installing and configuring Docker, Understand Docker Hub and download images, Creating containers on Docker pushing images to Docker Hub.

Module II

Introduction to ECR and ECS, Creating a repository in ECR and uploading the images, Create ECS Cluster with EC2 Machines.

Module III

Creating Task Definitions for deploying containers, Deploy Tasks and Services on ECS Cluster.

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BCSICT710 ARTIFICIAL INTELLIGENCE

Course Objectives:

CO1	To learn about the knowledge of intelligent agents
CO2	To learn about machine learning
CO3	Understand Bayesian network and fuzzy logic in case of uncertainty.
CO4	To understand HMM model
CO5	To understand Uniformed search strategies

Unit I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning

Unit III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

Unit V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text books: 1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2.Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education 4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India

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

CO1	To apply the knowledge of intelligent agents and the heuristic search techniques.
CO2	To analyze the role of knowledge representation techniques such as propositional and predicate logic in AI.
CO3	To apply the Bayesian network and fuzzy logic in case of uncertainty.
CO4	To analyze different types of planning and learning techniques.
CO5	To apply Uniformed search strategies

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BCSICT711 Big Data Analytics

Course Objectives:

CO1	Provide an overview of Apache Hadoop
CO2	Provide HDFS Concepts and Interfacing with HDFS
CO3	Understand Map Reduce Jobs
CO4	Apply analytics on Structured, Unstructured Data.
CO5	Understand the analysis of Big data

UNIT I : INTRODUCTION TO BIG DATA AND HADOOP

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II : HDFS(Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III : Map Reduce

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit IV : Hadoop Eco System

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.Big SQL : Introduction

UNIT V : Data Analytics with R

Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.
Big Data Analytics with BigR.

Text Books

• Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
• Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References

• Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
• Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
• Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
• Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
• Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

• Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
• Pete Warden, “Big Data Glossary”, O’Reily, 2011.
• Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
• ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
• Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

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

CO1	Analyze Infosphere BigInsights Big Data Recommendations.
CO2	Manage Job Execution in Hadoop Environment
CO3	Develop Big Data Solutions using Hadoop Eco System
CO4	Apply Machine Learning Techniques using R.
CO5	Analyze Big Data by using various techniques

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BCSICT712 Data Science

Unit – I: Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II: Data Collection and Data Pre-Processing

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III: Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV: Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Unit – V: Model Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions : The Intersection of IoT and Data Science”, PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

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BCSICT713 Cyber Forensics Lab

List of Programs:

1. Physical Collection of electronic evidence using forensic standards
2. Dismantling and re-building PCs in order to access the storage media safely
3. Boot sequence and Power On Self-Test mode analysis
4. Examination of File systems of Windows, Linux and Mac
5. Analysing Word processing and Graphic file format
6. Network data sniffing and analysing
7. Password and encryption techniques
8. Internet forensic and Malware analysis
9. Data recovery techniques for hard drive
10. Data recovery techniques for Pen drive and CD

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BCSICT714 Web Security and SDLC Lab

A) List Of Experiment:

Do the following 8 exercises for any two projects of your choice:

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

B) Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipherb) Rail fence row & Column Transformation

C) Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).

D) Demonstrate intrusion detection system using any tool (snort or any other s/w).

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BCSICT715 Cloud Security Lab

List of Programs:
1. Study the basic cloud architecture and represent it using a case study
2. Enlist Major difference between SAAS PAAS & IAAS also submit a research done on various companies in cloud business and the corresponding
services provided by them , tag them under SAAS PAAS & IAAS.
3. Study and present a report on Jolly cloud.
4. Present a report on obstacles and vulnerabilities in cloud computing on generic level
5. Present a report on Amazon cloud services.
6. Present a report on Microsoft cloud services.
7. Present a report on cost management on cloud
8. Enlist and explain legal issues involved in the cloud with the lelp of a case study
9. Explain the process of migrating to cloud with a case study.
10. Present a report on google cloud and cloud services.

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BCSICT 701 Economics for Engineers

MODULE -I

Economic Decisions Making – Overview, Problems, Role, Decision making process. 2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - Per- Unit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits. 3. Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value Of Money, Debt repayment, Nominal & Effective Interest. 4. Present Worth Analysis : End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.

MODULE-II

5. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate Of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector - Quantifying And Valuing Benefits & drawbacks. 6: Uncertainty In Future Events - Estimates And Their Use In Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, Simulation, Real Options

MODULE-III

. 7. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, Depreciation Calculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining Balance Depreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances. 8. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life Of A New Asset, Marginal Cost, Minimum Cost Life Problems. 9. Inflation And Price Change – Definition, Effects, Causes, Price Change With Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates. 10. Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct and Indirect Costs, Indirect Cost Allocation.

Books

1. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,David B.Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson
5. R.Paneer Seelvan: Engineering Economics, PHI
6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pubmywbut.com