SCHOOL OF ENGINEERING AND TECHNOLOGY

SRI PADMAVATI MAHILA VISVAVIDYALAYAM

(WOMEN'S UNIVERSITY)

TIRUPATI – 517502, ANDHRA PRADESH

Accredited by NAAC with 'A' Grade

ISO 9001:2021 Certified

Syllabus

for

B.Tech(CSE) – R20

Department of Computer Science and Engineering

B.Tech
I Year I Semester

B.Tech I Year I Semester

S.No	Course Code	Course Title
1	20BST04	Engineering Mathematics – 1
2	20BST03	Engineering Physics
3	20BST01	Functional English
4	20ECT01	Basic Electronics Engineering
5	20BSP03	Engineering Physics Lab
6	20BSP01	Communicative English Lab
7	20MEP03	Workshop and Manufacturing Practices Lab
8	20ECP01	Basic Electronics Engineering Lab

20BST04: ENGINEERING MATHEMATICS – I

Credits - 4 **Sessional Marks: 30**
L: T: P:: 3: 1: 0 **University Exam Marks: 70**

Course Objectives

1. To introduce the mean value theorems and the fallouts of Rolle's Theorem that is fundamental to application of analysis to engineering problems.
2. To familiarize the students with techniques in integral calculus and introduce the idea of applying integral calculus to notations of curvature.
3. To acquaint the student with different effective mathematical tools for the solutions of differential equations that model physical processes.
4. To equip the students with standard concepts in vector calculus and its applications.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Identify the extrema of a function on an interval and classify them as maxima, minima or saddle using the first derivative test.
CO2 Calculate double and triple integrals and apply to measure the area of a plane and volume of a solid.
CO3 Use the tools of Calculus to sketch the graphs of functions, Critical points, intercepts, Asymptotes etc.
CO4 Solve second and higher order linear differential equations with constant coefficients.
CO5 Analyze the methods for finding the solutions of linear differential equations.
CO6 Memorize definitions of Curl, Gradient and Divergence of vector field and compute them.
CO7 Understand the statements of Stoke's, Green's and Divergence theorem and apply them in solving Engineering problems.

UNIT I

Calculus: Roll's and Mean value theorems, Taylor's theorem, Maclaurins theorem - Maxima & minima for functions of two variables – Curve tracing.

UNIT II

Multiple integrals: Double and triple integrals, Change of order of integration, Change of variables – Simple applications – areas & volumes.

UNIT III

Differential Equations-I: Exact, Linear and Bernoulli's equations, orthogonal trajectories; Homogeneous and Non-Homogeneous linear differential equations of second and higher order with constant coefficients.

UNIT IV

Differential Equations-II: Linear equations with variable coefficients-Euler equations, Method of variation of parameters, Simultaneous equations.

UNIT V

Vector Calculus: Gradient, Divergence, Curl and related properties; Line, surface and volume integrals; Stokes, Greens and Gauss-Divergence theorems.

Text books

1. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition.

Reference Books

1. T.K.V.Iyengar & B.Krishna Gandhi et., "Engineering Mathematics – I, II", S. Chand & Company.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H		L										M	
CO2	H	M		L											H
CO3	H	H	M	L											M
CO4	H	M	L												L
CO5	H	M			L									M	
CO6	M	H			L										M
CO7	M	H			L									M	

20BST03: ENGINEERING PHYSICS

Credits – 4 **Sessional Marks: 30**
L: T: P:3: 1: 0 **University Exam Marks: 70**

Course Objectives

1. To understand this course is at the end of the course the students would be exposed to fundamental knowledge in various engineering subjects and applications.
2. To know the acquaintance of basic physics principles would help engineers to understand the vital role played by science and engineering in the development of new technologies.
3. To Familiarize basic concepts of quantum mechanics, semiconductors and superconductors will lead the students to solve some basic problems in the higher levels of their respective courses.
4. To Gain Knowledge of upcoming technologies like laser technology, fiber optics and Nanotechnology.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Explain the basic concepts of Quantum Mechanics and the band theory of solids.

CO2 Learn and to apply the basic concepts of properties of matter in day-to-day life.

CO3 Learn the types of Semiconductors and the role of carrier concentrations in conductivity and Understand the behaviour of materials at low temperatures and the applications of Super conductivity.

CO4 Understand the use of lasers in Engineering Science, Medicines & apply the concepts of optical fibre in communication systems.

CO5 Get a basic understanding of Nanotechnology. The course will give idea of synthesis, characterisation of Nano materials and electrical & optical properties, applications of Nano systems.

UNIT I

Quantum Mechanics and Conducting Material: Introduction-wave nature of particles-De-Broglie Hypothesis-Time dependent and independent Schrodinger wave equation-Physical signification of wave function-particle in one dimensional infinite potential well-Heisenberg Uncertainty Principle-Classical free electron theory-quantum free electron theory-Fermi Dirac Distribution.

UNIT II

Properties of Matter: Elasticity– Stress-strain diagram and its uses - factors affecting elastic Modulus and tensile strength – Torsion stress and deformations– twisting couple - torsion pendulum: theory and experiment -bending of beams- bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT III

Semiconductors and Superconductors: Semiconductors: Semiconducting materials: Intrinsic and extrinsic semiconductors – carrier concentration derivation – Fermi level – variation of Fermi level with temperature in intrinsic – electrical conductivity for intrinsic semiconductor –Hall Effect.

Superconductivity: Introduction - effect of magnetic field- Meissner effect- Types of superconductors - Flux quantization - Magnetic Levitation - BCS theory - Josephson Effect - Application of superconductors.

UNIT IV

Laser& Fiber Optics: Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; Amplification of light by population inversion, different types of lasers: He-Ne Gas Laser, Ruby Laser - Coherence -applications in engineering science and medicine.

Fiber Optics: Light propagation through fibers –Acceptance angle – numerical aperture – types of fibers – step index, graded index – single mode, multimode – attenuation – dispersion– LED-Detector- application of fiber optics in communication

UNIT V

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down Fabrication: Chemical Vapour Deposition, Physical Vapour Deposition, Pulsed Laser Vapour Deposition Methods, Characterization (TEM)-Carbon Nan tubes (OD,1D,2D and 3D) – Applications.

Text Books

1. Avadhanulu M. N., "Engineering Physics", S. Chand & Co., 2007
2. K.Thiyagarajan,"Engineering Physics" McGraw Hill Education (India) Private Limited.

Reference Books

1. Gaur R K, Gupta S L, "Engineering Physics", Dhanpat Rai Publications, 2013.
2. R.Murugesan, Kiruthiga Sivaprasath,"Modern Physics" S.Chand & Company Pvt. Ltd, 2014.
3. Pillai, S.O., "Solid State Physics", New Age International Publication, New Delhi, Seventh Edition, 2015.

Course Outcomes – Program Outcomes- Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M													M
CO2			H		M										H
CO3			M			H	L						L		H
CO4					H					H					M
CO5				H			M				H			L	

20BST01: FUNCTIONAL ENGLISH

Credits – 3 **Sessional Marks: 30**
L: T: P:: 3: 0: 0 **University Exam Marks: 70**

Course Objectives

1. To develop the knowledge of communicative grammar, enhance lexical capabilities by extensive practice exercises, build the vocabulary, and develop skimming and scanning skills using reading materials on different topics.
2. To enhance professional competence in reading, writing, listening and speaking.
3. To switch the approach from providing information about the language to use the language.
4. To minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
5. To introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centered learning rather than on the teacher-centered learning.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Analyze the usage of English words in different contexts and acquire considerable flair in using broad range of vocabulary.

CO2 Upgrade comprehension of technical and academic articles and recognize writings as a process rather than a product.

CO3 Identify common errors in various parts of English and give effective expression in oral and written communication.

CO4 Explore various grammatical units of English and design a language component critically and coherently to meet desired needs within the realistic constraints.

UNIT I

The Secret of Work by Swami Vivekananda: Vocabulary Building: Root words from foreign languages and their use in English; Writing: Tenses; Identifying Common Errors: Subject-Verb agreement; Reading Comprehension.

UNIT II

Reaching for the Stars: Kalpana Chawla: Vocabulary Building: Word Formation; Writing: Sentence Structures, Use of phrases and clauses in sentences; Identifying Common Errors: Noun-Pronoun Agreement; Reading Comprehension.

UNIT III

A Retrieved Reformation by O. Henry: Vocabulary Building: Acquaintance with prefix and suffix from foreign languages in English to form derivatives; Writing: Importance of proper punctuation, Creating Coherence, Describing; Identifying Common Errors: Misplaced Modifiers; Reading Comprehension.

UNIT IV

Water: The Elixir of Life by C.V. Raman: Vocabulary Building: Synonyms and antonyms; Writing: Paragraph writing, Précis Writing; Identifying Common Errors: Articles, Prepositions; Reading Comprehension.

UNIT V

The Post Office by Rabindranath Tagore: Vocabulary Building: Standard Abbreviations; Writing: Letter Writing; Identifying Common Errors: Use of Adjectives; Reading Comprehension.

Reference Books

1. Michael Swan, “Practical English Usage”, OUP. 1995.

2. F.T. Wood, “Remedial English Grammar”, Macmillan. 2007.
3. William Zinsser, “On Writing Well”, Harper Resource Book. 2001.
4. Liz Hamp-Lyons and Ben Heasly. “Study Writing”, Cambridge University Press. 2006.
5. Sanjay Kumar and PushpLata. “Communication Skills”, Oxford University Press. 2011.

Course Outcomes – Program Outcomes- Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		H								M		L		M	
CO2				M						H		M		L	
CO3									M	H		L			M
CO4				M						H		M		M	

20ECT01: BASIC ELECTRONICS ENGINEERING

Credits–3 Sessional Marks:30
L:T:P::2:1:0 University Exam Marks:70

Course Objectives

1. To Know the volt-Ampere characteristics of semiconductor devices.
2. To Gain knowledge on various Transistor Amplifiers.
3. To Know the principle of operation of FET biasing schemes and Amplifiers.
4. To Familiarize with negative feedback Amplifiers and oscillators.
5. To Implement different op-Ampcircuits.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Learn PN-Diode, Transistor, FET, Amplifiers, Oscillators, IC‘s.
CO2 Solve problems related to Rectifiers, Transistor Amplifiers, negativefeedback amplifiers, Inverting and non-inverting Op-Amp circuits.
CO3 Classify Rectifiers and FET Amplifiers, Oscillators.
CO4 Analyze the biasing schemes of Transistors, FET ‘s, rectifiers and Amplifiers.
CO5 Apply rectifiers, BJT Amplifiers, FET amplifier, negative Feedback Amplifiers, oscillators, OP-Amps for electronic systems.

UNIT I

PN Junction Diode: Semiconductor materials, PN junction diode, Volt-ampere characteristic and applications, Half wave rectifier, Full wave rectifier, Bridge rectifier, Filters.

UNIT II

Bipolar Junction Transistor: Construction, characteristics and parameters, Transistor as amplifier,Biasing, CB, CE, CC amplifiers and their comparison.

UNIT III

Field Effect Transistor: Construction, characteristics and parameters of JFET, depletion and enhancement type MOSFETS, Biasing, JFET amplifiers, CS, CD and CG amplifiers and their comparison.

UNIT IV

Feedback Amplifiers and Oscillators: Concept of Feedback, advantages of Negative Feedback, typesof feedback circuits, BarkHausen criterion, RC phase shift and wein bridge oscillators, Hartley and Colpitts oscillators.

UNIT V

Integrated Circuit Applications: Op-Amp applications, inverting and Non-inverting amplifiers, comparator, Summer, Integrator, Astable and Monostable Multi-vibrators.

Text Books

1. J.Milliman and C.C.Halkias, Satyabratajit, ―Integrated Electronics‖, 2nd edition, TMH,1998.
2. Allen Mottershead, ―Electronic Devices and Circuits‖, PHI Private Limited,1979.

Reference Books

1. RobertL.Boylestad, LouisNashelsky-‐Electronic Devices and Circuit Theory,9thEdition,2008.
2. S.Salivahana, N.Suresh Kumar, A.Vallavaraj- Electronic Devices and Circuits, 2nd Edition

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-										H		
CO2		H	M	L					L	L	L		H	M	
CO3	H	M											H		
CO4	H	M	L	L										L	H
CO5			H	M		M	L		L	L	L	L		L	H

20BSP03: ENGINEERING PHYSICS LAB

Credits - 1 **Sessional Marks: 40**
L:T:P::0:0:2 **University Exam Marks: 60**

Course Objective

1. To impart practical knowledge about some practical phenomena they have studied in the engineering physics course.
2. To develop the experimental skills of the students.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Apply knowledge of mathematics and physics fundamentals and an Instrumentation to arrive solution for various problems.
CO2 Understand the usage of basic laws and theories to determine various properties of the materials given.
CO3 Apply the theories learnt and the skills acquired to solve real time problems.
CO4 Carryout experiments to understand the laws and concepts of physics.

LIST OF EXPERIMENTS
(Minimum Six are mandatory)

1. Determination of Numerical aperture and bending losses of fibers of an optical fiber.
2. Young's modulus - non uniform bending – Pin and microscope
3. Calibration of voltmeter / ammeter using potentiometer
4. Spectrometer-Dispersive power of prism /grating.
5. Spectrometer- Determination of refractive index of given liquid using Hollow Prism.
6. Laser-Determination of wavelength.
7. Air Wedge- Determination of thickness of given thin wire.
8. V-I Characteristics of PN Junction diode.
9. Energy Gap Determination of a PN Junction Diode
10. Determination of surface tension of the given liquid-drop weight method.

Course Outcomes – Program Outcomes – Program Specific Outcomes(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H														H
CO2		H													M
CO3			H												M
CO4	H				H					H					H

20BSP01: COMMUNICATIVE ENGLISH LAB

Credits – 1 **Sessional Marks: 40**
L:T:P::0:0:2 **University Exam Marks: 60**

Course Objectives

1. To enhance communicative skills of the students with emphasis on Listening, Speaking, Reading and Writing skills.
2. To develop oral communication and fluency in Group Discussions, Just a Minute and Debates.
3. To enable the student to acquire the structure of written expressions required for their profession.
4. To enable the student to communicate in English for Academic and Social purpose.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Learn English speech sounds, analyze phonetic transcriptions
CO2 Understand the stress on word accent, intonation, and rhythm to acquire better pronunciation.
CO3 Acquire fluency in spoken English and neutralize mother tongue influence.
CO4 Upgrade listening skills and receive and interpret messages in the communication process.
CO5 Become active participants in the learning process and acquire proficiency in both ways of communication

UNIT I

Phonetics: i) Phonetics: Importance ii) Speech Sounds - Vowels and Consonants iii) Phonetic Transcriptions

UNIT II

Pronunciation: i) Word Stress and Rhythm ii) Intonation: Rising tone, Falling tone.

UNIT III

Oral Communication: i) Group Discussions ii) Just a minute (JAM) iii) Debate iv) Situational Dialogues v) Oral Presentations

UNIT IV

Listening Skills

UNIT V

Resume Writing, Interview Skills

Reference Books

1. Nira Konar, “English Language Laboratories: A Comprehensive Manual”. PHI Learning Pvt. Ltd., 2011.
2. Michael Swan, “Practical English Usage”, OUP. 1995.
3. William Zinsser, “On Writing Well”, Harper Resource Book. 2001.
4. Liz Hamp-Lyons and Ben Heasly. “Study Writing, Cambridge University Press. 2006.
5. Sanjay Kumar and Pushp Lata. “Communication Skills”, Oxford University Press. 2011.
6. Central institute of English & Foreign Languages. “Exercises in Spoken English. Parts. I-III”, Hyderabad. Oxford University Press.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		**H**		**M**						**L**				**M**	
CO2		**L**		**M**						**H**				**L**	
CO3				**M**						**H**				**M**	
CO4		**M**								**H**					**M**
CO5				**L**						**H**		**M**			**H**

20MEP03: WORKSHOP AND MANUFACTURING PRACTICES LAB
(Common for all Branches)

Credits – 2 **Sessional Marks: 40**
L:T:P::0:0:4 **University Exam Marks: 60**

Course Objectives

To expose the students to the following

1. Understand the basic knowledge of Workshop Practice and Safety.
2. Identify and use of different hand tools and other instruments like Hand Saw, Jack Plane, Chisels etc and operations like such as Marking, cutting etc used in manufacturing processes.
3. Get hands on practice in various machining metal joining processes such as turning, facing, fitting, Soldering, etc.
4. Gain basic knowledge on Computer hardware and Software.

Course Outcomes

After successful completion of course the student should be able to

CO1 Gain basic knowledge of Workshop Practice and Safety useful for our daily living.
CO2 Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and Performing Operations such as Marking, cutting etc used in manufacturing.
CO3 Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber etc., to understand the concept of tolerances applicable in all kind of manufacturing.
CO4 Known and identify the computer hardware, assembly and disassemble the CPU.
CO5 Obtain the knowledge to installation of software's for different applications.

TRADE 1: CARPENTARY

Wood sizing exercise in planning, marking, sawing, chiseling and grooving to prepare

1. Cross Lap Joint.
2. Bridle Tee Joint.

TRADE 2: FITTING

Marking, cutting and filing to practice

1. Square Fitting.
2. V Fitting.

TRADE 3: ELECTRICAL & ELECTRONICS

Safety rules and practices in wiring, basic circuits common house wiring connections such as

1. Identification of basic electrical and electronic components.
2. (a) Two-switches, two-bulbs in parallel connection.
   (b)Staircase connection.
3. Soldering process.

TRADE 4: MANUFACTURING PRACTICE ON LATHE

1. Facing operation
2. Straight turning and Chamfering.

TRADE 5: INFORMATION TECHNOLOGY

1. Assembly and disassembly of CPU and component identification.
2. Software installation.

Reference Books

1. K. Venkat Reddy, Workshop Manual, BS Publications
2. P.Kannaiah, K.L.Narayana -Work shop Manual -SciTech Publishers.
3. Jeyapoovan, SaravanaPandian-Engineering Practices Lab Manual -Vikas publishers

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				M			L		M			H	M	
CO2	H	H	L							M			H	M	
CO3	H					M				M		L	M	M	
CO4	L	M			H					M			H	M	
CO5	H				L	M				M			H	M	

20ECP01: BASIC ELECTRONICS ENGINEERING LAB

Credits–1 **Sessional Marks:40**
L: T:P::0:0:2 **University ExamMarks:60**

Course Objectives

1. To provide Engineering skills by way of breadboard circuits with electronic devices and components.
2. To test and experimentally determine characteristics of electronic devices such as FET, PN diode, BJT&JFET.
3. To construct and measure different parameters of Rectifiers, Amplifiers and OP Amps.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Plot the characteristics of electronic devices and determine their parameters.
CO2 Construct and test amplifiers, Rectifiers and oscillators.
CO3 Operate electronic test equipment.
CO4 Verify experimentally determined values with theoretical values.
CO5 Identify the applications of different Electronic Devices.

LIST OF EXPERIMENTS

1. Study of CRO.
2. PN Junction Diode Characteristics
3. Half Wave Rectifier with and without C filter
4. Full Wave Rectifier with and without LC filter
5. Bridge Rectifier with and without πfilter
6. Input and output Characteristics of BJT in CE configuration
7. CE amplifier
8. FET characteristics
9. Feedback Amplifiers
10. RC phase shift Oscillator
11. OP-Amp applications
12. OP Amp Comparator and Astable Multivibrator.

Note: A Minimum of 10 experiments have to be conducted.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	-	-	-	-		L	L	L		H		
CO2			H	M					L	L	L			H	L
CO3		L	H	M					L	L	L		H	M	L
CO4		M	H						L	L	L		H		M
CO5		H	M	M					L	L	L	L	L		H

B. Tech
I Year II Semester

B.Tech I Year II Semester

S.No	Course Code	Course Title
1	20BST05	Engineering Mathematics – II
2	20BST02	Engineering Chemistry
3	20CST01	Programming for Problem Solving
4	20EET01	Basic Electrical Engineering
5	20BST13	Essence of Indian Knowledge Tradition
6	20BSP02	Engineering Chemistry Lab
7	20CSP01	Programming for Problem Solving Lab
8	20EEP01	Basic Electrical Engineering Lab
9	20MEP01	Engineering Graphics

20BST05: ENGINEERING MATHEMATICS – II

Credits - 4 **Sessional Marks: 30**
L: T: P :: 3: 1: 0 **University Exam Marks: 70**

Course Objectives

1. Provides an introduction to Laplace Transforms
2. To Gain knowledge of matrices in a comprehensive manner and the convergence of series.
3. To Familiarize numerical methods for solving first-order IVPs

To introduce partial differential equations and make the student get acquainted with the basics of PDE.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Define Laplace transforms, Rank, Eigen Values and Eigen vectors, absolute and Conditional convergence

CO2 Understand Convolution theorem, Linear Dependence and Independence, Convergence and Divergence of sequences and series, Basic concepts of formation of Partial differential equations.

CO3 Apply Laplace transforms to solve ordinary differential equations and use appropriate numerical method to solve algebraic, Transcendental equations, ordinary differential equations.

CO4 Determine the Laplace transforms of standard functions and evaluate a definite integral numerically and demonstrate that any square matrix satisfies its characteristic polynomial and evaluate its minimalpolynomial

CO5 Derive one – dimensional wave equation, Heat equation and Laplace equation

UNIT I

Laplace Transforms: Laplace transforms of standard functions, Transform of Periodic functions, Step function, Inverse transforms of derivatives and integrals, Convolution theorem, applications to solutions of ordinary differential equations.

UNIT II

Matrices: Rank, solution of system of linear equations, Eigen values, Eigen vectors, Cayley Hamilton theorem, Quadratic forms – Diagonalization.

Sequences and Series: Convergence and Divergence, Ratio test, Comparison test, Absolute and Conditional Convergence.

UNIT III

Partial Differential Equations: Formation of PDEs by elimination of arbitrary constants and arbitrary functions, Method of separation of variables, one dimensional wave equation, heat equation, Laplace equation.

UNIT IV

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation by Gauss elimination method, Gauss matrix and Gauss – Seidal iteration method.

Interpolation: Newton‘s forward and backward interpolation formulae – Lagrange‘s formulae.

UNIT V

Numerical Integration: Trapezoidal rule – Simpson‘s 1/3 Rule – Simpson‘s 3/8 Rule.

Numerical solution of Ordinary Differential equations

Solution by Taylor‘s series-Picard‘s Method of successive Approximations-Euler‘s Method, Runge-Kutta Methods, Predictor-Corrector Method-Milne‘s Method.

Text book

1. Grewal, B.S. Higher Engineering Mathematics, Khanna Publishers, 42nd Edition.

Reference Books

1. T.K.V. Iyengar & B. Krishna Gandhi et.,-Engineering Mathematics –I, II; S. Chand & Company.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M			L								**L**		
CO2	M	H			L									**M**	
CO3	H	L			M										**L**
CO4	H	M			M									**L**	
CO5	M	H			L										**M**

20BST02: ENGINEERING CHEMISTRY

Credits – 4 **Sessional Marks: 30**
L:T:P::3:1: 0 **University Exam Marks: 70**

Course Objectives

1. To impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
2. To strengthen the fundamentals of chemistry in Atomic Structure and then build an interface of theoretical concepts with the engineering applications.
3. To help students understand the fundamental concepts and achieve Advanced Knowledge about the interactions of Spectroscopy and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
4. To Implement the concepts of chemistry in respect of Electrochemical cells, Thermodynamic process, mechanism of corrosion and factors to influence, polymers with their applications and analytical methods.
5. To understand the upcoming technologies like Fullerenes, carbon nanotubes, applications of Telecommunications in Nano materials.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Explain the basic concepts of Atomic and Molecular structures and the band theory of solids.
CO2 Solve problems related to the structure, purity and to study Molecular interactions by Spectroscopic methods
CO3 Apply knowledge of Substitute metals with Conducting polymers and also produce Bio-degradable polymers to reduce Environmental Pollution
CO4 Understand the mechanism of Electro Chemical corrosion of metals, use of appropriate design criteria and apply corrosion protection techniques.
CO5 Give idea of synthesis, characterization of Nanomaterials and applications of latest technology on Carbon Nano wires and medicinal applications.

UNIT I

Atomic and molecular structure: Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals.Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT II

Spectroscopic techniques, applications and Organic reactions and synthesis of a drug molecule: Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

UNIT III

Polymers: Mechanism of polymerization and synthesis of polymers. Molecular weight, shape and conformation of polymers. Crystallinity, melting point and glass transition. Copolymerization. Viscoelasticity. Elastomers-structure, applications and curing. Conducting polymers and applications. Dendrimers. Solubility of polymers. Fabrication and moulding of polymers. Synthesis, properties and uses of PE, PVC, PMMA, formaldehyde resins, melamine- formaldehyde-urea resins. Adhesives, adhesive

mechanism and applications. Composites: characteristics, types and applications. Nanocomposites. Metallic and nonmetallic fillers.

UNIT IV

Surfactants and Lubricants and Corrosion: Methods of preparation, cleaning mechanism. Critical micelle concentration and itsdetermination. Hydrophobic and hydrophilic interactions. Micelles and reverse micelles. Detergents. Fricohesity of surfactants. Lubricants-physical and chemical properties, types and mechanism of lubrication. Additives of lubricants and freezing points of lubricants. Thermodynamic overview of electrochemical processes. Reversible and irreversible cells. Chemical and electrochemical corrosion and mechanism of corrosion. Factors affecting corrosion. Protection of corrosion and practical problems of corrosion.

UNIT V

New Materials/Nanomaterials: Nanomaterials. Properties and application of fullerenes, fullerols, carbon nanotubes and nanowires. Synthesis-top down and bottom-up approaches. Nanoelectronics. Applications of nanomaterials in catalysis, telecommunication and medicine.

Text Books

1. Jain and Jain –Engineering Chemistry,15th Edition, Dhanapatrai publishing company.
2. K.N.Jayaveera, G.V.Subba Reddy, C.Ramachandraiah. Engineering Chemistry,1st Edition, McGraw Hill Education (India) Private Limited,2013.

Reference Books

1. Jag Mohan, –Organic Spectroscopy, 2nd Edition, Narosa Publishing house, 2007.
2. V.K.Ahluwalia and Rakeshkumar Parashar. Organic Reaction Mechanisms, 3rd Edition, Narosa Publishing House, 2007.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M												L	
CO2		H	L		H									M	
CO3					M	H	H								M
CO4			H			H	L							L	
CO5					H		M			H					M

20CST01: PROGRAMMING FOR PROBLEM SOLVING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University ExamMarks:70**

Course Objectives

To expose the students to the following:
1. Basic concepts of computer, programming, flowchart, and pseudo code.
2. Variables, C-Tokens and operators, console I/O, expressions, statements
3. Functions, arrays and strings.
4. Pointers, dynamic memory allocation, structures, and unions.
5. Files, pre-processor directives, command line arguments

Course Outcomes

After successful completion of course the student should be able to

CO1 Learn and understand the basics of computers, c programming, functions, strings, structures and files.
CO2 Use C programming concepts in the implementation of real time problems
CO3 Analyze the problem for its decomposition into functions and synthesize a complete program using divide and conquer approach.
CO4 Test and execute the programs, correct syntax and logical errors.
CO5 Design algorithms and develop programs for the real time applications

UNIT I

Introduction to Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Problem Solving Aspects, Top-Down Design, Bottom-Up Design, Development of Algorithms, Representation of Algorithm, Flow Chart, Pseudo Code, Coding, Testing and Debugging.

UNIT II

Introduction to C: History of C programming Language, Structure of a C program - Comments, pre-processor statements, function header statements, variable declaration statements and executable statements. C character set, C tokens-constants, identifiers, operators, punctuations and keywords. Basic data types, modifiers, identifiers, variables, C Scopes, Type qualifiers, Storage Class Specifiers, variable initializations and constants. Console I/O: Reading and writing characters, Formatted console I/O. Operators: Assignment, Arithmetic, Relational, Logical, Bitwise, Ternary, Address, Increment/Decrement, special Operators. Expressions: Precedence of operators and associativity. Category of Statements: Decision Making, Branching and Looping statements.

UNIT III

Functions: Declaration, Prototype definition, calling by value and address, Standard Library Functions, User Defined functions, Recursive Functions.

Arrays and strings: Declaration, Initialization, Reading and Writing, Accessing, and Passing as a Parameter to functions, Types of arrays, String functions.

UNIT IV

Pointers: Pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointers to functions, Dynamic memory allocation functions.

Structures: Declaration, initialization, accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, Unions, Bit-fields, typedef, and enumerations.

UNIT V

Files: I/O and processing operations on Text and binary files, Pre-processor directives and Command Line Arguments.

Textbooks

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Prentice Hall of India, 2018

Reference Books

1. Herbert Schildt, "C: The Complete Reference", Tata McGraw-Hill, 4th Edition, 2000.
2. E Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill, 7th Edition, 2016.
3. Yeswanth Kanitkar, "Let us C", BPB Publications, 9th Edition, 2012.

Web References

1. https://nptel.ac.in/courses/106/105/106105171/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	L	-	-	M	-	-	-	-	-	L	M	H
CO2	M	-	-	H	L	-	-	-	-	-	-	-	H	M	L
CO3	L	M	-	H	-	-	-	-	-	-	-	-	H	M	L
CO4	L	-	H	M	-	-	-	-	-	-	-	-	H	M	L
CO5	-	-	H	L	M	-	-	-	-	-	-	-	H	M	L

20EET01: BASIC ELECTRICAL ENGINEERING
(Common for CSE, ME & ECE Branches)

Credits – 3 **Sessional Marks: 30**
L:T:P::3:0:0 **University Exam Marks: 70**

Course Objectives

1. To impart basic knowledge of electrical quantities such as current, voltage, power and energy and analysis techniques in electrical engineering.
2. To provide knowledge on magnetic circuits.
3. To familiarize with the ac circuits.
4. To introduce Network theorems to determine circuit response.
5. To Know the Construction and Principle of Operation of DC Generators, DC Motors,Transformers, single phase and three phase Induction motors.

Course Outcomes

After completion of the course the student will be able to

CO1 Apply the concepts of basic laws and calculate the fundamental quantities in DC circuits.
CO2 Explain the basic concepts of electromagnetism, types of induced emf, self and mutual Inductances.
CO3 Understand the basic definitions, Analyze and apply the phasor algebra approach in R, L, C series andparallel AC circuits.
CO4 Analyze the various Network theorems to determine circuit response
CO5 Describe the principle of operation, Types and construction of DC generators, DC motors, Transformers,Single & three phase induction motors.

UNIT I

DC Circuits: Active and passive elements – Ideal and practical sources –V –I Characteristics of R.L and C elements– Kirchhoff's laws, Mesh and nodal analysis – Concept of super mesh and super node.
Magnetic Circuits: Basic definitions, Analogy between electric and magnetic circuits, magnetization characteristics of ferromagnetic materials, self inductance, mutual inductance, energy in linear magnetic systems, coils connected in series attracting force of electro magnets. Concept of coupling and dot convention.

UNIT II

AC Circuits: Principle of AC voltages, wave forms and basic definitions, relationship between frequency, speedand number of poles, root mean square and average values of alternating current and voltage, form factor and peak factor, phasor representation of Alternating Quantities, the j operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series circuits, single phase parallel circuits, single phase series parallel circuits, power in AC circuits.

UNIT III

Network Theorems: Super position theorem, Thevenin's& Norton's theorem, Maximum power transfer theorems,Tellegan's Theorem, Millman's Theorem and problems.

UNIT IV

Transformers: Principle of operation, constructional details, ideal transformer, and practical transformer, losses, transformertesting, efficiency, and regulation calculations (all the above topics are elementary treatment and simple problems).
Direct Current Machines: principle of operation of DC machines, armature windings, EMF equation in DCmachines, torque production in a DC machine, operation of a DC machine as a generator, operation of a DCmachine as a motor, losses and efficiency.

UNIT V

A.C Machines: Single Phase Induction Motor: principle of operation, types of single phase induction

motor and working.
Three Phase Induction Motor: principle of operation, production of rotating magnetic field, slip and rotorfrequency, torque (simple problems), losses and efficiency.

Text Books
1. M.S Naidu and S.Kamakshaiah, ―Basic Electrical Engineering, 2nd Edition, Tata McGraw – Hill, 2008
2. T.K.Nagsarkar and M.S.Sukhija, ‐Basic Electrical Engineering, 2nd Edition, Oxford University press, 2017.

Reference Books
1. D.P.Kothari& I.J.Nagrath, Theory and Problems of Basic Electrical Engineering, 2nd Edition, PHI, 2017.
2. V.K.Mehta, ―Principles of Electrical Engineering Revised Edition, S.Chand publications, 2010
3. David V.Kems, JRJ.David ―Essentials of Electrical and computer engineering, United States Edition, IrwinPearson, 2004

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	M	-	-	-	-	M	-	-	L	H	-
CO2	H	-	-	-	-	-	-	-	-	M	-	-	L	M	-
CO3	M	H	-	-	L	-	-	-	-	M	-	-	L	M	-
CO4	M	-	-	-	H	-	-	-	-	M	-	-	L	M	-
CO5	H	L	H	-	-	-	-	-	-	M	-	-	L	M	-

20BST13: ESSENCE OF INDIAN KNOWLEDGE TRADITION

Credits – No credits
L:T:P::3:0:0

Course Objectives

1. To impart basic principles of thought process, reasoning and inferencing. Sustainability is at thecore of Indian Traditional knowledge systems connecting society and nature.
2. To impart holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
3. To focus on introduction to Indian knowledge System, Indian perspective of modern scientificworld-view and basic principles of Yoga and holistic health care system.
4. To focuses on Indian Philosophical traditions, Indian linguistic Tradition and Indian artistic tradition.

Course Outcomes

After successful completion of course the student should be able to

CO1 The student will be able to understand, connect up and explain basics of Indian Traditional knowledge in modern scientific perspective.

UNIT I

The basic structures of Indian knowledge system: Vedas – vedangas, Upavedas – Ayurveda, Dhanur veda, Gandharva veda, Vedic gods – Agni, Indra, Varuna, Vishnu, Importance of the study of the vedic hymns.

UNIT II

Modern sciences and Indian knowledge system: Vedic cosmology, Indian atomic theory, Matter life and Mind –Sri Aurobindo.

UNIT III

Yoga and Holistic Health Care: Mind and its Modes, Afflictions, Threefold pain, Dispositions, Levels of Attention, Astanga Yoga.

UNIT IV

Indian Philosophical Tradition: Asatikadarshanas - Nyaya, Vaisesika, Sankhya, Yoga, Mimamsa, Vendanta. Nastikadarshanas – Carvaka, Jaina Buddhism

UNIT V

Indian Linguistic and Aristic Tradition: Phonology - (sabda), Morphology (pada), syntax (vakya), Semantics, Vakhyartha, Chitrakala, Murthikala, vasthukala

Reference Books

1. S. RadhaKrishna , Indian Philosophy ,Oxford Indian Paper backs, New Delhi.
2. V.SivaramaKrishnan (Ed.), Cultural Heritage of Indian - course material, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
3. SmamiJitatmanand , Modern Physics and Vedant , BhartiyaVidyaBhavan.
4. SmamiJitatamanad , Holistic Science and Vedant , BhartiyaVidyaBhavan.
5. Fritz of capra ,Tao of Physics.
6. Fritz of capra, The Wave of Life VN Jha(Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Arnakulam.
7. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
8. GN Jha (Eng. Trans.), Ed. RN Jha , Yoga-darshanam with VyasaBhashya, Vidyanidhi Prakashan, Delhi 2016.
9. RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidhi Prakashan, Delhi, 2016
10. PB Sharma (English translation), Shodashang Hridayan.

20BSP02: ENGINEERING CHEMISTRY LAB

Credits – 1 **Sessional Mark: 40**
L:T:P::0:0: 2 **University Exam Marks: 60**

Course Objectives

1. To impart practical knowledge about some practical phenomena they have studied in the engineering Chemistry course.
2. To develop the experimental skills of the students.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Understand the estimation of the acidity of water, Dissolved Oxygen in different water samples, estimation of chloride content of water and some ions etc.

CO2 Analyse and to measure the conductance and redox potentials of different solutions.

CO3 Develop knowledge pertaining to the appropriate selection of instruments for the successful analysis of complex mixture.

CO4 Apply the knowledge of various aspects of synthesis of drug

LIST OF EXPERIMENTS
(Minimum Seven are mandatory)

1. To determine the strength of KMnO4 solution by titrating it against a standard solution of Oxalic acid.
2. Determination of hardness of water by EDTA method.
3. Estimation of acidity of Water.
4. Estimation of Dissolved oxygen in water sample.
5. Determination of Iron by using potassium dichromate.
6. Estimation of copper by EDTA method.
7. Estimation of chloride in water sample.
8. Conductometric titration of strong acid with strong base.
9. Potentiometric titration of Iron by dichrometry method.
10. Colorimetric estimation of manganese
11. Synthesis of a polymer/ drug.
12. Thin layer chromatography.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H													M	
CO2		H												H	
CO3					H									L	
CO4						H									M

20CSP01: PROGRAMMING FOR PROBLEM SOLVING LAB

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:0:4 **University Exam Marks:60**

Course Objectives

To expose the students to the following:
1. Understand and solve logical and mathematical problems.
2. Learn problem solving techniques.
3. Programming methodologies using C language.

Course Outcomes

After successful completion of course the student should be able to

CO1 Formulate the algorithms and develop simple C programs without any looping constructs.
CO2 Write complex C programs using loops, functions, strings, pointers.
CO3 Create and maintain files using C constructs.
CO4 Implement real time applications using the C language features.

LIST OF EXPERIMENTS

1. Write a C program to display "Hello Computer" on the screen.
2. Write a C program to display Your Name, Address and City in different lines.
3. Write a C program to find the area of a circle
4. Write a C program to convert centigrade into Fahrenheit. Formula: C=(F*32)/1.8.
5. Write a C program to read in a three-digit number produce following output (assuming that the input is 347) 3 hundreds 4 tens 7units
6. Write a C program to read in two integers and display one as a percentage of the other. Typically, your output should look like 20 is 50.00% of 40 assuming that the input numbers were 20 and 40. Display the percentage correct to 2 decimal places.
7. Write a C program to swap variable values of i and j.
8. Write the program for the simple, compound interest.
9. Write a C program to find the maximum from given three nos.
10. Write a C program to find that the accepted no is Negative, Positive or Zero.
11. Write a program which reads two integer values. If the first is lesser print the message up. If the second is lesser, print the message down if they are equal, print the message equal if there is an error reading the data, print a message containing the word Error
12. Given as input three integers representing a date as day, month, year, print the number day, month and year for the next day's date. Typical input: —28 2 1992, Typical output: —Date following 28:02:1992 is 01:03:1992.
13. Write program for students marks grading.
14. Take three coefficients (a, b, and c) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program to output the possible roots for a given set of coefficients with appropriate messages.
15. Implement a C program that takes an integer number as input, check whether it is PALINDROME or NOT and output the reverse of the same with suitable messages. Ex: Num: 2014, Reverse: 4102, Not a Palindrome.
16. Implement a C program to find the square root of a given number N and execute for all possible inputs with appropriate messages. Note: Don't use library function sqrt(n).
17. Design and develop a C program to read a year as an input and find whether it is leap year or not. Also consider end of the centuries.
18. Design and develop a C function Right Shift (x, n) that takes two integers x and n as input and returns value of the integer x rotated to the right by n positions. Assume the integers are unsigned.
19. Write a C program that invokes this function with different values for x and n and tabulate the

results with suitable headings.

20. Design and develop a C function is prime (num) that accepts an integer argument and returns 1 if the argument is prime, a 0 otherwise. Write a C program that invokes this function to generate prime numbers between the given ranges.
21. Write a C program for the problem given below: Assume that the United States of America uses the following income tax code formula for their annual income: First US$ 5000 of income: 0% tax Next US$ 10,000 of income: 10% tax Next US$ 20,000 of income: 15% tax. An amount above US$ 35,000: 20% tax. For example, somebody earning US$ 38,000 annually would owe US$ 5000 X 0.00 + 10,000 X 0.10 + 20,000 X 0.15 + 3,000 X 0.20, which comes to US$ 4600.
22. Write a program that uses a loop to input the income and calculate and report the owed tax amount. Make sure that your calculation is mathematically accurate and that truncation errors are eliminated.
23. Write a C program to convert decimal to binary.
24. Write a C program to convert decimal to octal.
25. Write a C program to convert decimal to hexadecimal.
26. Write a C program that reads in integers until a 0 is entered. If it encounters 0 as input, then it should display:
    a. The total number of even and odd integers
    b. Average value of even integers
    c. Average value of odd integers. Note: Use switch statement for selection.
27. Write an interactive program to generate the divisors of a given integer.
28. Write a program to find all Armstrong number in the range of 0 and 999 Hint: An Armstrong number of three digits is an integer such that the sum of the cubes of its digits is equal to the number itself. For example, 371 is an Armstrong number since 3**3 + 7**3 + 1**3 =371.
29. Write a program to check whether a given number is a perfect number or not. Hint: A positive integer n is called a perfect number if it is equal to the sum of all of its positive divisors, excluding n itself. For example, 6 is a perfect number, because 1, 2 and 3 are its proper positive divisors and 1 + 2 + 3 = 6. The next perfect number is 28 = 1 + 2 + 4 + 7 + 14. The next perfect numbers are 496 and8128.
30. Write a program to check whether given two numbers are amicable numbers or not. Hint: Amicable numbers are two numbers so related that the sum of the proper divisors of the one is equal to the other, unity being considered as a proper divisor but not the number itself. Such a pair is (220,284); for the proper divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110, of which the sum is 284; and the proper divisors of 284 are 1, 2, 4, 71, and 142, of which the sum is 220.
31. Write a program that will take as input a set of integers and find and display the largest and the smallest values within the input data values.
32. Write a C program that uses functions to perform the following operations: i. To insert a sub-string in to a given main string from a given position. ii. To delete n Characters from a given position in a given string.
33. Write a C program to do the following computation by providing the option using the switch statement:
    a. Add two matrices
    b. Subtract two matrices
    c. Multiply two matrices
34. Write a program to check if the given matrix is magic square or not.
35. Write a program print the upper and lower triangle of the matrix.
36. Write a program to compute transpose of a matrix.
37. Write a program to find the inverse of a matrix.
38. Using recursion, (i) Find the factorial of a number (ii) Find Greatest Common Divisor (GCD) of two numbers (iii) To generate Fibonacci sequence (iv) Reverse n characters.
39. Write a C program to convert a Roman numeral to its decimal equivalent.
40. Write a program to convert a given lowercase string to upper case string without using the inbuilt string function.

41. Write a program to count number of vowels, consonants and spaces in a given string.
42. Define a structure that will hold the data for a complex number. Using this structure, please write a program that will input two complex numbers and output the multiple of the two complex numbers. Use double variables to represent complex number components. Note: A complex number z is a number of the form z = a + bi where a and b are real numbers. The term a is called the real part of z and b is called the imaginary part of z. The multiplication operation on complex numbers is defined as: (a + bi) * (c + di) = (ac - bd) + (ad + bc) i
43. Write a function that will return the length of a character string. You are not allowed to use the strlen C library function. Note: Use ―Pointers concept
44. Write a function that returns the minimum and the maximum value in an array of integers.
45. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
46. Write a program that prompts the user the name of a file and then counts and displays the number of bytes in the file. And create a duplicate file with the word .backup appended to the file name. Please check whether file was successfully opened, and display an error message, if not.
47. Write a program to create a file, open it, type-in some characters and count the number of characters in a file.
48. Write a program that will input a person's first name, last name, SSN number and age and write the information to a data file. One person's information should be in a single line. Use the function fprintf to write to the data file. Accept the information and write the data within a loop. Your program should exit the loop when the word 'EXIT' is entered for the first name. Remember to close the file before terminating the program. Hint: Use the function strcmp( ) to compare two strings.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	M	H	-	-	-	-	-	-	-	-	-	-	H	M	L
CO2	-	L	H	M	-	-	-	-	-	-	-	-	M	H	L
CO3	-	L	M	-	H	-	-	-	-	-	-	-	H	M	L
CO4	-	-	H	M	L	-	-	-	-	-	-	-	M	H	L

20EEP01: BASIC ELECTRICAL ENGINEERING LAB

Credits – 1 **Sessional Mark: 40**
L:T:P::0:0:2 **University Exam Marks: 60**

Course Objectives

1. To provide hands on experience to the students so that they are able to put theoretical concepts to practice.
2. To find the circuit response using KVL, KCL and various network theorems.
3. To conduct OC and SC test on single phase transformer.
4. To learn about various test conditions on DC shunt motor

Course Outcomes

After completion of the course the student will able to

CO1 Apply suitable theorems for circuit analysis and verify the results theoretically.
CO2 Experimentally determine self-inductance, mutual inductance and coefficient of coupling
CO3 Analyze the performance of DC shunt motor, single phase transformer.
CO4 Verify KVL and KCL in a series and parallel resistive network.
CO5 Draw current locus diagrams

LIST OF EXPERIMENTS

1. Verification of KVL and KCL in a series and parallel resistive network.
2. Determination of coefficient of coupling of a coupled circuit.
3. Verification of Superposition Theorem.
4. Verification of Thevenin's Theorem.
5. Verification Norton's Theorem.
6. Verification of Maximum power transfer theorem with DC source.
7. Verification of Millman's Theorem
8. OC and SC test on single phase transformer.
9. Brake test on DC shunt motor.
10. Swinburne's tests on DC shunt motor.

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	M	-	-	-	-	-	-	M	-	L	H	M	-
CO2	M	H	M	M	-	-	-	-	-	M	-	-	M	H	-
CO3	M	H	M	M	-	-	-	-	-	M	-	-	M	H	-
CO4	H	M	M	M	-	-	-	-	-	M	-	-	H	H	-
CO5	H	H	M	-	-	-	-	-	-	M	-	-	-	H	-

20MEP01: ENGINEERING GRAPHICS

Credits – 3 **Sessional Marks: 40**
L:T:P::0:0:6 **University Exam Marks: 60**

Course Objectives

To expose the students to the following

1. Develop the graphic skills for communication of concepts, ideas and design of engineering products.
2. Expose them to existing national standards related to technical drawings.
3. Develop skills in three-dimensional visualization of engineering component.
4. Learn sketching and taking field dimensions.
5. Take data and transform it into graphic drawings.
6. Learn basic engineering drawing formats, basic AutoCAD skills & draw 2D drawings in Auto CAD.

Course Outcomes

After successful completion of course the student should be able to

CO1 Prepare drawings as per standards.
CO2 Solve specific geometrical problems in plane geometry involving lines, plane figures and special Curves.
CO3 Produce orthographic projection of engineering components working from pictorial drawings.
CO4 Perform basic sketching techniques will improve.
CO5 Draw projections and sections, ability to produce engineered drawings will improve, willbecome familiar with Auto-CAD two-dimensional practice and standards.
CO6 Develop good communication skills and teamwork.

Part A

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Dimensioningprinciples, Conventions in Drawing.
Conics Sections: Ellipse - Eccentricity method, Arcs of circles Method, Oblong method and Four Center Method;Parabola - Eccentricity method, rectangular method, Tangent method.
Hyperbola - Eccentricity method, Rectangular Hyperbola.

Principles of Projections: Principles of Orthographic Projections and Conventions. Projection of Points, Projection of Lines (first angle projection only) inclined to both planes.

Projections of Planes: Projections of regular Planes (Triangle, Square, Rectangle, Pentagon, Hexagon and Circle) insimple position, inclined to both the planes.

Part B (Using AutoCAD)

Projections of Solids: Projections of right regular solids (Cube, Prism, Pyramid) in simple position, inclined to boththe planes.
Isometric Projections: Isometric projection of right regular solids (Cube, Prism, Pyramid, Sphere). Conversion ofgiven isometric views to orthographic views of simple objects.

Text Books

1. N.D. Bhat / Charotar, ‐Engineering Drawing, New edition.
2. K.L. Narayana and Kannaiah, ‐Engineering Drawing, Scitech Publishers.

Reference Books

1. Venugopal K, ‐Engineering Drawing and Graphics, New Age International.
2. P.J. Shah, ‐Engineering drawing, S. Chand.
3. Johle, ―Engineering Drawing, Tata McGraw Hill.

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H									M			H		
CO2		H	L							M			H	M	
CO3		L	M	H						M				H	
CO4	H									M			H	M	
CO5			M	H	L					M				M	
CO6					L				H	M			H		

B.Tech

II Year I Semester

B.Tech II Year I Semester

20BST08	Economics and Accountancy
20BST16	Universal Human Values & Ethics
20ECT26	Digital Logic Design
20MET13	Operations Research
20CST02	Discrete Mathematics
20CST03	Data Structures
20ECP12	Digital Logic Design Lab
20CSP02	Data Structures Lab
20CSP03	IT Workshop
20CSS01	Learning Tableau

20BST08: ECONOMICS AND ACCOUNTANCY

Credits – 4 **Sessional Marks: 30**
L:T:P::3:1:0 **University Exam Marks: 70**

Course Objectives

1. To impart in-depth knowledge of the subject and highlights the role of the economics, finance & accountancy in the field of engineering.
2. To strengthen the fundamentals of demand analysis & production function.
3. To estimate demand, price-output in different market structures.
4. To select the different investment alternatives
5. To know the financial position of the companies

Course Outcomes

After successful completion of the course the student should be able to

CO1 Define law of demand, assumption, production function & different types of costs
CO2 Apply demand forecasting techniques & BEP for estimation of demand & production
CO3 Identify the price-output in different competitions
CO4 Determine the feasible investment alternative.
CO5 Analyse the financial position of the company through ratio analysis.

UNIT I

Introduction to Economics: Economics – Micro & Macro Economics – Definitions - Significance & Limitations. Demand Analysis: Law of Demand, Demand Determinants. Elasticity of Demand: Definition, Types and Demand Forecasting methods.

UNIT II

Theory of Production: Firm and Industry – Production Function – Cobb Douglas Production function – Laws of returns – internal and external economies of scale. Break-Even Analysis: Concept of Break-even point (BEP) – Significance of BEP – Limitation - Assumptions - Break-even chart – Determination of BEP in volume and value (Simple problems).

UNIT III

Cost Analysis: Cost concepts, Fixed Vs Variable costs, explicit Vs implicit costs, Out-of-pocket costs Vs imputed costs and Opportunity cost. Introduction to Markets, Market structure, types of competition, features of Perfect competition, Monopoly, Monopolistic competition – Price output determination.

UNIT IV

Fundamentals of finance and Capital Budgeting: Capital and its significance – Types of Capital, Estimation of Fixed and Working Capital, requirements and methods of raising capital. Capital Budgeting Methods: Pay back method, Accounting Rate of Return (ARR) and Net Present Value (NPV) and IRR methods (Simple Problems).

UNIT V

Introduction to Financial Accounting and Financial Analysis: Double Entry Book Keeping – Journal, Ledger, Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments. Ratio Analysis: Computation of Liquidity ratios (Current ratio and quick ratio), Activity Ratios (Inventory Turnover ratio, Debtors Turnover ratio) Capital Structure Ratios (Debt-equity Ratio and Interest Coverage ratio) and Profitability Ratios (Gross Profit ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS) Analysis and interpretation

Text Books

1. Joel Dean, Managerial Economics, PHI 2001
2. James C. Van Home, Financial Management Policy

3. I.M. Pandy, Financial Management, PHI

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			**H**								**M**	**L**	**H**		
CO2				**M**	**H**							**L**		**L**	
CO3			**L**								**M**				
CO4				**L**	**M**						**H**	**L**			
CO5				**M**							**H**	**L**			**L**

20BST16 UNIVERSAL HUMAN VALUES AND ETHICS

Credits – 3 **Sessional Marks: 30**
L:T: P::3:0:0 **University Exam Marks: 70**

Course Objectives

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Students are expected to become more aware of themselves, and their surroundings (family, society, nature)

CO2 They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3 They would have better critical ability.

CO4 They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

CO5 It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

UNIT I

Course Introduction – Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values--I
2. Self-Exploration-what is it? – Its content and process; 'Natural Acceptance' and Experiential Validation – as the process for self-exploration
3. Continuous Happiness and Prosperity – A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility – the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking- disliking

UNIT II

Understanding Harmony in the Human Being – Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' – happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body : Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT III

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature - recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

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

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

Textbooks

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"

5. E. FSchumacher. “Small is Beautiful”
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa “Economy of Permanence”
8. Pandit Sunderlal “Bharat Mein Angreji Raj”
9. Dharampal, “Rediscovering India”
10. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									H	L					L
CO2							H	L						L	
CO3			H					M							M
CO4				H											M
CO5			H			M									H

20ECT26: DIGITAL LOGIC DESIGN

Credits-3 **Sessional Marks: 30**
L:T:P::2:1:0 **University Exam Marks: 70**

Course objectives

1. Tointroducethebasicrulesfordesignwithcombinationalandsequentialdigitallogicandstate machines.
2. To learn simple digital circuits in preparation for computer Engineering.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Define different Number systems, binary addition and subtraction, two's complement representation & operations, different switching algebra theorems and apply them for logic functions

CO2 Define K-map for a few variables and perform an algorithmic reduction of logic functions and known about different combinational circuits

CO3 Learn about different sequential logic circuits

CO4 Learn HDL for combinational logic circuits.

CO5 Learn HDL for Sequential logic circuits.

UNIT I

Binary Systems: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, Complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions canonical and standard forms, Other logic operations, Digital logic gates, Integrated circuits.

UNIT II

Gate Level Minimization: The map method, Four-variable map, five variable map, Product of sums simplification, Don't care conditions, NAND and NOR implementation, Other Two level implementations, Exclusive-OR function,

Combinational Logic: Combinational Circuits, Analysis procedure, Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexer.

UNIT III

Synchronous Sequential Logic: Sequential circuits, latches, Flip-flops, Analysis of clocked sequential, Hardware Description Language (HDL), HDL for Sequential circuits, HDL for logic circuits, State reduction and Assignment: Design procedure, Registers, Shift Registers,

UNIT IV

Ripple counters, Synchronous counters, Other Counters, HDL for Registers and Counters. Introduction, Random-Access Memory Decoding, Error Detection and Correction, Read-Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices

UNIT V

Asynchronous Sequential Logic: Introduction, Analysis, procedure, Circuits with Latches, Design procedure, Reduction of state and flow tables, Race free state assignment Hazards, Design Example.

Text Books

1. M. Morris Mano, ―Digital Logic and Computer Design-3rdEdition, Pearson Education/PHI Thomson,

Reference Books

1. Zvi.Kohavi, ―Switching and finite automata Theory, Tata Mc Graw Hill

2. Donlad D.Givone, Digital Principles and Design, Tata Mc Graw Hill, Edition.
3. M.Rafiquzzaman Hohn Wiley, –Fundamentals of Digital Logic & Micro Computer Design. 5th Edition.

Course Outcomes-Program Outcomes- Program Specific Outcomes-(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	H	L	-	-	-	-	L	M	L	-	H	-	-
CO2	L	L	H	M	-	-	-	-	L	L	M	-	-	H	M
CO3	M	H	-	-	-	-	--	--	-	-	-	-	H	M	
CO4	H	L	-	-	-	-	-	-	-	-	-	-	-	H	M
CO5		L	L	M	H	-	-	-	-	-	-	-	-	M	H

20MET13: OPERATIONS RESEARCH

Credits – 4 **Sessional Marks: 30**
L:T:P::3:1:0 **University Exam Marks: 70**

Course Objectives
To expose the students to the following
1. Familiarize optimized Decision-Making models in Operations Management.

Course Outcomes
After successful completion of course the student should be able to
CO1 Define and formulate mathematical models for Operation Management.
CO2 Formulate the Assignment Models. `
CO3 Define replacement strategies for maintenance of production systems.
CO4 Understand game, queuing and decision theories.
CO5 Formulate multi-stage applications into a dynamic programming framework

UNIT I
Development: definition– characteristics and phases – types of operation research models – applications. Allocation: Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two–phase method, big-M method – duality principle.

UNIT II
Transportation Problem: Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem-traveling salesman problem.
Sequencing: Introduction – flow –shop sequencing – *n* jobs through two machines – *n* jobs through three machines – job shop sequencing – two jobs through 'm'machines.

UNIT III
Replacement: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT IV
Theory of games: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games –graphical method.
Waiting Lines: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals.

UNIT V
Dynamic Programming: shortest path problem, PERT, CPM, Applications and simulation techniques and applications.

Text Books
1. S.D.Sharma-Kedarnath, "Operations Research".
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th edition, Tata McGraw Hill.

Reference Books
1. Hiller & Libermann, "Introduction to O.R", Tata McGraw Hill.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson.
3. Maurice Saseini, Arhur Yaspan & Lawrence Friedman., "Operations Research Methods & Problems".
4. R.Panner selvam, "Operations Research", PHI Publications.

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M		M		M		L	L	M	L	H		M
CO2		H	M				M				M	L			M
CO3	H	H	M		M		M		L		M	L			M
CO4	H									L		M			M
CO5		H	M		M		M		L		M	M			

20CST02: DISCRETE MATHEMATICS

Credits – 3 **Sessional Marks: 30**
L:T:P::2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Propositional Logic, Predicate Logic, quantifiers, rules of inference
2. Sets, functions, and relations
3. Mathematical Induction and recursion
4. Counting and its advanced techniques
5. Semi groups, monoids, groups, and rings

Course Outcomes

After successful completion of course the student should be able to

CO1 Have knowledge and understand the basic concepts on logic, induction, recursion, basic structures, counting and algebraic structures.

CO2 Apply the rules of inference, principles of mathematical induction to prove various theorems, basic counting techniques to solve combinatorial problems

CO3 Perform analysis on logic and proofs, counting techniques and algebraic structures.

CO4 Test and validate the expressions/statements using logic, induction and counting techniques.

CO5 Solve real-time problems using basic and algebraic structures, any induction technique or counting principles.

UNIT I

The Foundations – Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicated and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs.

UNIT II

Basic Structures: Sets, Set Operations, Functions, Sequences and Summations, Cardinality of Sets, Relations and their properties, n-ary relations and their applications, representing relations, closures of relations, equivalence relations, partial orderings

UNIT III

Induction and Recursion: Mathematical Induction, Strong Induction and Well-ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT IV

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, Generating Permutations and Combinations.

Advanced Counting Techniques: Applications of Recurrence Relations, Solving Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion

UNIT V

Algebraic Structures: Semi groups and Monoids – Definition and Examples, Sub semi groups and Sub monoids, Homomorphism of Semigroups and Monoids, Groups – Definitions and Examples, Subgroups, Group Homomorphism, Cosets and Lagrange's Theorem, Normal Subgroups and Quotient Groups, Permutation Groups, Algebraic Systems with Two Binary Operations – Rings, Some Special classes of Rings, Subrings and Homomorphisms.

Textbooks

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw – Hill, 8th edition, 2019
2. N. Chandrasekaran and M. Umaparvathi, "Discrete Mathematics", PHI Learning Private Limited, Second Edition, 2015

Reference Books

1. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structure and Its Application to Computer Science", TMG Edition, Tata McGraw-Hill, 2001.
2. Bernard Kolman, Robert Busby, Sharon C. Ross, "Discrete Mathematical Structures", 6th Edition, Pearson Education, 2014.

Web References

1. https://nptel.ac.in/courses/106/106/106106183/
2. https://nptel.ac.in/courses/106/105/106105192/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	H	-	L	M	-	-	-	-	-	-	-	-	H	-	-
CO3	-	H	L	M	-	-	-	-	-	-	-	-	H	-	-
CO4	M	L	H	-	-	-	-	-	-	-	-	-	H	-	-
CO5	-	L	M	H	-	-	-	-	-	-	-	-	H	-	L

20CST03: DATA STRUCTURES

Credits – 3 **Sessional Marks: 30**
L:T:P::2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Basic concepts of object-oriented programming, graphs and trees.
2. Fundamental concepts of data structures like Stacks, queues and expression evaluation using stack data structure.
3. Building lists, graphs and trees.
4. Performing tree and graph traversals.
5. Compare and distinguish various searching and sorting techniques.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand the basic concepts of Object-Oriented Programming like inheritance, polymorphism, graphs and trees.
CO2 Analyse stack and queues ADTs and their applications and Expression evaluation.
CO3 Design algorithms for stacks, queues, trees and graphs.
CO4 Apply Graph search, traversal algorithms using OOPS concepts.
CO5 Constructing and applying sorting and searching techniques.

UNIT I

Introduction to Object Oriented Programming: An overview of C++ Programming, classes and objects, constructors, destructors, templates, Data Abstraction, Inheritance, Overloading functions and operators, Polymorphism, Friend Functions, Inline Functions, Exception Handling.

UNIT II

Stacks and Queues: ADT Stack and its operations, Applications of Stacks: Expression Conversion and evaluation, ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue - Operations and applications.

UNIT III

Linked Lists: Singly linked list, doubly linked list, Circular linked list–operations and applications, linked stacks and queues

Graphs: Basic Terminologies and Representations, Graph search and traversal algorithms-applications.

UNIT IV

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Heap Tree, Binary Search Tree, AVL Tree - operations and Applications of Binary Trees, B Tree, B+ Tree.

UNIT V

Sorting: Introduction to internal sorting, Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, external sorting.

Searching: linear search, binary search, Hashing.

Textbooks

1. Herbert Schildt, “Complete Reference C++”, Tata McGraw-Hill, Fifth edition, 2015.
2. Ellis Horowitz, Sartaj Sahni, “Fundamentals of Data Structures in C++”, Illustrative edition, Galgotia publication, 2013.

Reference Books

1. BjarneStroustrup, "The C++ Programming Language", Addison-Wesley Professional, 4th Edition, 2013.
2. Adam Drozdek, "Data Structures and Algorithms in C++", 4th Edition, Cengage Learning, 2012.
3. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Silicon Press, Second Edition 2005.

Web References

1. https://www.programiz.com/dsa
2. https://dl.acm.org/doi/book/10.5555/1201270
3. https://www.cise.ufl.edu/~sahni/dsaac/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	L	-	M	-	-	-	-	-	-	-	H	-	-
CO2	H	-	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	H	L	-	M	-	-	-	-	-	-	-	-	M	-	-
CO4	M	L	-	H	-	-	-	-	-	-	-	-	-	M	-
CO5	H	-	H	-	-	-	-	-	-	-	-	-	H	-	-

20ECP12: DIGITAL LOGIC DESIGN LAB

Credits – 1 **Sessional Marks:40**
L:T:P::0:0:2 **University Exam Marks:60**

Course Objectives

1. To know about the behavior of digital logic.
2. To understand combinational logic circuits and sequential logic circuits.

Course Outcomes

At the end of the course, students will demonstrate the ability to:

CO1 Construct and experiment different logic gates.
CO2 Measure Test combinational logic circuits.
CO3 Usage different adders and subtractor.
CO4 Verify experimentally sequential logic circuits.
CO5 Identify the applications of decoders and display.

LIST OF EXPERIMENTS

1. Testing of Logic gates
2. Decoders
3. Encoders
4. Multiplexers
5. Demultiplexers
6. Half subtractor & Full subtractor
7. Half adder & Full adder
8. Flip–Flops
9. MOD-10Counter
10. Shift register
11. Johnson counter
12. Seven Segment Decoder

Note: A minimum of 10 experiments have to be conducted.

Course outcomes-Program outcomes -Program Specific Outcomes(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	H	L					L	M	L		H		
CO2	L	L	H	M					L	L	M			H	M
CO3	M	H											H	M	
CO4	H	L												H	M
CO5		L	L	M	H									M	H

20CSP02: DATA STRUCTURES LAB

Credits – 1 **Sessional Marks: 40**
L:T:P::0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Develop skills to design and analyse simple linear and non-linear data structures.
2. Strengthen the ability to identify and apply the suitable data structure for the given real-world problem.
3. Implement various sorting and searching methods

Course Outcomes

After successful completion of course the student should be able to

CO1 Identify and implement the solutions for given real world problems using OOPs concepts and appropriate linear and non-linear data structure for a given problem.

CO2 Determine and simulate the appropriate searching and sorting techniques for a given problem.

CO3 Implement various graph traversal techniques.

LIST OF PROGRAMS

1. Define a class to represent a bank account which includes the following members as Data members
   a) Name of the depositor b) Account Number c) Withdrawal amount d) Balance amount in the account
   Member Functions: a) To assign initial values b) To deposit an amount c) To withdraw an amount after checking the balance d) To display name and balance.
2. Write the above program for handling n number of account holders using array of objects.
3. Write a C++ program to compute area of right-angle triangle, equilateral triangle, isosceles triangle using function overloading concept.
4. Write a C++ program to swap the values two integer members of different classes using friend function.
5. Define a class string and overload == to compare two strings and + operator for concatenation of two strings.
6. Consider an example of declaring the examination result. Design three classes' student, exam and result. The student has data members such as roll no, name. Create the lass exam by inheriting the student class. The exam class adds data members representing the marks scored in 5 subjects. Derive the result from exam-class and it has own data members like total, avg. Write the interactive program into model this relationship
7. Write a program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array
8. Write a program to reverse the elements in the stack using recursion.
9. Write a program to implement the simple Queue and circular operations
10. Write a program that uses functions to perform the following: a) Create a singly linked list of integers. b) Delete a given integer from the above linked list. c) Display the contents of the above list after deletion.
11. Write a program that uses functions to perform the following: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion.
12. Write a program to implement Circular linked list operations
13. Determine the in degree and out degree of all the vertices of a given graph.
14. Write programs for implementing the following graph traversal algorithms:

a. Depth first traversal
b. Breadth first traversal

15. Determine whether the given graph is connected graph or not.
16. Write a program that uses functions to perform the following: a) Create a binary search tree of characters. b) Traverse the above Binary search tree recursively in Postorder.
17. Write a program that uses functions to perform the following: a) Create a binary search tree of integers. b) Traverse the above Binary search tree non-recursively in inorder.
18. Write a program to implement B-tree
19. Write a program to implement B++ tree
20. Write a program to implement AVL tree
21. Write programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Bubble sort b) Insertion sort
22. Write programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Quick sort b) Selection sort
23. Write programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Merge sort b) Heap sort
24. Write a program to implement external sorting technique.
25. Write a program to search for a given element using
    a. Linear search
    b. Binary search
26. Write a program to implement all the functions of a dictionary (ADT) using hashing.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	M	-	-	M	-	-	-	-	-	-	H	-	-
CO2	H	M	H	-	-	-	-	-	-	-	-	-	M	-	-
CO3	H	H	M	-	-	-	-	-	-	-	-	-	-	-	L

20CSP03: IT WORKSHOP

Credits – 1 **Sessional Marks: 40**
L:T:P::0:0:2 **University Exam Marks:60**

Course Objectives

To expose the students to the following:

1. How to repair the faults occurred in
2. Desktop, Laptop, Mobile phones
3. Training on PC Hardware, Internet & World Wide Web, Spread sheet computations, and Presentation.
4. Introduction to a personal computer and its basic peripherals, the process of assembling and installing a personal computer with system software along with Troubleshooting.
5. Introduction to the usage of Productivity tools in crafting professional word documents, excel spread sheets and power point presentations using open office tools and LaTeX.

Course Outcomes

After successful completion of course the student should be able to

CO1 Perform all maintenance tasks related to desktop, laptop and mobile phones
CO2 Apply knowledge for computer assembling and software installation.
CO3 Solve the trouble shooting problems.
CO4 Utilize the tools for preparation of PPT, documentation and budget sheet etc.

LIST OF EXPERIMENTS

1. Maintenance of Desktop, Laptop and Mobile Phones
2. Hardware Troubleshooting
3. Software Troubleshooting
4. Web Browsers, Surfing the Web
5. Search Engines &Netiquette
6. Cyber Hygiene
7. Development of web pages
8. Word Orientation along with LaTex
9. Utilization of LaTeX and Word to create project certificate
10. Creating projects
11. Creating a Newsletter
12. Spread sheet Orientation
13. Calculating GPA
14. Creating PowerPoint

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	H	M	-	M	-	L	-	H	-	-	M	-	-
CO2	H	M	-	M	-	L	-	L	M	M	-	L	M	-	-
CO3	H	L	-	M	L	-	L	L	L	M	-	-	M	-	-
CO4	L	L	M	-	H	-	-	L	-	-	-	-	L	H	-

20CSS01: LEARNING TABLEAU

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following

1. Develop the fundamental skills of the tool and Use all the basic functionality to visualize their data.
2. Strengthen the ability to use the tool to the real world problems.
3. Implement advanced formatting and data visualization best practices.

Course Outcomes

After successful completion of course the student should be able to

CO1 Work with Tableau by applying basic and advanced features of Tableau
CO2 Identify and implement the appropriate solution for the problem using Tableau Desktop
CO3 Create dashboards that yield meaningful insights.
CO4 Implement skills to the next level with advanced calculations, enhanced dashboard interactivity, and advanced analytics.

UNIT I

Communicating Data: A step in the process, a model of Communication, Three types of communication, Six principles of communicating data.
Introduction: Getting Started with Tableau Desktop, brief introduction to Tableau Desktop, Seeing what you can do with Tableau, Understanding the basics.

UNIT II

Bringing in Data: Understanding data Connections, Data Sources, Different editions of Tableau Desktop, Considering Live Data versus Data Extracts, Connecting to Data, Visualizing Data

UNIT III

Analyzing Data: Understanding Tableau Desktop Environment, Considering Data Display options, Adding Worksheets, Creating Dashboards, and Building Stories

UNIT IV

Publishing and Sharing: Publishing workbooks, Understanding Publishing, Sharing Tableau Workbooks, Providing Access to Analysis, Sharing Files with Tableau

UNIT V

Advancing to a Higher Level: Advanced Visual Analytics, Creating Calculations, Unlocking the language of Calculated Fields

Textbooks

1. Molly Monsey and Paul Sochan, "Tableau for Dummies", John Wiley & Sons, First Edition, 2016.
2. Ben Jones, "Communicating Data with Tableau", O'Reilly, 1st Edition, 2014.

Reference Books

1. Ryan Sleeper, "Practical Tableau", O'Reilly, 1st Edition, 2018.
2. Daniel G.Murray, "Tableau your Data", John Wiley & Sons, 1st Edition, 2013.

LIST OF PROGRAMS

1. Orientation to Tableau and downloading and Installing Tableau
2. Creating your First Visualizations and Dashboard
3. Working with Data in Tableau
4. Moving from Foundations to Advanced Visualizations
5. Using Row-Level and Aggregate Calculations
6. Table Calculations
7. Formatting a Visualization to Look Great and Work Well
8. Telling a Data Story with Dashboards
9. Adding Value to Analysis-Trends, Distributions and Forecasting
10. Making Data work for you
11. Advanced Techniques
12. Sharing your Data Story

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	-	H	-	-	-	-	-	-	-	H	M	-
CO2	M	H	-	L	-	-	-	-	-	-	-	-	H	M	L
CO3	-	M	H	-	M	-	-	-	-	-	-	-	M	M	L
CO4	H	M	-	L	H	-	-	-	-	-	-	-	H	M	L

B.Tech

II Year II Semester

B.Tech II Year II Semester

S. No	Course Code	Course Title
1	20BST07	Probability and Statistics
2	20BST09	Industrial Management
3	20CST04	Computer Architecture and Organization
4	20CST05	Object Oriented Programming
5	20CST06	Database Management Systems
6	**ELECTIVE – I**	
	20CST15	Data Communication
	20CST16	System Programming
	20CST17	Software Project Management
	20CST18	Data Mining
8	20BST12	Environmental Studies
9	20CSP04	Object Oriented Programming Lab
10	20CSP05	Database Management Systems Lab
11	20CSP06	Mathematical Tool Kit Lab
12	20CSS02	PHP: Hypertext Processor

20BST07: PROBABILITY AND STATISTICS

Credits - 3 **Sessional Marks: 30**
L: T: P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

1. To study the fundamental concepts like random variables, probability, probability distributions, sampling.
2. To understand the statistical concepts of estimation, hypothesis testing, regression, correlation analysis and multiple regression.
3. To equip students with essential tools for statistical analyses at the graduate level.
4. To familiarize the techniques of ANOVA designs and reliability most frequently used in engineering and applied research.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Find probabilities of single events, complementary events and the unions and intersections of collections of events.
CO2 Derive the probability density function of random variables and use these techniques to generate data for various distributions.
CO3 Calculate the mean and variance of continuous and discrete random variable.
CO4 Describes the Sampling distribution of mean when σ- known or unknown.
CO5 Differentiate between a population and a sample
CO6 Identify features that determine the width of a confidence interval.
CO7 State and apply the definitions of the t, F and χ 2 distributions in terms of the standard Normal.
CO8 Define the concept of least squares estimation in linear regression.
CO9 State the modelling assumptions underlying ANOVA.

UNIT I

Probability & Random Variables: Probability- Axioms of Probability-some elementary Theorems-Conditional probability-Baye's theorem. Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectations, Mean and Variance.

UNIT II

Probability Distributions: Binomial Distribution, Mean and Standard Deviations of Binomial Distribution, Poisson distribution, Mean and Standard Deviations of Poisson Distribution. Continuous Distributions: Normal Distribution, Mean, Variance and area properties.

UNIT III

Sampling Distributions, Inferences concerning means, Inferences concerning variances

Populations and Samples, The Sampling Distribution of the Mean (σ Known), The Sampling Distribution of the Mean (σ Unknown), The Sampling Distribution of the Variance. Point Estimation, Interval Estimation, Bayesian Estimation, Tests of Hypotheses, Null Hypotheses and Significance Tests, Hypotheses Concerning One Mean, Operating Characteristic Curves, Hypotheses Concerning Two Means, The Estimation of Variances, Hypotheses Concerning One Variance, Hypotheses Concerning Two Variances.

UNIT IV

Test of Significance (small samples): Student's t – test, test for ratio of variance (or) F – test, Chi – square test for Goodness of fit and independence of attributes - The method of least squares-fitting a straight-line, second-degree parabolas and more general curves - Curvilinear Regression –Multiple Regressions, Correlation.

UNIT V

Anova: Analysis of variance - one way classification, two way classification, Completely Randomized Designs. Reliability – Failure –Time Distributions-The exponential Model Reliability –The Weibull Model in Life Testing.

Text books

1. T.K.V.Iyengar & B.Krishna Gandhi et. al, "Probability and Statistics", S. Chand & Company, Vol.III.
2. Irwin Miller, John E.Freund, "Probability and Statistics for Engineers", Pearson Global edition, 9th edition.
3. S C Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", S. Chand & Son's, 10th edition 2000.
4. Shahnaz Bathul, "A text book of Probability and Statistics", Ridge Publications, 2nd edition.

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M											M		
CO2	H	L			M										
CO3	H	M											L		
CO4	H	L					M								
CO5	M	H					L							M	
CO6	M	H													
CO7	H	M												M	
CO8	H	M											L		
CO9	H	M													H

20BST09: INDUSTRIAL MANAGEMENT

Credits – 3 **Sessional Marks: 30**
L:T: P::3:0:0 **University Exam Marks: 70**

Course Objectives

1. To impact in-depth knowledge of the subject and highlights the role of the management in the field of engineering.
2. To strengthen the fundamentals of management functions and organisation structures.
3. To select the suitable type of organisation
4. To know the feasible location for the plant & layout
5. To understand the role of human resource management in organisations.
6. To select suitable marketing mix, channels of distribution for the organisation

Course Outcomes

After successful completion of the course the student should be able to

CO1 Define the function of management, organisation, material management & HRM
CO2 Evaluate the thoughts of management, performance of employees & job evaluation.
CO3 Identify the type & location of organisation.
CO4 Understand the functions of HRM
CO5 Determine the marketing mix, channels of distribution and PLC

UNIT I

Introduction to Management: Concept of Management - Functions of Management – Evaluation of Management Thought: Taylor's Scientific Management, Fayol's principles of Management, Douglas MC Gregor's theory X and Y, Maslow's Hierarchy of human needs.

UNIT II

Organisation: Concept - Principles of organisation. Organisational Structure: Line Organisation, Functional Organisation and Line and Staff Organisation. Types of Business Organisations: Features, Merits and Demerits of Sole trading Proprietorship, Partnership, Joint stock Companies.

UNIT III

Introduction to Operations Management: Plant location and Layout, Methods of Production. Work-study: Method study- Procedure and charts. Work measurement – procedure & work sampling. Materials Management: objectives of inventory control - EOQ & ABC analysis.

UNIT IV

Introduction to Human Resource Management: The concept of HRM. Functions of the HR manager - Manpower planning, Recruitment, Selection, Training and Development, Performance Appraisal and Job evaluation.

UNIT V

Marketing: Marketing – Definition – Marketing concepts – Marketing Environment - Marketing Mix, Marketing Vs Selling, Stages in Product Life Cycle, Channels of Distribution.

Text Book

1. A.R. Aryasri, Management Science for JNTU (B.Tech), TMH, 2002

Reference Books

1. Koontz and O'Donnel, Principles of Management, MC Graw Hill, 2001
2. Phillip Kotler, Marketing Management (11th Ed 2002) Prentice Hall of India.
3. Gary Dessler, Human Resource Management, Pearson Education, Asis, 2002
4. O.P. Khanna, Industrial Engineering & Management, Dhanpat Rai 1999
5. Chandra Bose, Management and Administration, Prentice Hall, 2002
6. W. Glueck & L.R. Jauch, Business Policy and Strategic Management, MC Graw Hill,

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								H						M	
CO2					M				H			L		L	
CO3									H		M				H
CO4					L				H		M	L		L	
CO5									H		M	L		M	

20CST04: COMPUTER ARCHITECTURE AND ORGANIZATION

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. How Computer Systems work & the basic principles, Instruction Level Architecture and Instruction Execution, the data is represented and the operations are carried out in the computer
2. Perform memory system design
3. Access I/O devices and its principles.
4. Enhance the knowledge on Instruction Level Parallelism
5. Develop the skills on micro programming.
6. Apply the concepts of advanced pipelining techniques.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand the building blocks of computer, instruction execution cycle, I/O transfers, interrupts, and memory organization.

CO2 Identify addressing modes, and data/instruction formats, advantage of the pipelining and parallel processors.

CO3 Perform the arithmetic operations using various algorithms and number systems and design memory in various ways.

CO4 Detect errors in the transmission.

CO5 Compare various cache memory mapping techniques.

UNIT I

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU, registers, instruction execution cycle, RTL Interpretation of instructions, addressing modes, instruction set, instruction formats.

UNIT II

Data representation: signed number representation, fixed and floating-point representations, character representation. Algorithms for arithmetic operations: Addition, Subtraction, multiplication (Booth's, Modified Booth's) - division (restoring and non-restoring)

UNIT III

Memory Organization: Memory systems hierarchy-Main memory organization-Types of Main memory-memory interleaving and its characteristics and performance- Cache memories: address mapping-line size-replacement and write policies**,** Reliability of memory systems- error detecting and error correcting systems.

UNIT IV

Peripheral devices and their characteristics: Input-output subsystems, I/O device Interface, I/O transfers–program controlled, interrupt driven and DMA.

UNIT V

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency

Textbooks

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", Pearson Education, 10th Edition, 2016.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann, Elsevier, 5th Edition, 2011.

Reference Books

1. Carl Hamacher, "Computer Organization and Embedded Systems", McGraw Hill HigherEducation, 6th Edition, 2011.
2. Vincent P. Heuring, Harry F. Jordan, and T.G. Venkatesh, "Computer System Design and Architecture", Pearson Education, 2nd Edition, 2008.

Web References

1. https://nptel.ac.in/courses/106/106/106106166/
2. https://nptel.ac.in/courses/106/105/106105163/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	L	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO3	-	H	M	-	-	-	-	L	-	-	-	-	H	-	-
CO4	L	-	-	H	-	-	-	-	-		-	-	H	-	-
CO5	-	L	-	H	-	-	-	-	-	-	-	-	H	-	L

20CST05: OBJECT ORIENTED PROGRAMMING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Study the syntax, semantics and features of Java Programming Language.
2. Learn inheritance, polymorphism and interfaces.
3. The method of creating multi-threaded programs and handle exceptions.
4. Java features to create GUI applications & perform event handling.
5. Basics of Java Data Base Connectivity.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand the basic concepts of object-oriented programming.
CO2 Solve problems using object-oriented approach and implement them using Java.
CO3 Write efficient programs with multitasking.
CO4 Create own Exceptions and handle Exceptions.
CO5 Develop GUI Components and design application projects.CO6. Design java application to connect to Database.

UNIT I

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, Polymorphism

Java Programming: History of java, comments, data types, variables, constants, scope and life time of variables, operators, hierarchy expressions, type conversions and casting, enumerated types, control for block scope, conditional statements, loops, break and continue statements, simple java standalone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access controls, this reference, overloading methods and constructors, recursions, garbage collections, building strings, exploring strings class.

UNIT II

Inheritance: Inheritance hierarchies super and sub classes, member access rules, super keyword, and preventing inheritance: final classes and methods, the object class and its methods.

Polymorphism: Dynamic binding, method overloading, abstract classes and methods.

Interface: Interface vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interfaces references, extending interface.

Inner classes- use of inner classes, local inner classes, anonymous inner classes, static inner classes, example

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages

UNIT III

Exception Handling: Dealing with errors, benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exception, usage of try, catch, throw, throws, and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading-difference between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

UNIT IV

Collection Framework in Java: Introduction to java collections, overview of java collection frame work, Generics, commonly used Collection Classes-Array List, vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties.

Files: Streams-byte streams, character streams, text input/output, binary input/output, random access file operations, file management using File class.

Connecting to Database: JDBC type I to IV drivers, connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT V

GUI Programming with Java: The AWT class hierarchy, introduction to Swing, Swing vs. AWT, Hierarchy for Swing components, Containers-JFrame, JApplet, JDialog, JPanel, Overview of some swing components, JButton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management-Layout manager types- border grid and flow.

Event Handling: Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, examples: handling a button click, handling mouse events, Adapter classes.

Textbooks

1. Herbert Schildt,DaleSkrien, "Java Fundamentals-A Comprehensive Introduction", McGraw-Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the complete Reference", McGraw-Hill, Osborne 2011.

Reference Books

1. P.Radha Krishna, "Object Oriented Programming through java", Universities Press, 2007.
2. Bruce Eckel, "Thinking in Java", Pearson Education, 2006.
3. S.Malhotra and S.Choudhary, "Programming in Java", Oxford University Press, 2013.

Web References

1. http://www.javatpoint.com/java-tutorial
2. http://www.javatutorialpoint.com/2015/03/introduction-to-java.html

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	-	-	-	-	-	-	H	H	M
CO2	L	M	H	-	-	-	-	-	-	-	-	-	M	M	-
CO3	-	M	H	L	-	-	-	-	-	-	-	-	H	H	-
CO4	L	-	H	M	-	-	-	-	-	-	-	-	L	L	-
CO5	L	-	H	-	M	-	-	-	-	-	-	-	M	-	M

20CST06: DATABASE MANAGEMENT SYSTEMS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Basics of database systems.
2. Understand the different issues involved in the design and implementation of a database system.
3. Study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
4. Use data manipulation language to query, update, and manage a database.
5. Normalization, indexing, transaction management and concurrency control.

Course Outcomes

After successful completion of course the students should be able to

CO1 Understand the basics of database systems, recovery techniques and transaction processing system.
CO2 Write relational algebra expressions for a given query and optimize the developed expressions.
CO3 Design ER model for given database specifications.
CO4 Perform normalization for the given schema and various operations of indexing.
CO5 Construct the SQL queries for given specifications and optimize its execution using Query optimization algorithms for a given query.
CO6 Demonstrate the isolation property, including locking, time stamping based on concurrency control and serializability of scheduling.

UNIT I

Overview of Database Systems: Introduction, File Systems versus DBMS, Advantages of DBMS, Describing and Storing Data in a DBMS: The Relational Model – Levels of Abstraction in a DBMS – Data Independence, Database Architecture, Structure of a DBMS, Database users, Data Models.

UNIT II

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model: Key Constraints – Participation Constraints – Weak Entities – Class Hierarchies – Aggregation.

The Relational Model: Introduction – Creating and Modifying Relations Using SQL, Integrity Constraints over Relations: Key Constraints – Foreign Key Constraints – General Constraints, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational – Entity Sets to Tables - Relationship Sets (without Constraints) to Tables – Translating Relationship Sets with Key Constraints – Translating Relationship Sets with Participation Constraints – Translating Weak Entity Sets Introduction to Views: Views, Data Independence, Security – Updates on Views, Destroying/Altering Tables and Views.

UNIT III

SQL: The Form of a Basic SQL Query: Examples of Basic SQL Queries – Expressions and Strings in the SELECT Command, UNION, INTERSECT, and EXCEPT, Nested Queries: Introduction to Nested Queries - Correlated Nested Queries, Aggregate Operators: The GROUP BY and HAVING Clauses, Joins

Normalization: Purpose of normalization (or) schema refinement, concept of functional dependency, normal forms (1NF,2NF,3NF, BCNF & 4NF), Lossless join and Dependency preservation decomposition.

UNIT IV

Overview of Storage and Indexing: Data on External Storage, File Organizations and Indexing: Clustered Indexes - Primary and Secondary Indexes, Index Data Structures: Hash-Based Indexing - Tree-Based

Indexing, ISAM, B+ Trees.

UNIT V

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions: Concurrent Execution –Serializability, Two phase Locking (2PL), Strict 2PL.
Concurrency Control: Serializability- View Serializability, Lock Management: Types- Lock conversions,dead locks, Concurrency Control without Locking: Time stamp- based concurrency control, MultipleGranularity locking, Database Recovery Techniques

Textbooks

1. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", Global Edition, Pearson Education, 2016.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw-Hill, 2010.

Reference Book

1. Raghu Ramakrishnan, Johannes Gehrke, "Database management Systems", Third Edition, 2003.

Web References

1. https://nptel.ac.in/courses/106/104/106104135/
2. https://nptel.ac.in/courses/106/105/106105175/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	-	-	-	-	-	-	-	-	-	H	M	L
CO2	L	H	-	L	M	-	-	-	-	-	-	-	M	H	L
CO3	L	M	H	-	M	-	-	-	-	-	-	-	H	M	L
CO4	L	L	-	M	H	-	-	-	-	-	-	-	M	H	-
CO5	-	L	M	H	M	-	-	-	-	-	-	-	M	H	-
CO6	L	M	M	L	H	M	-	-	-	-	-	-	M	H	-

20CST15: DATA COMMUNICATION

Credits – 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Concepts of data communication and its importance.
2. Information about transmission media.
3. Behavioural knowledge of the data encoding and modulation.
4. To describe the features and functions of multiplexing and modulation.
5. To enable them to differentiate source and channel coding.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand data, signals and transmission media.
CO2 Evaluate performance of the channel.
CO3 Analyse various transmission media, data encoding, modulation and multiplexing techniques.
CO4 Represent various data encoding and modulation techniques.
CO5 Identify the errors using source and coding methods.

UNIT I

Introduction: Data and Signal, Signal characteristics, Analog and Digital Signal, Analog and Digital Data Communication System, Transmission Impairments (Attenuation, Noise, Distortion)

UNIT II

Transmission Media: Copper Media and Fiber Optics, Unguided Transmission Media -Terrestrial Microwaves and Satellite Communication, Cellular System, Multipath Fading, Data Rate Limits - Nyquist Bit Rate for Noiseless Channel, Shannon Capacity for Noisy Channel, Performance of Channel - Bandwidth, Throughput, Latency, Jitter and Bit Error Rate (BER).

UNIT III

Data Encoding and Modulation: Baseband Communication (Analog/Digital), Data Encoding and Modulation, Types of Analog Modulation - AM, FM and PM, Pulse Modulation System - PAM and PWM, Encoding Analog Data as Digital Signal - PCM, Encoding Digital Data as Digital Signals, Line Coding Schemes - NRZ, RZ, Manchester and AMI, Block Coding, Scrambling, Digital Modulation - ASK, FSK, PSK, QAM.

UNIT IV

Multiplexing and Spreading: Multiplexing and Application, FDM, WDM, TDM, Random-Access, CDMA.

UNIT V

Source and Channel Coding: Measure of Information, Huffman Coding, Error Detection and Correction Code, Hamming Distance, Linear Block Coding, Cyclic Codes, CRC, Convolution Codes

Textbooks

1. William Stallings, "Data and Computer Communications", 10th Edition, Pearson Education, 2014.
2. Stallings W, "Data and Computer Communications", Prentice Hall, 2010.

Reference Books

1. Forouzan B. A., "Data Communication and Networking", McGraw Hill, 2013
2. Lathi, B. P. & Ding, Z., "Modern Digital and Analog Communication Systems", Oxford University Press, 2010.

Web References

1. https://nptel.ac.in/courses/106/105/106105082/
2. https://nptel.ac.in/courses/106/108/106108098/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	L	-	-	-	-	H	-	-	-	M	-	H	L	-
CO2	M	-	-	-	H	-	-	-	-	-	L	-	M	H	L
CO3	M	H	-	M	-	-	-	-	-	-	-	-	H	L	-
CO4	M	-	L	-	H	-	-	-	-	-	-	-	L	H	-
CO5	-	H	-	-	-	-	-	L	M	-	-	-	H	M	L

20CST16: SYSTEM PROGRAMMING

Credits – 3 **Sessional Marks: 30**
L:T:P::2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following

1. Basic concepts of operating systems and Computer Architecture.
2. Design of operating systems and system software.
3. Learn the functioning of the principal parts of an operating system.
4. Design of Device drivers.

Course Outcomes

After successful completion of course the student should be able to

CO1 Demonstrate the ability to think critically and analyze system problems.
CO2 Understand SIC, SIC/XE architectures.
CO3 Demonstrate the ability to analyze, design programs to demonstrate basic knowledge of systems software and operating systems.
CO4 Formulate simple algorithms for Assemblers, Loaders and Macro processors.
CO5 Interpret Character device drivers and Block device drivers.

UNIT I

Machine Architecture: System Software and Machine Architecture, The Simplified Instructional Computer (SIC)-SIC Machine architecture, Data and Instruction Formats, Addressing Modes Instruction Sets, I/O and Programming.

UNIT II

Assemblers Basic Assembler Functions: A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine-Dependent Assembler Features Instruction Formats and Addressing Modes, Program Relocation, Machine Independent

Assembler Features: Literals, Symbol – Defining Statements, Expressions, One-Pass Assemblers, Multi-Pass Assemblers, Implementation Example - MASM Assembler.

UNIT III

Loaders and Linkers: Basic Loader Functions – Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for Linking Loader, Machine Independent Loader Features – Automatic Library Search, Loader Options, Loader.

Design Options: Linkage Editors, Dynamic Linking, Bootstrap Loaders, Implementation Example – MS-DOS Linker.

UNIT IV

Macro Processors: Macro Instructions, Features of a Macro Facility- Macro Instruction Arguments, Conditional Macro Expansion, Macro Calls within Macros, Macro Instructions Defining Macros, Implementation-Implementation of a Restricted Facility: A Two-Pass Algorithm, A Single-Pass Algorithm.

UNIT V

Block Drivers I: A Test Data Generator-Design Issues, Driver. Block Drivers II: A RAM Disk Drive-Design Issues, Driver. Block Drivers III: A SCSI Disk Driver -Design Issues, Driver.

Textbooks

1. Leland L. Beck, "System Software – Introduction to Systems Programming," Third Edition, Pearson Education Asia.
2. George Pajari, Writing UNIX Drivers, First Revised Edition, Addison-Wesley 2014.

Reference Book

1. D. M. Dhamdhere, "Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw-Hill, 2015.

Web Reference

1. https://www.youtube.com/watch?v=MylrhAMmNRY

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	-	-	-	L	-	-	-	H	-	H	-	M
CO2	H	-	-	-	-	-	M	-	-	-	L	-	M	H	L
CO3	-	M	L	H	-	-	-	-	-	-	-	-	H	-	L
CO4	M	H	L	-	-	-	-	-	-	-	-	-	H	-	L
CO5	L	M	-	H	-	-	-	-	-		-	-	H	L	M

20CST17: SOFTWARE PROJECT MANAGEMENT

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Learn all the Principles and Practices involved in Software Project Management.
2. Make estimations for different software projects.
3. How to schedule various activities in the project, manage and monitor the risks encountered in the software process.
4. Reengineering and restructuring concepts for the Software Development and Maintenance.
5. Recent developments in software engineering.

Course Outcomes

After successful completion of course the student should be able to

CO1 Analyse the issues and challenges faced while managing the software project, various estimation techniques.
CO2 Evaluate the defect removal efficiency for achieving high quality software.
CO3 Understand the concepts of project scheduling, tracking, Risk analysis, Quality management and Project estimation using different techniques.
CO4 Identify project goals, constraints, deliverables, performance criteria, control needs and resource requirements in consultation with stakeholders.
CO5 Demonstrate the trends and techniques involved in software project management.

UNIT I

Project Management concepts: The Management Spectrum—People, The Product, The Process, The Project; WHH principle, Critical practices.
Process and Project Metrics: Introduction, Software measurement, Software Quality Metrics, Integrating Metrics within the software process, Metrics for small organization.

UNIT II

Estimation for Software Projects: Introduction, Project planning process, software scope and feasibility, Resources, Software Project Estimation, Decomposition techniques, Empirical estimation models, Estimation for object-oriented projects, Specialized estimation techniques, the make/buy decision.

UNIT III

Project Scheduling: Basic concepts, Principles, defining a task set for software project, defining a task network, Scheduling, Earned value analysis.
Risk Management: Reactive versus Proactive risk strategies, Software risks, Risk Identification, Risk projection, Risk Refinement, Risk Mitigation, Monitoring and Management, RMMM plan.

UNIT IV

Maintenance and Reengineering: Software maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

UNIT V

Emerging trends in software Engineering: Technology Evolution, Software Engineering Trends, Identifying Soft Trends, Technology Directions, Tools-related Trends.

Textbook

1. Pressman R S, "Software Engineering—A Practitioner's Approach", 7th edition, McGraw Hill, 2017.

Reference Book

1. Jacobson I, Christeron M, Jonsson P, "Object Oriented Software Engineering: A Use Case DrivenApproach", Pearson 2015.

Web Reference

1. https://nptel.ac.in/courses/106/105/106105218/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	M	-	L	-	-	-	-	-	-	-	H	-	-
CO2	-	-	-	-	H	L	-	-	M	-	-	-	-	H	-
CO3	-	M	L	-	-	-	-	-	H	-	-	-	-	-	H
CO4	H	M	L	-	-	-	-	-	-	-	-	-	-	-	H
CO5	L	-	-	H	-	-	M	-	-	L	-	-	-	H	-

20CST18: DATA MINING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. The basic concepts and techniques of data warehousing and data mining.
2. Various pre-processing techniques and data mining functionalities.
3. Several multidimensional models for data warehousing.
4. The performance of Frequent Item sets and Association Rules.
5. Different types of classification and clustering algorithms.

Course Outcomes

After the successful completion of course, the students should be able to

CO1 Understand the basic concepts of data warehouse and data mining.
CO2 Apply pre-processing techniques for data cleansing.
CO3 Identify and design multidimensional models for data warehousing.
CO4 Analyze and Evaluate performance of algorithms for Association Rules, Classification andClustering techniques.
CO5 Develop research interest towards advances in data mining.

UNIT I

Data warehousing: Definition, multi-dimensional data model, OLAP operations, warehousing schema, Data warehousing Architecture, warehouse server, metadata OLAP engine, Data warehouse backend process.

UNIT II

Data Mining: Definition, KDD vs Data mining, DBMS vs Data mining, Data mining Techniques, Issues and challenges in data mining.

UNIT III

Association Rules: Introduction, Methods to discover Association, Apriori algorithm, Partition algorithm, Pincer search algorithm, FP-tree growth algorithm, Incremental algorithm, Border algorithm, Association rules with item constraints.

UNIT IV

Clustering Techniques: Introduction, clustering paradigms, partitioning algorithm, K-medoid algorithms, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE.

UNIT V

Decision trees: Introduction, tree construction principles, Decision tree construction algorithms, CART, ID3, C4.5, CHAID, Decision tree construction with presorting.
Introduction to web mining, web content mining, web structure mining, web usage mining, Text mining.

Textbooks

1. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining: Concepts and Techniques”, Morgan, Kaufmann publishers, 2011.

Reference Books

1. Arun K Pujari, “Data Mining Techniques”, University press, 2016.

Web Reference

1. https://nptel.ac.in/courses/106/105/106105174/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	L	-	H	-	M
CO2	L	M	-	-	-	H	-	-	-	-	-	-	H	M	-
CO3	L	-	H	M	-	-	-	-	-	-	-	-	M	L	H
CO4	L	M	-	H	-	-	-	-	-	-	-	-	M	H	-
CO5	L	L	H	M	-	-	-	-	-	-	-	-	M	L	H

20BST12: ENVIRONMENTAL STUDIES

Credits – No credits
L:T:P::3:0:0

Course Objectives

1. To reflect on how the natural and built environments shape and are shaped by multiple socio-cultural and political factors.
2. To think across and beyond existing disciplinary boundaries, mindful of the diverse forms of knowledge and experience that arises from human interactions with the world around them.
3. To live responsibly and appreciate the environmental and cultural histories of the places they inhabit.
4. To nurture knowledge, respect, and love for the natural and human communities of central Maine, the place where they spend four formative years of their lives.
5. To develop skills of analysis and communication, bearing in mind disciplinary traditions and diverse publics.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

CO2 Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.

CO3 Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

CO4 Appreciate that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.

CO5 Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT I

Environmental studies and Natural resources-Definition of environment, scope and importance of environment, environmental studies, need for public awareness.

Renewable and **Non Renewable Resources and associated problems and case studies-** Uses, consequences of exploitation and remedies- (i) Water resources, (ii) Forest resources, (iii) Land resources, (iv) Mineral resources, (v) Food resources, (vi) Energy resources. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles.

UNIT II

Environmental Pollution and Global Effects - Definition, Causes, Effects and Control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution and Noise pollution. Case studies. Role of an individual in prevention of pollution.

Solid waste Management- Causes, effects, disposal methods, and control of urban and industrial wastes.

Climate change- Global warming, Acid rain and Ozone layer depletion, Nuclear accidents and holocaust-case studies.

UNIT III

Disaster Management – Floods, earth quake, cyclone, avalanches, landslides and Tsunami.

Environment and Human health – Epidemic diseases, and pathology of Hepatitis –b, HIV/AIDs Malaria, Typhoid, Chikungunya, Avian flu and anthrax *etc.* Role of information technology in environment and human health, Case studies

Water conservation- Rain water harvesting – Water shed management.

Waste land reclamation

UNIT IV

Ecosystem- Concept of an ecosystem, Structure and functions of an ecosystem; types of ecosystems, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Types of ecosystems- characteristic feature, structure and functions.

Biodivesity and its conservation –Introduction; Definition; genetic, species and ecosystem diversity; Endangered and endemic species of India; Value of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, national and local level; Importance of biodiversity; Biodiversity hot-spots; India as a mega-diversity nation. Threats to biodiversity: habitats loss, poaching of wild life man wild life conflicts. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT V

Human population and the environment-Population growth and variation among nations, Population explosion - Family welfare program in specific to women and child, Human rights, Value education.

Environment Impact Assessment; Environmental risk assessment (ERA); Clean production and Life cycle assessment.

Environmental Legislation - Forest Act, Water Act, Air act, Wild life protection Act, Environmental protection Act. Issues involved in enforcement of environmental legislation and public awareness.

Reference Books

1. Kaushik & Kaushik, Environmental Studies, New age international Publishers, 4th Edition,
2. B.R. Shah and Snehal Popli, Environmental Studies, Mahajan Publishing House. 9th Edition,
3. C.S. Rao, Environmental Pollution Control Engineering, 2ndEdition, New International Publishers.
4. Canter, L.W., Handbook of Environmental Impact Assessment, Vol. I and II', The World Bank, Washington, 1991.
5. Pelczer, Jr., M.J., Chan, E.C.S., Krieg, R. Noel., and Pelczer Maerna Foss, 'Microbiology'. 5th Edition Tata Mc Graw Hill Publishing Company Limited, New Delhi-1996.
6. Metcalf & Eddy, Inc. "Wastewater Engineering Treatment Disposal and Reuse", Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi-1995.
7. Casey.I.J., 'Unit Treatment processes in Waste water engineering', John Wiley & Sons England, 1993.
8. Erach Bharucha, "Text book of Environmental Studies, UGC
9. DD Mishra, "Fundamental concepts in Environmental Studies", S Chand & Co Ltd

20CSP04: OBJECT ORIENTED PROGRAMMING LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Understand and solve logical and mathematical problems.
2. Programming methodologies using Java and Python programming.

Course Outcomes

After successful completion of course the students should be able to:

CO1 Demonstrate knowledge in Data Types, Variables, Expressions, Control statements, Strings and Text files, Lists, Dictionaries and Functions, Objects and Design with classes, Exception Handling and GUI

CO2 Analyze complex computational problems.

CO3 Design solutions for real life computational problems.

CO4 Solve complex problems using python and Java scripting constructs.

LIST OF JAVA PROGRAMS

1. Preparing and practice – Installation of Java software, study of any Integrated development environment, sample programs on operator precedence and associativity, class andpackage concept, scope concept, control structures, constructors and destructors. Learn to compile, debug and execute java programs.
2. Write program(s) on use of inheritance, preventing inheritance using final, abstract classes.
3. Write program(s) on dynamic binding, differentiating method overloading and overriding.
4. Write program(s) on ways of implementing interface.
5. Write a program to develop an applet that displays a simple message.
6. Write a program to develop an applet for waving a Flag using Applets and Threads.
7. Write program(s) which uses the exception handling features of the language, creates exceptions and handles them properly, uses the predefined exceptions, and create own exceptions
8. Write program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.
9. Write program(s) on creating multiple threads, assigning priority to threads, synchronizing threads, suspend and resume threads
10. Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
11. Write a program to create a super class called Figure that receives the dimensions of two-dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub classes override area () so that it returns the area of a rectangle and triangle respectively.
12. Write a program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds
13. Design a simple calculator which performs all arithmetic operations. The interface should look like the calculator application of the operating system. Handle the exceptions if any.
14. Write a program to handle mouse events
15. Write a program to handle keyboard events
16. Write a program that allows conduction of object type examination containing multiple choice

questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of the message.

17. Write a program that creates menu which appears similar to the menu of notepad application of theMicrosoft windows or any editor of your choice.
18. Write a program that creates dialog box which is similar to the save dialog box of the Microsoftwindows or any word processor of your choice.
19. Write a program that correctly implements producer consumer problem using the concept of inter threadcommunication
20. Write a program to find and replace pattern in a given file.

LIST OF PYTHON PROGRAMS

1. A map shows a scale of a:b. The distance between a car track and a temple on the map is shown to be 'x'cm. Given the value of 'a', 'b' and 'c' design a flowchart and write a Python code to determine the actual distance between the car and temple in meters. For example, if a is 1, b is 5000 and c is 8 then the actualdistance between car and temple is 400 meters
2. Given a day in April and the number of holidays, develop an algorithm and write a Python code to determine the reopening day of school. For example, if the day given is April 16 and number of holidays as 53 the reopening day will be June 9 and print it as 9, 6. The number of holidays can be only to the maximum of 60.
3. Ram has two square eggs trays of dimensions 'm' and 'n' and Raju has got some number of square trays of dimension 'p'. Ram has bought 'r' eggs. Design a flowchart and write a Python code to determine the number of trays he has to borrow from Raju to store eggs in the fridge. Assume an ideal condition that Raju will have the number of trays required by Ram. For example, if the value of m, n, p and r are 3, 2, 2, 20 then Ram has to borrow two trays from Raju.
4. Given the diameter of a circular pizza in cms and price in rupees, design a flowchart and write a Python program to calculate the cost per square inch of a pizza. The formula to calculate area is A= pi $*r^2$ and 1cm=0.393inch.
5. Given the circumference of a circular clock as 'C' cms, find the distance travelled by seconds clock in 'S'seconds. For example, if circumference of the clock is 64 cm, then the distance travelled by the clock in 15 seconds is 15 cm.
6. Given the radius of a circular ground in meters and speed of a bike in m/s. Determine the approximate number of seconds that will be taken by the bike to go around the ground once. Formula to calculate circumference of a circular ground = 2*pi*r. Assume that the bike will maintain a uniform speed and round the number of seconds taken to upper bound. That is 10.1, 10.5, 10.9 etc should be 11. For example, if the radius of the ground is 100 m and speed of bike as 40m/s, then the time taken to go around once is approximately16 seconds.
7. There are 50 p coins and Re 1 coin in a box. Given that the box contains 'X' number of 50 p coins and the number of Re 1 coin is twice as the number of 50 p coins, draw a flow chart and write a Python code to determine the total amount in the box.
8. Ram buys a sweet box with 'T' sweets in it and distributes it to his two children. He distributes 'X' percentage of the sweets given to his son and he gets 'N' number of sweets. Write an algorithm to determine the number of sweets got by his daughter and total number of sweets. For example, if Ram distributes 60% to his son and he gets 12 sweets then his daughter will get 8 sweets and there are 20 sweets in the box.
9. A dealer had Rs. 'X'. He purchased 'n' number of television sets, each costing Rs 'Y'. He used the remaining amount of money to purchase 'm' number of washing machines. Draw a flowchart to determine the cost of each washing machine? For example, if the dealer had 25,000 in hand and he bought 2 television sets of cost Rs. 12250 and if he bought 3 washing machines then the cost of one washing machine is 4250.

10. Molecular weight of Ethane is calculated as 2 * Number of Carbon atoms + 6 * Number of Hydrogen atoms. Given the number of Carbon and Hydrogen atoms, design a flowchart and Write a Python program that determines the molecular weight of ethane (C_2H_6). Use the following weights:

Atom	Weight (grams/mole)
H	1.0079
C	12.011
O	15.9994

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	-	-	-	-	-	-	H	H	M
CO2	L	M	H	-	-	-	-	-	-	-	-	-	M	M	-
CO3	-	M	H	L	-	-	-	-	-	-	-	-	H	H	-
CO4	L	H	M	-	-	-	-	-	-	-	-	-	L	L	-

20CSP05: DATABASE MANAGEMENT SYSTEMS LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives
To expose the students to the following:
1. Develop conceptual understanding of database management system.
2. Understand how a real-world problem can be mapped to schemas.
3. Solve different industry level problems.

Course Outcomes
After successful completion of course students should be able to
CO1 Define a problem at the view level.
CO2 Understand the physical structure of the database to handle data.
CO3 Implement the logic by using software.
CO4 Apply the concepts of transaction management for real time applications.

LIST OF EXPERIMENTS

1. Queries on DDL commands (Create, Alter, Drop, Rename)
Task 1:
a. Create a table with the following schemaStudent (sid, sname, saddress, sphone)
b. Write a query to display structure of the table as student (sid, sname, saddress, sphone, smail)
c. Write a query to display structure of the table as student (sid, sname, sphone, smail)
d. Write a query to change the name of the column smail to smailid
e. Drop the table student

Task 2:
a. Create a table with the following schemafaculty (Fid, Fname, Faddress, Fbranch)
b. Write a query to display structure of the table as faculty (Fid, Fname, Faddress, Fbranch, Fphone)
c. Write a query to display structure of the table as faculty (Fid, Fname, Fbranch)
d. Drop the table faculty

2. Queries on DML commands (Insert, update, Delete, select)
a. Create a table with the following schema
Storeinfo (storename, sales, txn_date, storeaddress)
b. Insert 10 rows in to the table
c. Insert 15 rows into the table using single insert statement
d. Write a query to change the sales of Levis store from 20% to 30%
e. Write a query to change the address of VanHeusen store to 40-32, Himayat Nagar, Hyderabad.
f. Write a query to delete the details of Levis store.
g. Write a query to delete the details of a store with address 20/35, Ameerpet
h. Write a query to display all the details of storeinfo.
i. Write a query to retrieve the details of Levis store.

3. Queries on DCL, TCL commands and computations on queriesDCL (Grant, Revoke)
a. Write queries to create a role called as testing and create permission to testing
b. Write queries to revoke a create table privilege from testing role and drop the testing role.

TCL (Commit, Rollback, Savepoint)

a. Perform commit operation to save the changes permanently
b. Create a schema student(sid,sname) with 3 rows initially.Later insert 3 rows with 3 save points.
c. perform rollback to savepoint B, savepoint A.

4. Commands on key-constraints (NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK)

a. Create a table persons (id, fname, lname, age) where the null values should not be allowed while insertingthe rows in id column.
b. Create a table persons such that all the values in column id are different.
c. Create a table student such that the column student id should not allow null values and duplicate values
d. Create a table persons (pid, fname, lname, age) and orders (id, ordernumber, pid).
e. Write a query to retrieve the ordered, ordername of a person with id 3.
f. Write a query to retrieve age of a person whose order id is 3.
g. Create a table votedetails (voterid, name, age, address) which does not allow the details of people whose age is <18.

5. Pattern matching queries and SQL queries using oracle functions

a. Write a query (WAQ) to retrieve the names of students whose names start with "S".
b. Write a query to retrieve the names of the students whose names end with "a".
c. Write a query to retrieve the names of the students whose names start with "ca".
d. Write a query to retrieve the names of the students whose names consists of "ee".
f. WAQ to concatenate 2 strings
g. WAQ to set the first character in uppercase and rest in lower case
h. WAQ to display the location of DER in "Hyderabad".
i. WAQ to return the length of a string engineering.
j. WAQ to convert all letters in a string "HYDERABAD" to lower case and upper case also
k. WAQ to add NEW to the word HYDERABAD and NAWABS to Hyderabad.
l. WAQ to extract base from Data base Management systems
m. Write query to count number of students in student table
n. Write queries to demonstrate CEIL, FLOOR, GREATEST, LEAST, MAX, MIN, SUM.
o. Write queries to demonstrate date functions like ADD_MONTHS, CURRENT_DATE, LAST_DAY,MONTHS_BETWEEN, NEXT_DAY, ROUND, SYSDATE, SYSTIMESTAMP.

6. Implementing Group By, Having, Order by clause

Task 1:

a. Create a table Northzone (custid, custname, address, city, country)
WAQ to display the number of customers in each country.
b. WAQ to display the number of customers in each country in descending order
c. Create a table Northzone (custid, custname, age, address, city, country)
WAQ to display the number of customers in each country whose age is greater than 30.

Task 2:

a. For the schema student, WAQ to display number of students in each section
b. WAQ to display names of students in descending order
c. WAQ to display the names of students in each section whose percentage is>65.

7. Queries on joins (INNER, LEFT OUTER, RIGHT OUTER, FULL JOINS)

a. Create a table orders (orderid, custid, orderdate), Create a table customers (custid, cname, country) perform all join operations on the given two tables based on conditions.

Sub-Queries

a. WAQ to display list of children taller than 'myke' from height table.
b. WAQ to display the names of children who are taller and older than 'Jim'
c. WAQ to get the names of the employees who work in department with the highest budget.
d. WAQ to display the names of students whose percentage is greater than 65
e. WAQ to display the names of the employees whose salary is greater than the average of all salaries.
f. WAQ to demonstrate ALL, ANY.

8. Operations on views (Insert, Update, Delete), sequences

a. Create a students above 65 with the details sid, sname, sphone, smailid
b. WAQ to change the phone number of a student whose name is 'XYZ' in students above 65 views.
c. WAQ to drop students above 65 views.
d. WAQ to delete the students details whose sid is 123 from students above 65 views.

SEQUENCES

a. Create a sequence seq1 for a table class which starts with 1 increment by1 and max value is 999 with cycle and without cycle.
b. Insert the values into class using nextval.

9. SYNONYMS, CLUSTER and INDEX

a. Create a synonym for the product table in Adventure works2012
b. Create a cluster named personnel with a cluster key column department and a size of 512 bytes.
c. Create an index on the cluster key of personnel.

Introduction to basics of pl/sql programming

a. Write a program to print 'Hello'.
b. Write a program to add 2 numbers
c. Write a program to print greatest of 3 numbers.

10. Sample Programs in PL/SQL

a. Write a program to demonstrate basic loop, for loop, while loop
b. Write a program to demonstrate insert, update, delete and select using pl/sql.

Week 10,11,12: Mini Project

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO2	H	M	-	-	H	-	-	-	-	-	-	-	H	-	L
CO3	-	L	H	M	L	-	-	-	L	-	-	-	M	H	L
CO4	-	L	M	-	H	L	L	-	L	-	-		H	-	M

20CSP06: MATHEMATICAL TOOLKIT LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives
To expose the students to the following:
1. Learn the MATLAB environment and its programming fundamentals.
2. Write Programs using commands and functions.
3. Handle polynomials, and use 2D Graphic commands.

Course Outcomes
After successful completion of course the students should be able to
CO1 Express programming and simulation for engineering problems.
CO2 Write basic engineering problems in MATLAB.

LIST OF PROGRAMS

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History,Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Functions: Input-Output functions, Reading and Storing Data, subs functions, scope, advantages of functions, scripts, problem solving
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.
9. File I/O: File input/output, excel files, text files, binary files
10. Introduction to usage of any network simulator
11. Implementation of queuing models using C/C++
12. Data Analysis and visualization: acquiring data, analysing data, visualizing data

Textbooks
1. Bansal R.K, Goel A.K., Sharma M.K., "MATLAB and its Applications in Engineering", Pearson Education, 2012.

Reference Books
1. Amos Gilat, "MATLAB-An Introduction with Applications", Wiley India, 2009.
2. Stephen. J. Chapman, "Programming in MATLAB for Engineers", Cengage Learning, 2011.

Web Reference
1. https://in.mathworks.com/help/matlab/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO)Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	M	M	M	H	-	-	L	-	-	-	-	M	H	-
CO2	-	L	-	M	H	-	-	L	-	-	-	-	H	L	-

20CSS02 - PHP: HYPERTEXT PREPROCESSOR

Credits – 2 **Sessional Marks: 40**
L:T:P::0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Know basics of PHP script writing
2. Strengthen the ability to write scripts to use database, functions, arrays
3. Implement various applications using cookies and sessions

Course Outcomes

After successful completion of course the student should be able to

CO1 Create basic PHP files
CO2 Run scripts to perform tasks related to functions
CO3 Implement various real time application operations using database
CO4 Create cookies and manage session data

UNIT I

Introduction to PHP: History, Unique Features, Basic Development Concepts, Creating Your First PHP Script, Writing and Running the Script, Understanding the Script, Handling Script Errors, Mixing PHP with HTML, Escaping Special Characters, Sample Applications: php MyAdmin, phpBB, Gallery, PoMMo, Smarty, Squirrel mail, eZ Publish, Mantis, Wordpress.

UNIT II

Using Variables and Operators: Storing Data in Variables, Assigning Values to Variables, Destroying Variables, Inspecting Variable Contents, Understanding PHP's Data, Setting and Checking Variable Data Types, Using, Manipulating Variables with operators, Arithmetic Operations, Concatenating Strings, Comparing Variables, Performing Logical Tests, Other Useful Operators, Operator Precedence, Building a Dollars-to-Euros Converter, Handling Form Input, Building an Interactive HTML Color Sampler

Controlling Program Flow: Writing Simple Conditional Statements, More Complex Conditional Statements, Combining Conditional Statements, Actions with Loops, Combining, Interrupting and Skipping Loops, String and Numeric Functions, Processing a Member Registration Form

UNIT III

Working with Arrays: Storing Data in the arrays, Processing Arrays with Loops and Iterators, Working with Array Functions, Working with Dates and Times,

Using Functions and Classes: Creating User-Defined Functions, Creating Classes, Using Advanced OOP Concepts.

UNIT IV

Working with Files and Directories: Reading Files, Writing Files, Processing Directories, Performing Other File and Directory Operations,

Working with Databases and SQL: Introducing Databases and SQL, PHP's MySQLi Extension, Using PHP's SQLite Extension, Using PHP's PDO Extension

UNIT V

Working with Cookies, Sessions, and Headers: Working with Cookies, Working with Sessions, Using HTTP Headers

Handling Errors: Handling Script Errors, Using Exceptions, Logging Errors, Debugging Errors.

Textbook

1. Viram Vaswani, "PHP A Beginner's Guide", The Mc Graw Hill, 2017.

Reference Books

1. Steven Holzner, "PHP: The Complete Reference", TMG Edition, Tata McGraw-Hill, 2008.
2. Luke Welling "PHP and MySQL Web Development" fifth edition, Pearson Education, 2016

LIST OF PROGRAMS

1. Write the php script to print a welcome message on screen.
2. Installing and Configuring Required Software to script PHP
3. Write a function countWords($str) that takes any string of characters and finds the number of times each word occurs. Ignore the distinction between capital and lowercase letters, and do not have to worry about dealing with characters that are not letters.
4. Display date and time using predefined functions
5. Write a PHP file that will output a form containing 2 fields: username and password. The output should be one of three options: 1. The login form. 2. The welcome message, if successful login. 3. The invalid message and the login form, if failed login
6. Write the reset password form for previous script
7. Write the change password form
8. Create an input form to accept student details and generate marks list for the respected input
9. Write the script to create table in the php my admin and perform various manipulation operations like insertion, alteration, delete, etc
10. Retrieve the inserted data from the database
11. Create script to upload files
12. Build the factorial calculator using functions
13. Perform the encryption and decryption of the entered text
14. Create script for Save and Restore User Preferences using cookies
15. Write the php script to Track Previous Visits to a Page

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	L	H	-	-	L	-	-	-	-	H	M	L
CO2	M	M	-	L	H	L	-	-	-	-	-	-	M	H	L
CO3	L	M	-	-	H	M	-	-	-	-	-	-	H	M	L
CO4	L	M	H	-	H	-	-	-	-	-	-	-	M	H	L

B.Tech
III Year I Semester

B.Tech III Year I Semester

S.No	Course Code	Course Title
1	20BST10	Entrepreneurship & Project Management
2	20CST07	Theory of Computation
3	20CST08	Design and Analysis of Algorithms
4	20CST09	Operating Systems
5	20CST10	Software Engineering
6	**Elective – II**	
20CST19		Software Testing
20CST20		Wireless Networks
20CST21		Information Security
20CST22		Big Data Analytics
7	20BST11	Constitution of India
8	20CSP07	Operating Systems Lab
9	20CSP08	Software Engineering and Object-Oriented Analysis and Design Lab
10	20BSS01	Effective Communication Skills

20BST10: ENTREPRENEURSHIP & PROJECT MANAGEMENT

Credits – 3 **Sessional Marks: 30**
L:T: P::3:0:0 **University Exam Marks: 70**

Course Objectives

1. To understand the principles & phases of projects
2. To identify the resources of the project & duration.
3. To know the role entrepreneurship in economic development
4. To understand the problems of SSE
5. To learn the design & preparation of business plan.

Course Outcomes

After successful completion of the course the student should be able to

CO1 Define the concepts of project, engineering project design, and prototyping and feasibility study
CO2 Evaluate product duration, cost & quality control charts
CO3 Identify the ways to enhance economic development
CO4 Capable to maintain the problems of SSE and SWOT analysis
CO5 Design the business plan

UNIT I

Project Management: Concept of project - Project Life Cycle Phases – Human centred Engineering Project Design – Design thinking – Principles – Preliminary project specification – Feasibility Study – Detailed Project Design - Prototyping Methods – Validation of project with users.

UNIT II

Project Evaluation Techniques: PERT - CPM - Statistical Quality Control: X & R charts, P & C charts - Report preparation - Incubation – Concept – Support System.

UNIT III

Introduction to Entrepreneurship: Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs Manager, Entrepreneur vs Entrepreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development – Problems faced by women entrepreneurs – Support System for entrepreneurs.

UNIT IV

Small Scale Enterprise: Definition, Characteristics, Role of Small Enterprise in Economic Development, Problems of SSE, and Steps involved to start SSE, Package for promotion of Small Scale Enterprise, SWOT Analysis.

UNIT V

Business Model Design: Innovation readiness to commercialisation – Business Plan Preparation - Venture capital support system – Start-up support system and Review of Indian start-up business models.

Reference Books

1 L.S. Srinath, PERT/CPM, Affiliated East-West Press, New Delhi, 2002
2 S. Choudary, Project Management, McGraw Hill Education (India) Private Limited, New Delhi.
3 S.S.Khanka, Entrepreneurial Development, S Chand & Company Ltd., New Delhi.

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					M		L						L		
CO2					M						H	L			
CO3									L					M	
CO4				M					M			L	M		
CO5					H				M		H	L		L	

20CST07: THEORY OF COMPUTATION

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following

1. Designing finite automata to accept a set of strings of language and machine formats.
2. Basic concepts related to regular expressions and decidable problems for regular languages.
3. Knowledge about context free grammars to generate strings from a context free language and convert them into normal forms.
4. Understand the Push Down Automata, Acceptance of strings, Equivalence of PDA's and conversion of PDA to CFG and vice-versa.
5. Various types of Turing machines, decidable and undecidable problems of Turing machine.

Course Outcomes

After successful completion of course the student should be able to

CO1 Identify a formal notation of strings and the hierarchy of languages, grammars and machines, Arden's theorem, Simplification of CFG, Equivalence of PDA, Turing Machine

CO2 Design finite automata, Push Down Automata, Linear Bounded Automata, Turing Machine to accept a set of strings of a language.

CO3 Apply the rules of Regular Expressions for regular languages for context free grammars to resolve the real-time problems.

CO4 Determine whether the given language is regular or not, equivalence of languages accepted by Push-Down Automata and languages generated by context free grammars.

CO5 Analyze languages Regular, Context free, context sensitive, recursively enumerable of Turing machine.

UNIT I

Finite Automata: Alphabets, Strings, Grammar and Languages, Chomsky Hierarchy, Finite Automata, Representation of FA, Types of Finite Automata, Conversion of NFA into DFA, Equivalence of DFA and NFA, Finite Automata with Epsilon transitions (ϵ-NFA or NFA- ϵ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem, Applications and Limitation of Finite Automata.

UNIT II

Regular Expressions: Regular Expressions (RE), Identity Rules, The Arden's Theorem, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Pumping Lemma for RLs, Decision problems of RLS, Applications of REs and FAs.

UNIT III

Context Free Grammars: Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars, Left recursion and Left factoring, Linear Grammar, Conversion Methods of Linear Grammar, Normal Forms for Context Free Grammars, Pumping Lemma for CFLs, Closure Properties, Applications of Context Free Grammars.

UNIT IV

Pushdown Automata: Pushdown Automata, Instantaneous Description, Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown

Automata, Conversion of CFG to PDA and PDA to CFG, Equivalence of Pushdown Automata, Two Stack Pushdown Automata.

UNIT V

Turing Machine: Turing Machine, Instantaneous Descriptions, Representation of TMs, Language Acceptance of a Turing Machine, Design of Turing Machines, Variations of Turing Machines, Church's Thesis, Universal Turing Machine, Linear Bounded Automata, TM Languages, Unrestricted grammar, Properties of Recursive and Recursively enumerable languages, Un-decidability, Reducibility, Un-decidable problems about TMs, Post Correspondence Problem (PCP), Modified PCP.

Textbooks

1. Shyamalendu Kandar, "Introduction to Automata Theory, Formal Languages and Computation", Pearson education, 2013.
2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Pearson Education Asia, 2012.

Reference Books

1. Peter Linz, "An Introduction to formal languages and automata", 6th Edition, Jones & Bartlett, 2012.
2. Rajendra Kumar "Theory of Automata, Languages and Computation", McGraw Hill, 2014.
3. Krithivasan Kamala, Rama R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009.

Web References

1. https://nptel.ac.in/courses/106/106/106106049/
2. https://nptel.ac.in/courses/106/104/106104148/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO2	-	-	H	-	M	-	-	-	-	-	-	-	H	M	-
CO3	L	-	-	-	H	M	-	-	-	-	-	-	H	-	L
CO4	-	H	-	M	-	L	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	L	-	-	-	-	-	-	H	-	-

20CST08: DESIGN AND ANALYSIS OF ALGORITHMS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Knowledge in analysing the efficiency and performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate major algorithms and data structures.
4. Concepts in algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes

After successful completion of course the students should be able to

CO1 Understand the fundamental concepts of various algorithms.
CO2 Analyse the performance of algorithms.
CO3 Apply appropriate algorithm design techniques for solving real time problems.
CO4 Choose the algorithmic design methods to test the impact on performance of algorithms.
CO5 Evaluate tractable and Intractable Problems.

UNIT I

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, randomized algorithms.

Divide and Conquer: General method, Binary Search, Merge sort, Quick Sort, Strassen's matrix multiplication.

UNIT II

Greedy Method: General method, Minimum cost Spanning Trees, Knapsack problem

Dynamic Programming: General Method, Optimal binary search trees, 0/1 knapsack, The travelling sales person problem.

UNIT III

Graph and Tree Algorithms: Techniques for binary trees, Techniques for Graphs, connected components and Spanning trees, Bi-connected components and DFS

Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles

UNIT IV

Branch and-Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency considerations.

UNIT V

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

Textbooks

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", 4thEdition, MIT Press/McGraw-Hill, 2014.

2. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2008.

Reference Books

1. Jon Kleinberg and Eva Tardos, "Algorithm Design", 1st Edition, Pearson, 2013.
2. Michael T Goodrich and Roberto Tamassia, "Algorithm Design: Foundations, Analysis, and Internet Examples", Second Edition, Wiley, 2006.
3. Udi Manber, "Algorithms—A Creative Approach", 3rd Edition, Addison-Wesley, 2000.

Web Reference

1. https://nptel.ac.in/courses/106/106/106106131/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	L	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	L	M	-	H	-	-	-	-	-	-	-	-	H	-	-
CO3	L	-	-	M	-	H	-	-	L	-	-	M	L	-	H
CO4	L	-	H	M	-	-	-	-	-	-	-	-	L	-	H
CO5	L	H	M	-	-	-	-	-	-	-	-	-	L	-	-

20CST09: OPERATING SYSTEMS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. The basic concepts of Operating System, its functions and services.
2. The functionality of CPU Scheduling, Processes and Threads.
3. Various views and management policies adopted by OS as pertaining with processes, Deadlock, memory.
4. Fundamental concepts towards File and I/O operations.

Course Outcomes

After successful completion of course the students should able to

CO1 Understand the fundamental concepts of operating systems and its structure, processes and threads.
CO2 Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
CO3 Analyze the memory management techniques.
CO4 Apply page replacement algorithms to resolve the issues in virtual memory.
CO5 Acquire the knowledge on files and I/O management system.

UNIT I

Introduction and Operating System Structure: Operating-System Structure, Operating-System Operations, Protection and Security, Kernel Data Structures, Computing Environments, Open-Source Operating Systems, Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Operating-System Debugging, Operating-System Generation, System Boot

UNIT II

Process Management: Processes: Process Concept, Process Scheduling, Operations on Processes Inter process Communication, Examples of IPC Systems, Communication in Client– Server Systems Threads: Overview, Multi core Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Operating-System Examples, Algorithm Evaluation

UNIT III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Memory Management: Main memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, structure of the Page Table

Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

UNIT IV

Storage management: Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure

File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

UNIT V

File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, NFS

I/O Systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/ORequests to Hardware Operations, STREAMS.

Textbooks

1. Silberschatz and Galvin Jhon, "Operating Systems Concepts", 9th Edition, Wiley, 2013.

Reference Books

1. Williams Stallings, "Operating Systems", Second Edition, PHI, 1997.
2. Ida M.Flynn and Ann MclverMcHoes, "Understanding Operating Systems",7thEdition,DelmarCengage Learning,2013.
3. Charles Crowley, "Operating System: A Design-oriented Approach", 1st Edition,Irwin Publishing 1997.

Web Reference

1. https://nptel.ac.in/courses/106/106/106106144/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	M	M	H	L	-	-	-	-	-	-	-	-	L	H	L
CO3	M	H	-	L	-	-	-	-	-	-	-	-	H	-	L
CO4	-	H	M	M	-	-	-	L	-	-	-	-	-	-	-
CO5	H	M	L	-	M	-	-	-	-	-	-	-	H	-	-

20CST10: SOFTWARE ENGINEERING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the concepts all software process models.
2. Knowledge about umbrella activities involved in Software development.
3. Learn various software architectural styles.
4. Discuss the concepts of different software testing approaches.
5. Acquire knowledge about quality control and ensure good quality software.

Course Outcomes

After successful completion of course the student should be able to

CO1 Learn the concepts of software development life cycle models.
CO2 Develop correct and robust software products by gathering requirements.
CO3 Analyse various metrics for estimation of software.
CO4 Manage and maintain Software Project to ensure good quality software with high reliability.
CO5 Gain knowledge in different Key Process Areas like planning and estimation of software projects, the implementation issues, and validation and verification procedures.

UNIT I

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models

UNIT II

Software Measurement: process metrics, project metrics, and product metrics for Software quality, integrating metrics with the software process.

Software Project Planning: Software Project Estimation, Decomposition Techniques and Estimation models, Software Risk Management, Project Scheduling and Tracking, Software Quality Assurance, Reliability, Software Configuration Management.

UNIT III

Requirements Engineering: Establishing the Groundwork, Eliciting Requirements, developing use cases, Building the requirements model, Negotiating, Validating Requirements.

Requirements Modeling (Scenarios, Information and Analysis Classes): Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS): Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

UNIT IV

Design Concepts: Design with Context of Software Engineering, The Design Process, Design Concepts, The Design Model.

Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.
Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-Based Development.
User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

UNIT V

Software Testing: Software testing fundamentals, Text Case designs, and Testing approaches, strategies. Clean Room Software Engineering, Component based software engineering, client/Server Software Engineering, Web engineering, Reengineering.

Textbooks

1. Roger S. Pressman, "Software engineering A practitioner's Approach", Seventh Edition, McGraw Hill International Education, 2016.

Reference Books

1. Rajib Mall, "Fundamentals of Software Engineering", Fourth Edition, PHI Learning, 2017.
2. IAN Sommerville, "Software Engineering", Ninth Edition, Pearson, 2011.
3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India,2010.

Web Reference

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	L	M	H	-	-	-	-	-	-	-	-	-	L	-	H
CO3	L	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO4	-	-	-	-	-	-	-	-	-	H	M	L	L	H	-
CO5	H	L	-	-	-	H	-	-	-	-	-	-	-	-	-

20CST19: SOFTWARE TESTING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Learn Software Myths and Facts with their testing functioning of Management.
2. Analyze the various techniques to test the software product.
3. Collect metrics for the management.
4. Implementation of various Regression Techniques.

Course Outcomes

After successful completion of course the students should be able to

CO1 Gain knowledge about the processes involved in various testing methodologies.
CO2 Analyse the techniques in both structure and behaviour of the software.
CO3 Specify the design and analysis of steps in Software management.
CO4 Collection of metrics on various types of Environments.
CO5 Articulate the Methods of Regression Test tools.
CO6 Process various Test and continuous Quality improvement.

UNIT I

Introduction to Software Testing: Evolution of Software Testing, Software Testing—Myths and Facts, Goals of Software Testing, Psychology for Software Testing, Software Testing Definitions, Model for Software Testing, Effective Software Testing vs. Exhaustive Software Testing. Effective Testing is Hard, Software Testing as a Process. Terminology & Methodology: Software Testing Terminology, Software Testing Life Cycle (STLC), Software Testing Methodology.

UNIT II

White Box Testing: Need of White-Box Testing, Logic Coverage Criteria, Basis Path Testing, Graph Matrices, Loop Testing, Data Flow Testing, Mutation Testing.

UNIT III

Black Box Testing: Boundary Value Analysis (BVA), Equivalence Class Testing, State Table-Based Testing, Decision Table-Based Testing, Cause Effect Graphing Based Testing, Error Guessing.

UNIT IV

Software Test Management & Metrics: Test Management: Test Organization, Structure of Testing Group, Test Planning, Detailed Test Design, Test Specifications. Software Metrics: Definition of Software Metrics, Classification of Software Metrics, Size Metrics.

UNIT V

Regression and Automation: Regression Testing: Progressive vs. Regressive Testing, Regression Testing Produces Quality Software, Regression Testability, Objectives of Regression Testing, Regression Testing Types, Defining Regression Test Problem, Regression Testing Techniques. Automation and Testing Tools: Need for Automation, Categorization of Testing Tools, Selection of Testing Tools, Costs Incurred in Testing Tools, Guidelines for Automated Testing, Overview of Some Commercial Testing Tools.

Textbooks

1. Naresh Chauhan, “Software Testing: Principles and Practices”, 2nd Edition, Oxford University Press, 2016.

Reference Books

1. Boris Beizer, “Software Testing Techniques”, 2nd Edition, Dream Tech Press, 2004.
2. K. V. K. K. Prasad, “Software Testing Tools”, Dream Tech Press, 2004.

Web Reference

1. https://nptel.ac.in/courses/106/105/106105150/
2. https://nptel.ac.in/courses/106/101/106101163/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	M	-
CO2	L	H	-	M	-	-	-	-	-	-	-	-	H	-	M
CO3	-	L	H	M	-	-	-	-	-	-	-	-	H	-	M
CO4	H	M	-	L	-	-	-	-	-	-	-	-	H	L	-
CO5	-	-	H	M	-	L	-	-	-	-	-	-	L	-	H
CO6	L	-	-	M	-	H	-	-	-	-	-	-	H	M	L

20CST20: WIRELESS NETWORKS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the concepts of Wireless networks, protocol stack and standards.
2. Introduction to fundamentals of 3G Services, its protocols and applications.
3. Illustrate evolution of 4G Networks, its architecture and applications.

Course Outcomes

After successful completion of course students should be able to

CO1 Demonstrate Conversant with the latest 3G/4G and WiMAX networks and its architecture.

CO2 Design wireless network environment for any application using latest wireless protocols and standards.

CO3 Implement different type of applications for smart phones and mobile devices with latest network strategies.

UNIT I

Wireless LAN: Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum - IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security – IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II

Mobile Network Layer: Introduction – Mobile IP: IP packet delivery, Agent discovery, tunnelling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III

Mobile Transport Layer: TCP enhancements for wireless protocols – Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility – Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT IV

Wireless Wide Area Network: Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V

4G Networks: Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

Textbooks

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education 2012.
2. Vijay Garg, “Wireless Communications and networking”, First Edition, Elsevier 2007.

Reference Books

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin, Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013.

Web Reference

1. https://www.youtube.com/watch?v=pnunzdvezto

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	M	-	-	-	-	H	-	-	-	-	-	H	L	M
CO2	L	-	H	M	-	-	-	-	-	-	-	-	M	-	H
CO3	L	-	H	-	M	-	-	M	-	-	-	-	H	M	-

20CST21: INFORMATION SECURITY

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. The basic approaches in information security, the information assurance as practiced incomputer operating systems, distributed systems, networks and representative applications.
2. The prevalent network and distributed system attacks defences against them and forensics.
3. The cryptography, how it has evolved and some key encryption techniques used today.
4. Security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Course Outcomes

After successful completion of course the students should be able to

CO1 Formulate information security governance, and related legal and regulatory issues.
CO2 Devices how threats to an organization are discovered, analyzed, and dealt with.
CO3 Evaluate network security, threats and countermeasures.
CO4 Construct network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)
CO5 Acquire the knowledge of advanced security issues and technologies (such as DDoS attack detection and containment, and anonymous communications).

UNIT I

Fundamentals: Introduction to Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, SDLC, Security SDLC.

UNIT II

Security Investigation: Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT III

Security Analysis: Risk Management: Identifying and Assessing Risk - Assessing and Controlling Risk - Trends in Information Risk Management - Managing Risk in an Intranet Environment.

UNIT IV

Logical Design: Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V

Physical Design: Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel issues.

Textbooks

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, 6th Edition, CengageLearning Publishers, 2017.

Reference Books

1. Micki Krause, Harold F. Tipton, “Handbook of Information Security Management”, Vol 1-3, Press LLC,

2007.
2. Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2012.
3. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2015.

Web References

1. https://nptel.ac.in/courses/106/106/106106129/
2. https://nptel.ac.in/courses/106/106/106106141/
3. https://nptel.ac.in/courses/106/106/106106157/
4. https://nptel.ac.in/courses/106/106/106106178/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	L	H	-	M	-	-	-	-	-	-	-	H	-	L
CO2	-	H	M	-	L	-	-	-	-	-	-	-	M	-	H
CO3	-	L	M	H	-	-	-	-	-	-	-	-	H	L	-
CO4	-	-	H	M	L	-	-	-	-	-	-	-	H	-	M
CO5	-	-	M	-	L	-	-	-	-	-	H	-	H	M	L

20CST22: BIG DATA ANALYTICS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following

1. Basics of Hadoop, Map-reduce.
2. Analytics – Concepts, Data preparation – merging, managing missing numbers sampling, Data visualisation, Basic statistics
3. Handling an analytics project on Big Data
4. Big data for business intelligence.

Course Outcomes

After successful completion of course the student should be able to

CO1 Describe Big Data and its importance with its applications
CO2 Differentiate various big data technologies like Hadoop, MapReduce, Pig, Hive, HBase and No-SQL.
CO3 Apply tools and techniques to analyze Big Data.
CO4 Design a solution for a given problem using suitable Big Data Techniques

UNIT I

Introduction to Bigdata: Definition of Big data, History of Data Management, Big data characteristics: Volume, Variety, Velocity, Veracity; Analytics, Basic nomenclature, Analytics process model, Analytical model requirements, Types of data sources, Sampling, Types of data elements, Missing values, Standardizing data, Outlier detection and treatment, Categorization.

UNIT II

Hadoop and Hadoop Distributed File Systems: A brief history of Hadoop, The Hadoop ecosystem, Hadoop release, The building blocks of Hadoop, Name node-data node, secondary name node, Job tracker, Task tracker. The Hadoop Distributed File System: The design of HDFS, HDFS concepts, Hadoop file systems.

UNIT III

Data Modeling: NoSQL data modeling techniques: Types of NoSQL stores, Choice of database system, JSON, Column Family Databases, Operations on column family, Understanding Cassandra data model, Designing Cassandra data structures, Schema migration approach using ETL.

UNIT IV

Map-Reduce: MapReduce workflows, How MapReduce works, Anatomy of MapReduce: MapReduce1, MapReduce2, Failures in classic MapReduce; YARN, Failure in YARN, Job scheduling - The fair scheduler, The capacity scheduler; Shuffle and sort in MapReduce.

UNIT V

Extracting Values from Bigdata: In- memory computing technology, Real-time analytics, CAP Theorem, Use of In-memory data grid, Map-Reduce and real time processing, Real-time analysis of machine generated data.
Data Scientist: Definition, Big Data flow, Data scientist activities.

Textbooks

1. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to Data Science and its

Applications", Wiley Publications, 2014.
2. Mohanty S, Jagadeesh M, Srivatsa H, "Big data Imperatives: Enterprise big data warehouse, BI Implementation and analytics", Apress/Springer (India), 2013.

Reference Books

1. Tom White, "Hadoop: The Definitive Guide", Fourth Edition, O'Reilly Publications, 2016.
2. DT Editorial Services, "Big Data Black Book", Dream tech Press,2016.

Web References

1. https://nptel.ac.in/courses/106/106/106106142/
2. https://nptel.ac.in/courses/106/104/106104189/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	M	-	-	-	-	-	-	-	-	H	M	L
CO2	-	H	M	L	-	-	-	-	-	-	-	-	H	M	L
CO3	-	-	-	M	H	-	M	L	-	-	-	-	L	H	M
CO4	-	-	H	L	M	-	-	-	-	-	-	-	H	L	M

20CSP07: OPERATING SYSTEMS LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Various CPU scheduling algorithms and file allocation mechanisms.
2. Simulate file organization strategies, page replacement algorithms, deadlock avoidance and prevention algorithms.

Course Outcomes

After successful completion of the course students should be able to

CO1 Develop synchronized programs using multithreading concepts and deadlocks.
CO2 Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
CO3 Implement memory management schemes and page replacement schemes,
CO4 Design file management techniques

LIST OF PROGRAMS

1. Implement the following scenario (RR)
2. Each customer comes to bank in order to deposit (process) some amount. Now the bank manager decides that no customer will starve (waiting in queue for indefinite time) and each customer must get chance to deposit its amount. For this, he creates some rules
   a. There will be a queue. Whoever wants to deposit its cash must stand in queue first. By analogy, if there is a process, which wants to execute, it must be in queue.
   b. There will be a certain amount "A", fixed by Manager, which is the maximum amount, a customer can deposit at a time. If total amount of customer is greater than A, then customer will leave cashier counter and again stand in Queue and wait for its turn. However, if total amount is less than A, then after deposit, customer will leave cashier counter and get out of bank immediately and next customerfrom queue will deposit his amount next from that point of time.
3. Implement the SJF scheduling algorithm.
4. Implement the following scenario (FCFS)
   a. When he/she went for buying the tickets at a movie theatre.
5. Implement the following scenario(priority)
   a. When you want to watch a movie based on your priority using a pendrive in which there are 10 movies
6. Implement the following scenario using sequential file allocation
   a. StrategySeats allocated for students in an examination hall
7. Implement the following scenario
   a. Books arranged in the library, using Indexed file allocation strategy
8. Implement the following scenario using Linked File allocation strategy
   a. When a viewer goes to the movie theatre how he will find his seat number, first he will extract the alphabet series then he needs to go through the series to get the seat number.
9. Implement how will you organize your files in the documents directory in your pc (File organization usingsingle level directory)
10. Implement how will you organize your files by using a specific folder in the documents directory in your pc (File organization using two level directory).
11. Create the folder MyMusic in which subfolders will be there namely “Artist”, “format”
12. Artist folder consists of the following sub folders of music year, album, format, song and format folder will have the following subfolders year, artist, album, song (File organization using Hierarchical technique)

13. Consider the following reference string to perform the FIFO page replacement 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1 Number of frames=3Consider the following reference string to perform the LRU page replacement 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 Number of frames = 3
14. Consider the following reference string to perform the LRU page replacement 7 0 1 2 0 3 0 4 2 3 0 3 21 2 0 1 7 0 1 Number of frames = 3
15. Simulate banker's algorithm for Dead lock avoidance and prevention.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	L	M	H	-	-	-	-	L	-	-	-	-	M	H	-
CO2	-	H	M	M	-	-	-	L	-	-	-	-	L	H	-
CO3	M	-	H	-	M	-	-	L	-	-	-	-	H	M	L
CO4	M	-	H	-	L	-	-	L	-	-	-	-	H	-	M

20CSP08: SOFTWARE ENGINEERING AND OBJECT-ORIENTED ANALYSIS AND DESIGN LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives
To expose the students to the following:
1. Practice the notation for representing various UML diagrams.
2. The software engineering methodologies for project development.

Course Outcomes
After successful completion of course the student should be able to
CO1 Find solutions to the problems using object-oriented approach.
CO2 Represent using UML notation and interact with the customer to refine the UML diagrams.
CO3 Develop a software project from requirements gathered to implementation.
CO4 Obtain knowledge about principles and practices for estimation and maintenance of software systems.
CO5 Focus on the fundamentals of modeling a software project.

LIST OF EXPERIMENTS

Prepare the following documents for each experiment
1. Develop the software using Software engineering methodology
   a. Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope,Objectives and Infrastructure.
   b. Software Requirement Analysis -Describe the individual Phases/modules of the project and Identifydeliverables.
   c. Data Modelling - Use work products – data dictionary, use case diagrams and activity diagrams, buildand test class diagrams, sequence diagrams and add interface to class Diagrams.
   d. Software Development and Debugging – implement the design by coding
   e. Software Testing- Prepare test plan, perform validation testing, coverage analysis, memory leaks,develop test case hierarchy, Site check and site monitor.
2. Develop UML diagrams.
   a. Use Case Diagram.
   b. Class Diagram.
   c. Sequence Diagram.
   d. Collaboration Diagram.
   e. State Diagram
   f. Activity Diagram.
   g. Component Diagram
   h. Deployment Diagram.
   i. Test Design.

Applications that may be considered are:
1. College information system
2. Hostel management
3. ATM system
3. Online ticket reservation system
4. Airline Reservation System
5. Library Management System

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO)Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	H	-	H	-	-	M	-	-	-	-	M	H	L
CO2	L	-	H	-	H	-	-	M	-	H	-	-	M	H	-
CO3	-	-	H	-	H	M	-	M	-	-	L	-	M	H	L
CO4	H	-	-	-	H	L	-	M	-	-	-	-	H	L	-
CO5	H	-	-	-	H	L	-	-	-	-	-	-	M	H	-

20BSS01: EFFECTIVE COMMUNICATION SKILLS

Credits – 2 **Sessional Marks:40**
L:T:P::0:1:2 **University Exam Marks:60**

Course Objectives

1. To enhance speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
2. To write well-structured paragraphs on specific topics.
3. To improve the fluency in spoken English and neutralize mother tongue influence.
4. To train students to use language appropriately for interview skills, group discussion and public speaking

Course Outcomes

CO1 Understand verbal and non-verbal communication and become efficient in formal/informal conversations
CO2 Applying presentation & Interview skills for their personal and professional growth.
CO3 Implementing skills and master their Interpersonal skills.
CO4 Transmitting the abilities of Debates and Group discussion for better performance in professional life.

UNIT- I

Introduction to Communication Skills

- Introducing oneself - Introducing others – Greetings
- Role play/Situational Dialogues
- Just A Minute (JAM)

UNIT – II

Soft Skills

- Intrapersonal Skills:
  Time Management, Positive Thinking & Goal Setting
- Interpersonal Skills:
  Leadership Skills, Team Building & Crisis Management

UNIT – III

Writing Skills

- Technical Report Writing
- Resume Writing
- Email Writing

UNIT – IV

Presentation Skills Oral Presentations

- Power Point Presentation
- Non- verbal Communication Skills

UNIT – V

Career Skills

- Group Discussions
- Debates
- Interview Skills

- FAQs & Quick tips

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO)Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		H								M		L	L		
CO2			L	M		H						M	L		
CO3									M	H		M	L		
CO4				M						H		M	L		

B.Tech
III Year II Semester

B.Tech III Year II Semester

S.No	Course Code	Course Title
1	20CST11	Compiler Design
2	20CST12	Computer Networks
3	**Elective – III**	
	20CST23	Cryptography and Network Security
	20CST24	Neural Networks
	20CST25	Cloud Computing
	20CST26	Distributed Computing
4	**Open Elective – I**	
	20CST31	Introduction to C++ Programming
	20CSP13	Advanced Programming Lab
	20CST32	Fundamentals of Computer Organization
5	**Open Elective – II**	
	20CST33	Basics of Computer Networks
	20CST34	Introduction to Cyber Security
	20CST35	Introduction to Cloud Computing
6	20CSP09	Machine Learning and Artificial IntelligenceLab
7	20CSP10	Computer Networks Lab
8	**Skill Development Course III**	
	20CSS03	Visual Studio
	20CSS05	Android App Development
	20CSS07	Mongo DB
	20CSS09	Java Script
	20CSS11	Animation for Beginners

20CST11: COMPILER DESIGN

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Basic concepts of Compiler design phases.
2. Knowledge about lexical analysis.
3. Design top-down and bottom-up parser.
4. Identify synthesized and inherited attributes and develop syntax directed translation schemes.
5. Develop algorithms to generate code for a target machine.

Course Outcomes

After successful completion of course the student should be able to

CO1 Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyser, and also able to use the Compiler tools like LEX, YACC, runtime environment, etc.

CO2 Perform parsing using various parsing techniques.

CO3 Develop programs by Syntax directed translation using synthesized and inherited attributes.

CO4 CO4. Use the tools related to compiler design effectively and efficiently.

CO5 Write intermediate code, optimized code and generate the appropriate target code.

UNIT I

Introduction to Compilers: A Language Processing System, Cousins of Compiler, Phases of a compiler, grouping of the phases into passes, Bootstrapping, Compiler Construction Tool.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Strings and Languages, Operation on Languages, Regular Expressions, Recognition of Tokens, Transition Diagrams, lexical analyzer generator LEX, Design of a Lexical Analyzer generator.

UNIT II

Syntax Analysis: Introduction to Syntax Analyzer, Formal definition of CFG, Parse Trees and Derivations, Elimination of Ambiguity, Elimination of Left Recursion, Left Factoring, Top down Parsing, Bottom up Parsing, Operator-Precedence Parsing, Construction of Simple LR Parsing Table, More Powerful LR Parsers, Using ambiguous grammars, Parser Generators.

UNIT III

Syntax-Directed Translator: Syntax-Directed Definitions, Evaluation Orders for SDD's, Construction of Syntax Trees, Parser Stack Implementation of Postfix SDT's, Bottom-Up Parsing of L-Attributed SDD's.

UNIT IV

Intermediate Code Generation: Direct Acyclic Graph, Three Address Code, Type Expressions, Type Equivalence, Declarations, Type Checking, Type Conversions, Over Loading of Functions and Operators, Type Inference and Polymorphic Functions, Boolean expressions, Switch –Statements, Procedures.

Run-Time Environments: Storage Organization, Stack Allocation of Space, Access to Non-local Data on the Stack, Heap Management.

UNIT V

Code Optimization& Generation: The principal sources of optimization, Issues in the Design of a Code Generation, The Target Language, Address in the Target Code, Basic blocks and flow graphs, Optimization of Basic blocks, A simple code generator, Register allocation and assignment.

Textbooks

1. Alfred V.Aho, Monica S.Lam,RaviSethi, Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", Third Edition, Pearson Education, 2018.

Reference Books

1. Alfred V.Aho, Ravi Sethi, Jeffrey D Ullman, "Principles of Compiler Design", Second Edition, Narosa publications, 2002.
2. J.P.Benne, "Introduction to Compiling Techniques", Second edition, Tata McGraw-Hill 2000.
3. Kenneth C Louden, "Compiler Construction-Principles and Practice", Thomson Press (India) Ltd, 1997.

Web References

1. https://nptel.ac.in/courses/106/105/106105190/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	-	H	-	M	-	-	-	L	-	-	-	-	-	H
CO3	-	-	H	-	L	-	-	M	-	-	-	-	M	-	H
CO4	L	-	M	-	H	-	-	-	-	-	-	-	H	-	-
CO5	-	L	H	M	-	-	-	-	-	-	-	-	L	-	H

20CST12: COMPUTER NETWORKS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Modern network architectures from a design and performance perspective.
2. Major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. Impart skills in network programming.
4. Define WLAN metrics.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand and explore the basics of Computer Networks and Various Protocols.
CO2 Administrate a network and schedule flow of information.
CO3 Examine the network security issues in Mobile and ad hoc networks.
CO4 Evaluate the shortest path by using Routing algorithms.
CO5 Demonstrate the TCP/IP and OSI models with merits and demerits.
CO6 Design the various layers protocols.

UNIT I

Introduction: Introduction to computer networks, network hardware, network software, Reference models, examples of networks, example of data communication services, network Standardization. Overview of Physical layer

Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, protocol specification and verification, examples of data link protocols.

UNIT II

Medium Access Sub layer: Channel allocation problem, multiple access protocols, IEEE standard 802 for LANs and MANs, Bridges, High-speed LANs, Satellite network.

UNIT III

Network Layer: Design issues, routing algorithms, congestion control algorithms, internetworking, the network layer in the internet, the network layer in ATM network.

UNIT IV

Transport Layer: Transport services, elements of transport protocols, a simple transport protocol, internet transport protocols, (TCP and UDP), the ATN ALL layer protocols, performance issues.

UNIT V

Application Layer: Network security, DNS – Domain Name System, SNMP –Simple Network Management protocol, Electronic Mail, Usenet news, the World Wide Web (WWW), Multimedia.

Textbooks

1. Andrew S. Tanenbaum, David J. Wetherall, -Computer Networks, 5th Edition, Pearson, 2011.

Reference Books

1. Behrouz A. Forouzan, - Data Communication and Networking, 5th Edition, Tata McGraw Hill, 2013

Web References

1. https://nptel.ac.in/courses/106/105/106105081/
2. https://nptel.ac.in/courses/106/106/106106091/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	L	-	-	-	-	-	H	-	-
CO2	-	H	-	-	-	-	M	-	-	-	-	-	H	-	-
CO3	-	M	-	H	-	M	-	-	-	-	-	-	H	-	M
CO4	-	-	-	H	M	-	-	-	-	-	-	-	H	-	-
CO5	-	-	-	H	-	-	-	-	-	M	-	-	L	M	-
CO6	-	-	H	-	M	-	-	-	-	-	-	-	L	M	M

20CST23: CRYPTOGRAPHY AND NETWORK SECURITY

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the basic categories of threats to computers, networks and various cryptographic algorithms.
2. Describe public-key cryptosystem.
3. Learn about the various key distribution and management schemes
4. Know the fundamental ideas of public-key cryptography.
5. Acquire knowledge on distribution of PGP key pair and use the PGP package to send an encrypted e-mail message.

Course Outcomes

After successful completion of course the students should be able to

CO1 Identify the security issues in the network and resolve it.
CO2 Analyse the vulnerabilities in any computing system and hence be able to design a security solution.
CO3 Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.
CO4 Demonstrate various network security applications, IPSec, Firewall, IDS, Web Security, Email Security and Malicious software etc.

UNIT I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT II

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Block cipher modes of operation, Stream ciphers, RC4, Key distribution

UNIT III

Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution

UNIT IV

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, HMAC, CMAC, Digital signatures.

UNIT V

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

Textbooks

1. William Stallings, “Cryptography and Network Security: Principles and Practice”, 7th Edition, PearsonEducation, 2017.

Reference Books

1. C K Shyamala, N Harini, Dr T R Padmanabhan, "Cryptography and Network Security", 1st Edition,Wiley India, 2011.
2. Forouzan Mukhopadhyay, "Cryptography and Network Security",2nd Edition, McGraw Hill, 2011.
3. Mark Stamp, "Information Security, Principles and Practice", 2nd Edition, Wiley India, 2011.

Web References

1. https://nptel.ac.in/courses/106/105/106105162/
2. https://nptel.ac.in/courses/106/105/106105031/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	L	M	H	-	-	-	-	L	-	-	-	H	-	-
CO2	L	M	H	H	-	-	-	L	-	-	-	-	H	-	H
CO3	-	H	-	-	-	M	-	L	-	-	-	-	H	-	M
CO4	H	-	-	-	-	-	M	-	-	L	-	-	M	-	-

20CST24: NEURAL NETWORKS

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. To demonstrate the basic concepts of Artificial Neural Networks and architectures.
2. To provide the knowledge on various methods of representing information in ANN.
3. To make them recognize the various architectures of building an ANN and its applications.
4. To formulate the Pattern classification and Pattern Association techniques.

Course Outcomes

After successful completion of course the student should be able to

CO1 Analyse simple neural nets for pattern classification.
CO2 Understand the Pattern Association and its applications.
CO3 Apply contextual knowledge to solve problems related to vector Quantization.
CO4 Devise the algorithms using Adaptive Resonance operations.

UNIT I

Introduction: Definition of ANN, Biological Neural Networks, Applications of ANN, Typical Architectures, Setting the weights, Common Activation functions, Development of Neural Networks, McCulloch-Pitts Neuron.

UNIT II

Simple Neural Nets for Pattern Classification: General discussion, Hebb net, Perceptron, Adaline, Back propagation neural net, Architecture, Delta Learning Rule Algorithm, Applications.

UNIT III

Pattern Association: Training Algorithm for Pattern Association-Hetero associative memory neural network applications, Auto associative net, Iterative Auto associative net Bidirectional Associative Memory, Applications.

UNIT IV

Neural Nets Based on Competition: Fixed Weights Competitive Nets, Kohonen's Self-Organizing Map, Applications Learning Vector Quantization, Applications, Counter Propagation Network Applications.

UNIT V

Adaptive Resonance Theory and Neocognitron: Motivation – Basic Architecture, Basic Operation, ART1-ART2-ArchitectureAlgorithm, applications, Analysis, Probabilistic Neural Net, Cascade Correlation Neocognitron: Architecture, Algorithm and Applications.

Textbooks

1. Laurene V. Fausett, "Fundamentals of Neural Networks-Architectures, Algorithms and Applications", Pearson Education, 2011.

Reference Books

1. James. A. Freeman and David. M. Skapura, "Neural Networks Algorithms, Applications and Programming Techniques", Sixth Reprint, Pearson Education, 2011.
2. Simon Haykin, "Neural Networks and Learning Methods", PHI Learning Pvt. Ltd., 2011.
3. James A. Anderson, "An Introduction to Neural Networks", PHI Learning Pvt. Ltd., 2011.

Web References

1. https://www.youtube.com/watch?v=d14TUNcbn1k

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**L**	**H**	**-**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**H**	**-**	**-**
CO2	**H**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**M**	**L**	**H**
CO3	**M**	**L**	**H**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**H**	**-**	**-**
CO4	**L**	**-**	**H**	**-**	**M**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**H**	**-**	**-**

20CST25: CLOUD COMPUTING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Fundamental concepts in the area of cloud computing.
2. Applications of cloud computing.
3. Broad perceptive of cloud architecture and model.
4. Concept of virtualization and design of cloud services.
5. Illustrate the familiarity of the lead players in the cloud.
6. Evaluate the features of Cloud Simulator.

Course Outcomes

After successful completion of course the student should be able to

CO1 Define cloud computing and related concepts.
CO2 Realize the key dimensions of the challenges and benefits of Cloud Computing.
CO3 Understand the hardware necessary for cloud computing and how components fit together.
CO4 Determine the suitability of in-house v/s hosted solutions.
CO5 Realize the systems, protocols and mechanisms to support cloud computing and develop applications for cloud computing.
CO6 Regulate numerous opportunities exist for practitioners seeking to create solutions for cloud computing.

UNIT I

Systems Modelling, Clustering and Virtualization: Distributed System Models and Enabling Technologies. Computer Clusters for Scalable Parallel Computing. Virtual Machines and Virtualization of Clusters and Data centres.

UNIT II

Foundations: Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era. The Enterprise Cloud Computing Paradigm

UNIT III

Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS): Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service. Secure Distributed Data Storage in Cloud Computing. Aneka, Comet Cloud, T-Systems, Understanding Scientific Applications for Cloud Environments

UNIT IV

Monitoring, Management and Applications: Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Production for HPC on Clouds, Best Practices in Architecture Cloud Applications in the AWS cloud, Building Content Delivery networks Clouds

UNIT V

Governance and Case Studies: Organizational Readiness and Change management in the Cloud age. Data Security in the Cloud, Legal issues in Cloud computing. Achieving Production Readiness for Cloud Services

Textbooks

1. Rajkumar B, Cloud Computing: "Principles and Paradigms", John Wiley & Sons Inc.., 2011.

2. Kal Hwang. Geoffeiy C. Fox. Jack J. Dongarra, “Distributed and Cloud Computing”, Elsevier, 2012

Reference Books

1. Anthony T.Velte. Toby J.VeFte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw Hill, 2011.
2. Gautam Shroif, “Enterprise Cloud Computing”, Cambridge University Press, 2010.

Web Reference

1. https://nptel.ac.in/courses/106/105/106105167/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	H	M	-	M	-	-	-	-	-	-	-	-	H	-	-
CO3	H	-	-	-	L	-	-	-	-	-	-	-	H	-	-
CO4	L	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO5	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO6	-	-	H	H	-	-	-	-	-	-	-	-	H	-	-

20CST26: DISTRIBUTED COMPUTING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the collaborative operations of collections of computer systems.
2. Acquire the skills to develop industry recommended projects as well group as research oriented.

Course Outcomes

After successful completion of course the students should be able to

CO1 Gain advanced knowledge in, IPC mechanisms and Event Synchronization, Distributed Computing Paradigms, SOCKET API, Group Communication, Distributed Objects, Remote Method Invocation (RMI) and Internet Applications.

CO2 Analyse message passing, client- server and peer -to-peer models to understand distributed computing paradigms.

CO3 Design and Implement application programs on distributed computing systems.

CO4 Apply appropriate techniques and tools to design distributed computing systems and deploying in Internet applications.

UNIT I

Introduction: Forms of computing-Strengths and weaknesses of distributed computing-OS overview-Network Overview-Software Engineering overview.

UNIT II

Inter Process Communication IPC: Program Interface**-**Event Synchronization, Timeouts and threading, Deadlock and timeouts, Data representation, Data encoding, Text based protocols, Request response protocols Event and sequence diagram, Connection vs. connectionless IPC.

UNIT III

Distributed Computing Paradigms: Message passing, client server, peer to peer, message system, remote procedure, call model, distributed objects, object space, mobile agent, network services, collaborative application - Abstraction, Tradeoffs: abstraction vs overhead, scalability, cross-platform.

UNIT IV

Socket API: Socket metaphor, diagram socket API stream mode socket API, sockets with non-blocking I/O, secure socket API, Client-server paradigm, Issues, service session, protocol for a service, Inter-process communications &event synchronization, data representation, Software engineering for a network service, software architecture, IPS Mechanism, Daytime client server, Connection oriented and connectionless servers, Echo client server, Iterative server and concurrent server, Stateful servers -global state information, session state information.

UNIT V

Group Communication: Unicasting, Multicasting, Multicast API, Connection oriented and connectionless Reliable, Unreliable multicast, Java Basic Multicast API-IP Multicast addresses, Joining/sending multicast group.

Textbooks

1. M. L. Liu, “Distributed Computing: Principles and Applications”, Pearson/Addison-Wesley, 2004.

Reference Books

1. G. Coulouris, J. Dollimore and T. Kindberg, “Distributed Systems: Concepts and Design”, 2nd edition,

Pearson Education, 2011.
2. HagitAttiya, Jennifer Welch, "Distributed Computing: Fundamentals, Simulations, and Advanced Topics", Second Edition, Wiley-Interscience, 2004.
3. A. Taunenbaum, "Distributed Systems: Principles and Paradigms", Pearson, 2017.

Web References

1. https://nptel.ac.in/courses/106/106/106106107/
2. https://nptel.ac.in/courses/106/106/106106168/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	L	-	H	-	-	-	-	-	-	-	-	H	-	-
CO3	-	L	H	L	-	-	-	-	-	-	-	-	L	H	M
CO4	-	H	M	-	H	-	-	-	-	-	-	-	L	H	M

OPEN ELECTIVE – I
&
OPEN ELECTIVE – II
(Refer to concerned Department Syllabus)

20CSP09: COMPILER DESIGN LAB

Credits – 1 **Sessional Mark: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Compiler writing tools.
2. Learn to implement the different Phases of compiler.
3. Be familiar with control flow and data flow analysis
4. Learn simple optimization techniques

Course Outcomes

After successful completion of course the students should be able to

CO1 Implement the different Phases of compiler using tools
CO2 Analyze the control flow and data flow of a typical program
CO3 Optimize a given program
CO4 Generate an assembly language program equivalent to a source language program

LIST OF EXPERIMENTS

1. To write a c program on lexical analysis to generate tokens.
2. To write a c program to do exercise on syntax analysis.
3. To write a c program to implement infix to postfix operation.
4. To write a c program to implement parser Techniques.
5. To write a c program to implement symbol table.
6. To write a c program to implement backend of the compiler.
7. To write a c program for stack to use dynamic storage allocation strategies.
8. To write a c program to implement data flow and control analysis.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	L	-	-	-	-	-	H	-	-
CO2	L	H	-	-	-	-	M	-	-	-	-	-	H	-	-
CO3	L	M	-	H	-	M	-	-	-	-	-	-	H	-	M
CO4	L	-	-	H	M	-	-	-	-	-	-	-	H	-	-

20CSP10: COMPUTER NETWORKS LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:
1. The concepts of all the layers to implement framing methods.
2. The required skills for developing algorithms.

Course Outcomes

After successful completion of course the students should able to
CO1 Develop the programs related to Bit stuffing, character count.
CO2 Apply appropriate algorithm for the finding of shortest route.
CO3 Simulate the encryption and decryption concepts in network layer
CO4 Demonstrate communication between the peers using client-server programming.

LIST OF PROGRAMS

1. Implement the data link layer framing methods such as bit stuffing
2. Implement the data link layer framing methods such as character stuffing.
3. Implement RSA Algorithm.
4. Implement on a data set of characters the three CRC.
5. Implement Dijkstra's algorithm to compute the shortest path.
6. Take an example subnet of hosts. Obtain broadcast tree for it.
7. Write a program to break the above DES coding.
8. Write a program to create a socket.
9. Write a program for Data link layer framing method (Character count).
10. Write a program for Sliding window protocol.
11. Write a C Program to Implement UDP Client Server Communication using Bind System Call
12. Write Java Client Server Program using Byte Stream
13. Write Java Multicasting Program
14. Write C Program to Restart Server by Capturing SIGHUP signal
15. Write Java Program for Message Group Window
16. Write Java Window Chat Program

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	H	-	H	-	M	L	-	-	-	-	L	H	L
CO2	-	H	H	L	M	L	-	L	-	-	-	-	H	-	L
CO3	-	-	-	-	H	H	-	L	-	-	-	-	M	-	L
CO4	-	-	-	-	H	-	-	L	-	H	M	-	M	-	L

20CSS03: VISUAL STUDIO

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Develop skills to design and analyse visual studio.
2. Strengthen the ability to identify and apply the various programming language concepts.
3. Implement various programming language concepts in visual studio IDE.

Course Outcomes

After successful completion of course the student should be able to

CO1 Demonstrate fundamental skills in utilizing the tools of visual environment such as command, menus and toolbars.
CO2 Implement the IDE using window forms
CO3 Understand the connectivity between visual studio with Database programming.
CO4 Implement the methods and Techniques to develop project.

UNIT I

Introduction: C#, .NET Framework, Object-Oriented Programming (OOP), Visual Studio Getting Started, Integrated Development Environment (IDE), New Project, Solution Explorer, Toolbox, Editors and Designers, Properties window, Build and Debug Tools.

UNIT II

Windows Programming: Windows Forms, WPF, Hello World, Getting Started with C#, Data Types and Variables, Boolean type, Numeric types: Integrals, Floating Point, Decimal, String type, Arrays, Control Flow, The if Statement, The switch Statement, Loops, The while Loop, The do Loop, The for Loop, The foreach Loop.

UNIT III

Methods: Non static Methods, Static Methods, Namespaces, Classes: Constructor, Properties, Naming Convention.

More Object-oriented Techniques: Inheritance, Polymorphism, Encapsulation, Exception Handling, Windows Forms Example.

UNIT IV

Web Programming: HTML, WebBrowser, CSS, JavaScript, ASP.NET, AJAX/ ASP.NET AJAX, Silverlight.

UNIT V

Database Programming, ADO.NET.

Textbook

1. Ockert J. du Preez, “Visual Studio 2019 In Depth”, 1st Edition, BPB publications 2019.

LIST OF PROGRAMS

1. Study Windows API's. Find out their relationship with MFC classes. Appreciate how they are helpful in finding complexities of windows programming.
2. Get familiar with essential classes in a typical (Document- view architecture) VC++ Program and their relationship with each other.
3. Create an SDI application in VC++ that adds a popup menu to your application which uses File drop down menu attached with the menu bar as the pop-up menu. The pop-up menu should be displayed on the right click of the mouse.
4. Create an SDI application in VC++ using which the user can draw atmost 20 rectangles in the client area. All the rectangles that are drawn should remain visible on the screen even if the window is refreshed. Rectangle should be drawn on the second click of the left mouse button out of the two consecutive clicks. If the user tries to draw more than 20 rectangles, a message should get displayed in the client area that "No more rectangles can be drawn"
5. Create an application in VC++ that shows how menu items can be grayed, disabled and appended at run time.
6. Write a program in VC++ to implement serialization of inbuilt and user defined objects.
7. Write a program in VC++ to create archive class object from C File class that reads and stores a simple structure (record)
8. Write a program in VC++ to create archive class object from C File class that reads and stores a simple structure (record).
9. Write a program in VB to implement a simple calculator
10. Create a simple database in MS Access Database /Oracle and a simple database application in VB that shows database connectivity through DAO and ADO
11. Write a simple program that displays an appropriate message when the illegal operation is performed using error handling technique in VB.
12. Write a program in VB to create a notepad.
13. Create a DLL in VB.
14. Write a program in VC++ to implement a simple calculator.
15. Write a program in VC++ to create a static link library and a dynamic link library.
16. Create a simple window using VC++ programming.
17. Write a program to interact with the mouse using vc++ programming
18. Write a program to interact with the keys using vc++ programming.
19. Write a program to perform the calculator operation using VC++ programming
20. Write a program to Create a ToolBar Using VC++ Programming
21. Write a program to create a DLL using them in an application using VC++ programming
22. Write a program to create a Threads using them in an application using VC++ programming.
23. Write a program to implement the MDI Application using VC++ Programming.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	L	H	-	-	L	-	-	-	-	H	-	-
CO2	M	M	-	L	H	L	-	-	-	-	-	-	M	-	-
CO3	-	M	-	-	H	M	-	-	-	-	-	-	M	-	-
CO4	-	M	H	-	H	-	-	-	-	-	-	-	M	-	-

20CSS05: ANDROID APP DEVELOPMENT

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. How to develop Applications in android environment.
2. Develop user interface applications.
3. URL related applications.

Course Outcomes

After successful completion of course the student should be able to

CO1 Identify various concepts of mobile programming that make it unique from programming for other platforms.

CO2 Critique mobile applications on their design pros and cons,

CO3 Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.

CO4 Program mobile applications for the Android operating system that use basic and advanced Phone features, and Deploy applications to the Android marketplace for distribution.

UNIT 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.

UNIT 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.

UNIT III

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

UNIT 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.

Textbook

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

Reference Books

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

LIST OF PROGRAMS

1. (a) Create an Android application that shows Hello + name of the user and run it on an emulator. (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spiner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout, (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.
4. Develop an application that uses a menu with 3 options for dialling a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.
7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	-	L	-	-	-	-	-	-	-	H	-	L
CO2	L	M	H	-	-	-	-	-	-	-	-	-	H	M	L
CO3	L	L	H	M	H	-	-	-	-	-	-	-	M	H	-
CO4	L	-	M	-	H	-	-	-	L	-	-	-	M	-	H

20CSS07: MONGO DB

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Fundamental concepts of MongoDB query methods.
2. Various MongoDB operations and the querying mechanisms in NOSQL.
3. Advanced topics like JSON methods with MongoDB.

Course Outcomes

After successful completion of course the student should be able to

CO1 Build a database system and demonstrate competence with the fundamental tasks involved with its modelling, designing, and implementation.
CO2 Use the MongoDB tools to develop and deploy the applications.
CO3 Create various Java/ Python web application for a real-world problem with MongoDB.
CO4 Design solutions for real life computational problems.

UNIT I

NoSQL: SQL, NoSQL, Definition, A Brief History of NoSQL, ACID vs. BASE, CAP Theorem, The BASE, NoSQL Data Types, Advantages of NoSQL, Disadvantages of NoSQL, SQL vs. NoSQL Databases, Categories of NoSQL Databases.

UNIT II

Introducing MongoDB: History, MongoDB Design Philosophy, Speed, Scalability, and Agility, Non-Relational Approach, JSON- Based Document Store, Performance, Features and Applications, Comparison with SQL.

The MongoDB Data Model: The Data Model, JSON and BSON, The Identifier, Capped Collection, Polymorphic Schemas, Object-Oriented Programming.

UNIT III

Querying MongoDB: Basic Querying, Data types, Create and Insert, Explicitly Creating Collections, Inserting Documents Using Loop, Update, Delete, Read, Using Indexes, Stepping Beyond the Basics, Using Conditional Operators, Regular Expressions, MapReduce, Aggregation.

UNIT IV

Data Management in MongoDB and Architecture: Core Processes, mongoDB, mongo, mongos, MongoDB Tools, Standalone Deployment, Replication, Master/Slave Replication, Replica Set, Implementing Advanced Clustering with Replica Sets, Sharding, Sharding Components, Data Distribution Process, Data Balancing Process, Operations, Implementing Sharding, Controlling Collection Distribution.

UNIT V

MongoDB Use Cases: Performance Monitoring, Schema Design, Operations, Sharding, Content Management.

Textbooks

1. Shakuntala Gupta, Edward, Navin Sabharwal, "Practical MongoDB", Apress, 2015.
2. Subhashini Chellappan, Dharanitharan Ganesan, "MongoDB Recipes: With Data Modeling and Query Building Strategies", 1st Edition, Apress, 2019.

Reference Books

1. Peter Membrey**,** David Hows**,** EelcoPlugge, "MongoDB Basics" 1st Edition, Apress, 2014.

2. Kristina Chodorow, “MongoDB: The Definitive Guide: Powerful and Scalable Data Storage”, O'Reilly Media, Second edition, 2013.

LIST OF PROGRAMS

1. MongoDB Basics
   a) MongoDB query to create and drop database.
   b) MongoDB query to create, display and drop collection
   c) MongoDB query to insert, query, update and delete a document.
2. Executing simple MongoDB queries
   a) Indexing
   b) Limiting records
   c) Sorting records
3. Queries for implementing aggregation in MongoDB.
4. Queries for implementing replication, backup in MongoDB.
5. Connecting Java and python with MongoDB and inserting, retrieving, updating and deleting.
6. Creating, parsing and persisting JSON.
7. Exporting and Importing JSON files with MongoDB.
8. Write a MongoDB query to display all the documents in the collection restaurants.
9. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
10. Write a MongoDB query to display the first 5 restaurants.
11. Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than100.
12. Write a MongoDB query to find the restaurants which locate in latitude value less than -95.754168.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	-	-	-	H	-	L	-	-	-	-	-	H	-	L
CO2	-	-	-	H	M	L	-	-	-	-	-	-	M	-	H
CO3	M	-	-	-	H	-	L	-	-	-	-	-	M	H	L
CO4	-	-	H	-	M	-	L	-	-	-	-	-	M	L	H

20CSS09: JAVA SCRIPT

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The JavaScript language.
2. Dynamic language programming, such as introspection, higher-order functions, and closures.
3. Language features such as prototypical inheritance.
4. Implementation of client-side interfaces through the use of the DOM.
5. Libraries and tools that are used in web application development.

Course Outcomes

After successful completion of course the student should be able to

CO1 Use JavaScript as an interactive tool for web development and regular expressions for form validation.
CO2 Implement interactive processes and responses in your web pages
CO3 Create and modify dynamic styles and CSS styles and presentation properties with JavaScript
CO4 Understand the Document Object Model (DOM)
CO5 Map HTML using the DOM - Document Object Model.

UNIT I

Introduction to JavaScript: What You Need to Know - Basic HTML and CSS Knowledge, Basic Text Editor and Web Browser Knowledge, Which Version, Remember, It's Not Java.
Beginning with JavaScript - Object Based, Client Side, Scripting Language.
Placing JavaScript in an HTML File: Using the HTML Script Tags, Creating Your First Script, Using External JavaScript File, Using JavaScript Comments.

UNIT II

Using Variables: Understanding Variables, Why Variables Are Useful, Defining Variables for Your Scripts, Understanding Variable Types, Using Variables in Scripts, Writing a Page of JavaScript.
Using Functions: Why Functions Are Useful, Structuring Functions, Calling Functions in Your Scripts**.**

UNIT III

JavaScript Operators: Understanding the Operator Types, Understanding Mathematical Operators, Understanding Assignment Operators, Understanding Comparison Operators, Understanding Logical Operators.
Conditional Statements and Loops: Defining Conditional Statements, Using Conditional Statements, Defining Loops, Using Loops

UNIT IV

Event Handlers: What Is an Event Handler? Why Event Handlers Are Useful, Understanding Event Handler Locations and Uses, Learning the Event Handlers, Creating Scripts Using Event Handlers.

UNIT V

Objects: Defining Objects, Creating Objects.
The Document Object: Defining the Document Object, Using the Document Object Model, Using the Properties of the Document Object, Using the Methods of the Document Object.

Text Book

1. John Pollock, "Java Script - A Beginner's Guide", 3rd Edition, McGraw Hill, 2011.

LIST OF PROGRAMS

1. JavaScript Program to Add Two Numbers
2. JavaScript Program to Make a Simple Calculator
3. JavaScript Program to Guess a Random Number
4. JavaScript Program to Find Factorial of Number Using Recursion
5. JavaScript Program to Check the Number of Occurrences of a Character in the String
6. JavaScript Program to Check if a Key Exists in an Object
7. JavaScript Program to Create Multiline Strings
8. JavaScript Program to Convert Objects to Strings
9. JavaScript Program to Display Date and Time
10. JavaScript Program to Create Countdown Timer
11. JavaScript Program to Remove Duplicates from Array
12. JavaScript Program to Get File Extension
13. JavaScript Program to Remove All Whitespaces from a Text
14. JavaScript Program to Pass a Function as Parameter
15. JavaScript Program to Check if a Number is Float or Integer

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	-	M	-	-	L	-	-	-	-	M	-	-
CO2	-	L	H	-	M	-	-	-	-	-	-	-	M	-	-
CO3	-	L	H	-	M	-	-	-	-	-	-	-	M	-	-
CO4	-	L	M	H	-	-	-	-	-	-	-	-	M	-	-
CO5	-	M	H	L	-	-	-	-	-	-	-	-	M	-	-

20CSS11: ANIMATION FOR BEGINNERS

Credits –2 **Sessional Marks: 30**
L:T:P:: 0:1:2 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Free hand drawing with animation related techniques.
2. Drawing techniques for animation with the help of mannequins and uses of light box equipment for animation.
3. The line of action and create gesture drawing and understand the principles of animation with the help of basic cell animation exercises.
4. The experimental animation.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand and apply techniques about drawing and sketching
CO2 Acquire knowledge about the basics form of arts required for animation course
CO3 Design and draw simple drawings in pencil and color about a given subject or concept
CO4 Demonstrate progress in human figure, cartoon, animals, birds and humanoids.

UNIT I

Introduction to animation: History of animation: Types of animation: case study Understanding and learning the principles of animation through the view of different animation films: case study.

UNIT II

Flip Book: Drawing simple flip book with minimum 30 pages, drawing a detail flip book with minimum 30 pages following the principles of animation

UNIT III

2D Software Interface: Understanding the 2d software interface Drawing tools, pen tools and other necessary tools to create any drawing in the frames.

UNIT IV

Frame by frame animation: Creating frame by frame animation for a short animation (maximum 10 sec with simple drawing. Creating simple frame by frame animation for a short animation (maximum 20 sec with color drawings and background.

UNIT V

Character drawing and creating symbols: Drawing simple character with pen tool or shape tool Preparing the character for animation: dividing each body parts into symbol Creating symbols, types of symbols

Textbook

1. Frank Thomas and Odie Johnson, The Illusion of Life: Disney Animation, Disney Editions; Rev Sub edition, 2014.

Reference Books

1. Williams, R. The Animator's Survival Kit. Revised Edition, Faber & Faber, 2011.

LIST OF PROGRAMS

1. Basic Sketching for Develop Drawing Skill using many techniques
2. Quick rapid sketching and gesture drawing
3. Flip book design
4. Understanding Classical Animation & Principles of Animation
   a. Time and Space
   b. Slow Out & Slow In
   c. Arc
   d. Squash & Stretch
   e. Follow Through & Overlapping Action
5. Experimental Animation
6. Advance Sketching for Develop Drawing Skill using many techniques
7. Understanding Classical Animation & Principles of Animation
8. Study of expression

Course Outcomes - Program Outcomes- Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	M	-	-	L	-	-	-	-	-	-	M	H	L
CO2	H	-	-	M	-	L	-	-	-	-	-	-	H	L	-
CO3	-	-	H	M	-	-	-	-	-	L	-	-	M	H	L
CO4	-	-	-	-	L	-	-	-	-	-	H	M	H	-	M

B.Tech
IV Year I Semester

B.Tech IV Year I Semester

S.No	Course Code	Course Title
1	20CST13	Machine Learning
2	20CST14	Internet and Web Programming
3	20CSM01	Elective – IV (Mandatory MOOCs)
4		**Elective V**
20CST27		Artificial Intelligence
20CST28		Deep Learning
20CST29		Data Science
20CST30		Speech and Natural Language Processing
5		**Open Elective III**
20CST36		Introduction to Artificial Intelligence
20CST37		Introduction to Java Programming
20CST38		Fundamentals of Internet of Things
6		Skill Oriented Course 5
20CSS04		Source Code Management using Git and Github
20CSS06		IoS App Development
20CSS08		Hadoop and Apache Spark
20CSS10		ASP: Active Server Pages
20CSS12		VFX: Visual Effects

20CST13: MACHINE LEARNING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Fundamental concepts in the area of machine learning.
2. Describe the machine learning and decisions trees, Neural networks and genetic algorithms.
3. Bayesian techniques, instant based learning and analytical learning and reinforced learning.

Course Outcomes

After successful completion of course the student should be able to

CO1 Familiarize with various types of machine learning algorithms and solve it.
CO2 Articulate how these algorithms are fundamentally different from traditional programming algorithms.
CO3 Practice the Bayesian and computational algorithms related to the real time application.
CO4 Implement the effective of analytical concepts, inductive analytical approaches and reinforced learning algorithms.
CO5 Construct various instant based learning and learning set of rules.

UNIT I

Introduction, Concept Learning and Decision Trees: Learning Problems, Designing Learning systems, Perspectives and Issues, Concept Learning, Version Spaces and Candidate Elimination Algorithm, Inductive bias, Decision Tree learning, Representation, Algorithm, Heuristic Space Search.

UNIT II

Neural Networks and Genetic Algorithms: Neural Network Representation, Problems, Perceptions, Multilayer Networks and Back Propagation Algorithms, Advanced Topics, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning.

UNIT III

Bayesian and Computational Learning: Bayes Theorem, Concept Learning, Maximum Likelihood, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier Bayesian Belief Network, EM (Expectation-Maximization) Algorithm, Probably Learning, Sample Complexity for Finite and Infinite Hypothesis Spaces, Mistake Bound Model.

UNIT IV

Instant Based Learning and Learning Set of Rules: k- Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Sequential Covering Algorithms, Learning Rule Sets, Learning First Order Rules, Learning Sets of First Order Rules, Induction as Inverted Deduction, Inverting Resolution.

UNIT V

Analytical Learning and Reinforced Learning: Perfect Domain Theories, Explanation Based Learning, Inductive Analytical Approaches, FOCL (First Order Combined Learner) Algorithm, Reinforcement Learning, Task, Q-Learning, Temporal Difference Learning

Textbooks

1. Tom M. Mitchell, “Machine Learning”, 1st Edition, McGraw-Hill, 2013

Reference Books

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Edition, MIT Press, 2009.
2. Kevin P. Murphy, "Machine Learning, A Probabilistic Perspective", MIT Press, 2012

Web References

1. https://nptel.ac.in/courses/106/106/106106202/
2. https://nptel.ac.in/courses/106/105/106105152/
3. https://nptel.ac.in/courses/106/106/106106139/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	H	-	M	-	-	-	L	-	H	-	-
CO2	H	-	M	-	-	-	-	-	-	-	-	-	-	-	H
CO3	L	-	-	-	-	H	M	-	-	-	-	-	-	-	H
CO4	L	-	-	-	-	-	-	-	H	M	-	L	H	-	-
CO5	L	-	-	-	-	-	-	-	-	-	-	H	-	-	H

20CST14: INTERNET AND WEB PROGRAMMING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the concept of tags, script, and code that create web pages.
2. Analyze how the web and web pages work.
3. Build the skills and to understand the potentials of developing a web application.
4. Develop web applications with Perl and Python Programming.

Course Outcomes

After Successful completion of course the students should be able to

CO1 Apply a structured approach to identifying needs, interests, and functionality of a website.
CO2 Design dynamic websites that meet specified needs and interests.
CO3 Use JavaScript to add dynamic content to pages.
CO4 Critique JavaScript code written by others, identifying examples of both good and bad practice.
CO5 Modify existing HTML, CSS, and JavaScript code to extend and alter its functionality, and to correct errors and cases of poor practice.
CO6 Develop web-based applications using Perl and Python programming.

UNIT I

HTML Common tags: List, Tables, images, forms, Frames; Cascading Style sheets.

UNIT II

JAVA Script: Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script. XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.

UNIT III

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

UNIT IV

Introduction to Perl and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT V

Python: Introduction to Python language, python syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

Textbooks

1. Robert W. Sebesta, "Programming the World Wide Web", Seventh edition, Pearson, 2014.
2. David Barron, "The World of Scripting Languages", First edition, Wiley Publications, 2000.

Reference Books

1. Mark lutz, “Programming Python”, Fourth Edition, O'Reilly Media, 2011.
2. Ellie Quigley, “Perl by Example”, Fifth Edition, O'Reilly Media, 2014.

Web References

1. https://www.youtube.com/watch?v=9k48hjSSOPA

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	M	-	-	-	-	-	-	-	-	-	M	-
CO2	L	-	H	M	-	-	-	-	-	-	-	-	-	M	-
CO3	L	-	M	-	H	-	-	-	-	-	-	-	H	-	-
CO4	L	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO5	L	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO6	-	L	H	M	-	-	-	-	-	-	-	-	H	-	-

20CST27: ARTIFICIAL INTELLIGENCE

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. About various AI domains and problem solving techniques.
2. Basic proficiency in representing difficult real life problems in a state space representation so as to solve them by using AI techniques like searching and game playing.
3. The concept of Knowledge representations, its various approaches and issues, Non-monotonic environment and Symbolic Reasoning in Uncertainty.
4. Formal foundation on Strong & Weak slot & filler structures.
5. An overview on Natural Language Understanding and processing.

Course Outcomes

After successful completion of course the student should be able to

CO1 Recognize various AI domains and identify problem solving techniques to apply them in real time applications.

CO2 Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.

CO3 Represent Knowledge in propositional calculus and Predicate calculus.

CO4 Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.

CO5 Get wide exposure about strong and weak slot & fillers available.

CO6 Gain an in-depth understanding of the computational properties of natural languages and the techniques for processing linguistic information.

UNIT I

Introduction to AI: The AI Problems-The Underlying Assumption-What is an AI Technique-Tic-Tac-Toe game playing, Problems, Problem Spaces and Search-Defining the problem as a State Space Search-Production Systems-Control Strategies-Heuristic Search, Issues in the design of search program.

Heuristic search techniques: Generate and Test, Hill Climbing-Simple Hill Climbing-Steepest Ascent Hill Climbing-Simulated Annealing, Best-first-search-OR Graphs, A* Algorithm, Agenda Driven Search.

UNIT II

Knowledge representation: Knowledge Representation Issues- Representations in Mappings, Approaches to Knowledge representation, Issues in Knowledge Representation.

Predicate logic: Representing simple facts in Logic, representing instance and isa Relationships, Computable Function and Predicates, Resolution-Conversion to Clause form-The basics of Resolution-Resolution in Propositional Logic-Resolution in Predicate Logic, Natural deductions.

UNIT III

Symbolic Reasoning under Uncertainty: Introduction to non-monotonic reasoning, logics for non-monotonic reasoning-Default Reasoning-Minimalist Reasoning, Implementation issues, Implementation in depth first search-Dependency directed Backtracking-Justification Based Truth Maintenance Systems-Logic-Based Truth Maintenance Systems- Implementation in Breadth first search.

UNIT IV

Weak slot and Filler Structures: Semantic Nets- Intersection Search-Representing Non-binary Predicates-Partitioned Semantic Nets, Frames-Frames as Sets and Instances-Slots as Full-Fledged Objects-Slot-Values as Objects-Inheritance Revisited.

Strong Slot and Filler Structures: Conceptual dependency.

UNIT V

Natural Language Processing: Introduction, Syntactic Processing-Grammars and Parsers-Top Down versus Bottom-Up Parsing-Finding one Interpretation or Many-Augmented Transition Networks-Unification Grammars, Semantic Analysis-Lexical Processing-Sentence-Level Processing-Semantic Grammars-Case Grammars-Conceptual Parsing-Approximately Compositional Semantic Interpretation-The interaction between Syntax and Semantics, Discourse and Pragmatic processing- Using Focus in Understanding-Modeling Beliefs-Using Goals and plans for Understanding-Speech acts-Conversational postulates.

Textbooks

1. Elaine Rich, Kelvin Knight and Shiva Shankar B.Nair, "Artificial Intelligence", 3rd Edition, Tata McGraw-Hill Edition, July, 2017.

Reference Books

1. Saroj koushik, "Artificial Intelligence", 1st Edition, Engage learning, 2011.
2. Ela kumar, "Artificial Intelligence", 1st Edition, I.K. International publishing house, 2010.

Web References

1. https://nptel.ac.in/courses/106/105/106105077/
2. https://nptel.ac.in/courses/106/105/106105079/
3. https://nptel.ac.in/courses/106/106/106106140/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	L	-	-	-	-	-	H	-	L
CO2	-	H	-	M	-	-	-	L	-	-	-	-	H	M	-
CO3	H	-	-	-	-	-	-	-	-	-	-	-	H	-	-
CO4	-	H	-	M	-	-	-	-	-	-	-	-	H	-	L
CO5	H	-	M	-	-	-	-	L	-	-	-	-	H	-	-
CO6	L	-	-	H	-	-	M	-	-	-	-	M	M	-	-

20CST28: DEEP LEARNING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Major deep learning algorithms, the problem settings, and their applications to solve real world problems.
2. Deep learning methods for working with sequential data.
3. Deep recurrent and memory networks.
4. Deep Turing machines.
5. Apply such deep learning mechanisms to various learning problems.
6. Open issues in deep learning, and have a grasp of the current research directions.

Course Outcomes

After successful completion of course the students should be able to

CO1 Understand the theory behind deep learning methods such as Convolutional Neural Networks, Auto encoders and Boltzmann Machines.

CO2 Acquire knowledge on the open issues and trends in deep learning research.

CO3 Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains

CO4 Devise deep learning algorithms and solve real-world problems

UNIT I

Introduction: Feed forward Neural networks, Gradient descent and the back propagation algorithm, Unit saturation, aka the vanishing gradient problem, and ways to mitigate it, RelU Heuristics for avoiding bad local minima, Heuristics for faster training, Nesters accelerated gradient descent, Regularization, Dropout.

UNIT II

Convolutional Neural Networks: Architectures, convolution / pooling layers.

UNIT III

Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures.

UNIT IV

Deep Unsupervised Learning: Auto encoders (standard, sparse, denoising, contractive, etc), Variational Auto encoders, Adversarial Generative Networks, Auto encoder and DBM.

UNIT V

Applications of Deep Learning to NLP: Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW)**,** Glove, Evaluations and Applications in word similarity, analogy reasoning, Named Entity Recognition, Opinion Mining using Recurrent Neural Networks, Parsing and Sentiment Analysis using Recursive Neural Networks.

Textbooks

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, “Deep learning”, An MIT Press book, 2018.
2. Rajiv chopra, “Deep Learning- A practical Approach”, Khanna publishing, 2018.

Reference Books

1. Bengio, Yoshua, "Learning deep architectures for AI (Foundations and trends in Machine Learning)", Now Publishers Inc., 2009.

Web References

1. https://nptel.ac.in/courses/106/105/106105215/
2. https://nptel.ac.in/courses/106/106/106106184/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	L	-	-	L	L	M	-	-	M	-	-
CO2	H	-	-	L	-	-	-	-	-	M	-	-	M	-	-
CO3	-	H	-	H	-	-	-	-	-	-	-	-	H	-	-
CO4	-	-	H	H	M	L	M	L	M	-	-	-	M	L	M

20CST29: DATA SCIENCE

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Learn how to analyse the data and apply operations on it with text mining.
2. Measure the statistics of the data using Az-score, p-score, One-tail test, F distribution, Chi-square distribution, ANOVA.
3. Have basic knowledge on estimating the likelihood of events.

Course Outcomes

After successful Completion of course the students should be able to

CO1 Present a report on how data is collected, managed and stored for data Science.
CO2 Demonstrate scholarly knowledge while uncovering the concept of machine learning for analysis.
CO3 Perform experiments on the estimation of the likelihood of events for generating recommendation and sentiment analysis for twitter real- time data.
CO4 Determine how data science can be applied in real time application.

UNIT I

Getting Started with Raw Data: The world of arrays with NumPy, Empowering data analysis with pandas, Data cleansing, Data Operations. Inferential Statistics: Various forms of distribution, Az-score, p-score, One-tail test, F distribution, Chi-square distribution, ANOVA.

UNIT II

Finding a Needle in a haystack: What is data mining, Presenting the analysis, studying the Titanic. Making Sense of Data through Advanced Visualization: Charts, plots, Heat maps, histograms, scatter plot matrix, Area plots.

UNIT III

Uncovering Machine Learning: Decision tress, Linear regression, Logistic regression, Naïve Bayes Classifier, k-means clustering. Performing predictions with Linear Regression: Simple Linear regression, multiple regressions, training and testing a model.

UNIT IV

Estimation the likelihood of events: Logistic regression, Generating recommendation with collaborative filtering: Used-based, Item-based.

UNIT V

Analyzing unstructured data with text mining: Pre-processing data, creating a world cloud, word and sentence tokenization, parts of speech tagging, stemming and lemmatization, performing sentiment analysis on world leaders using Twitter.

Textbooks

1. Samir Madhavan, “Mastering Python for Data Science”, PACKT Publishing, 2015.

Reference Books

1. Cathy O’Neil and Rachel Schutt, “Doing Data Science, Straight Talk From The Frontline”, O’Reilly, 2014.

2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2010.

Web References

1. https://nptel.ac.in/courses/106/106/106106179/
2. https://nptel.ac.in/courses/106/106/106106212/
3. https://nptel.ac.in/courses/106/105/106105186/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	L	-	-	-	-	-	H	-	-	H	-	M
CO2	H	M	-	L	-	-	-	-	-	-	-	-	H	-	L
CO3	L	-	H	-	M	-	-	-	-	-	-	-	L	-	H
CO4	L	-	-	H	-	-	-	-	-	-	-	M	H	L	M

20CST30: SPEECH AND NATURAL LANGUAGE PROCESSING

Credits – 3 **Sessional Marks: 30**
L:T:P :: 2:1:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Understand the basic algorithms available for the processing of linguistic information.
2. Describe the underlying computational properties of natural languages.
3. Analyze linguistic and algorithmic perspectives.
4. Acquire the knowledge on the computational properties of natural languages and of the algorithms used to process them.

Course Outcomes

After successful completion of course the students should be able to

CO1 Acquire knowledge in natural language processing and learn how to apply basic algorithms in this field.

CO2 Evaluate the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics.

CO3 Explore the resources of natural language data - corpora.

CO4 Demonstrate the basics of knowledge representation, inference, and relations to the artificial intelligence.

UNIT I

Introduction, Regular Expressions, Text Normalization and Edit Distance: Regular Expressions, Corpora Text Normalization Minimum Edit Distance

N-gram Language Models: N-Grams, Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, The Web and Stupid Backoff, Advanced: Perplexity's Relation to Entropy

UNIT II

Logistic Regression: Classification: the sigmoid, Learning in Logistic Regression, the cross-entropy loss function Gradient Descent, Regularization, Multinomial logistic regression, interpreting models, Advanced: Deriving the Gradient Equation.

Vector Semantics: Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the tf-idf vector model, Optional: Pointwise Mutual Information (PMI), Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models

UNIT III

Part-of-Speech Tagging: (Mostly) English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging, HMM Part-of-Speech Tagging, Maximum Entropy Markov Models, Bidirectionality, Part-of-Speech Tagging for Other Languages.

Sequence Processing with Recurrent Networks: Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs, Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs.

UNIT IV

Statistical Parsing: Probabilistic Context-Free Grammars, Probabilistic CKY Parsing of PCFGs, Ways to Learn PCFG Rule Probabilities, Problems with PCFGs, Improving PCFGs by Splitting Non-Terminals, Probabilistic Lexicalized CFGs, Probabilistic CCG Parsing, Evaluating Parsers, Human Parsing.
Dependency Parsing: Dependency Relations, Dependency Formalisms, Dependency Treebanks, Transition-Based Dependency Parsing, Graph-Based Dependency Parsing, Evaluation.

UNIT V

Computational Semantics, Semantic Parsing, Information Extraction: Named Entity Recognition, Relation Extraction, Extracting Times, Extracting Events and their Times, Template Filling.

Textbook

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Second Edition, Pearson, 2014.

Reference Book

1. Christopher D. Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing", First edition, MIT Press, 2000.

Web References

1. https://nptel.ac.in/courses/106/105/106105158/
2. https://nptel.ac.in/courses/106/106/106106211/

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	M	-	-	-	-	-	-	L	L	-
CO2	L	-	H	M	-	-	-	-	-	-	-	-	M	-	-
CO3	M	H	-	L	-	-	-	-	L	L	-	-	H	M	-
CO4	H	-	-	M	-	-	-	L	-	-	-	-	M	-	-

20CST39 : INTERNET OF THINGS

Credits–3 **Sessional Marks:30**
L:T:P::2:1:0 **University Exam Marks:70**

Course Objectives

To expose the students to the following:

1. Concepts IoT and Sensors.
2. IoT Business/Market perspective.
3. IoT Privacy, Security.
4. IoT Architecture, Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes

After successful completion of course the students should be able to

CO1. Analyse the vision of IoT from a global context.
CO2. Understand the vision of IoT from a global context.
CO3. Determine the Market/Business perspective of IoT.
CO4. Use devices like Sensors, Participatory Sensing, RFIDs and Wireless Sensor Networks, Data acquiring, storage and Management in IoT.
CO5. Build architecture for IoT.

UNIT I

Internet of Things: An Overview: Internet of Things, IoT Conceptual Framework, IoT Architectural view, Technology Behind IoT, Sources of IoT, M2M Communication, Examples of IoT.

Design Principles For Connected Devices: Introduction, IoT M2M Systems Layers and Designs Standardisation, Communication Technologies, Data Enrichment, Data Consolidation and Device Management at Gateway, Ease of Design and Affordability.

UNIT II

Design Principles for Web Connectivity: Introduction, Web Communication Protocols For Connected Devices, Message Communication Protocols For Connected Devices, Web Connectivity for Connected-Devices Network Using Gateway, SOAP, REST, HTTP RESTful and Web Sockets.

Internet Connectivity Principles: Introduction, Internet Connectivity, Internet-Based Communication, IP Addressing in the IoT, Media Access Control, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet and others.

UNIT III

Data Acquiring, Processing and Analytics: Introduction, Data Acquiring and Storage, Organising the data, Transactions, Business Processes, Integration and Enterprise Systems, Analytics, Knowledge Acquiring, Managing and Storing Processes.

Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks: Introduction, Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Networks Technology.

UNIT IV

Prototyping the Embedded Devices for IoT and M2M: Introduction, Embedded Computing Basics, Embedded platforms for Prototyping, Things always connected to the IoT/Cloud.

Prototyping and Designing the software for IoT Applications: Introduction, Prototyping Embedded Device Software, Devices, Gateways, Internet and Web/Cloud Services Software Development, Prototyping Online Component APIs and Web APIs.

UNIT V

IoT Privacy, Security and Vulnerabilities Solutions: Introduction, Vulnerabilities, Security Requirements and Threat Analysis, Identity Management and Establishment, Access Control and Secure Message Communication, Security Models, Profiles and Protocols for IoT.

Business Models and Processes using IoT: Introduction, Business Models and Business Model Innovation, Value creation in the IoT, Business Model scenarios for IoT.

Text Books

1. Raj Kamal, "Internet of Things Architecture and Design Principles", McGraw Hill Education (India) Private Limited, 2017.

Reference Books

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press,2014.
2. Michael Miller, "The Internet of Things", First Edition, Pearson,2015.
3. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", Wiley,2013.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO2	H	-	-	-	M	-	L	-	-	-	-	-	H	-	-
CO3	M	-	-	-	-	-	H	-	-	M	-	L	H	-	-
CO4	-	-	-	-	H	-	-	-	-	-	-	-	L	H	M
CO5	-	M	H	-	-	-	-	-	-	-	-	-	L	-	H

20CSP11: MACHINE LEARNING LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The programs can be implemented in either JAVA or Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
3. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

Course Outcomes

After successful completion of course students should be able to:

CO1 Gain wide exposure on the basic concepts in machine learning.
CO2 Implementation procedures for the machine learning algorithms.
CO3 Apply appropriate data sets to the Machine Learning algorithms.
CO4 Analyze Machine Learning algorithms to solve real world problems.

LIST OF EXPERIMENTS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a CSV file. Compute the accuracy of the classifier, considering few test data sets
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	M	-	-	-	-	-	-	-	-	H	M	-
CO2	-	H	M	L	-	-	-	-	-	-	-	-	H	M	-
CO3	-	-	-	M	H	-	M	L	-	-	-	-	-	H	M
CO4	-	H	M	L	M	-	-	-	-	-	-	-	H	-	M

20CSP12: INTERNET AND WEB PROGRAMMING LAB

Credits – 1 **Sessional Marks: 40**
L:T:P :: 0:0:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1 Understand the principles of creating an effective web page.
2 Learn the language of the web: HTML and CSS.
3 Develop skills in analyzing the usability of a web site.
4 Use JavaScript to access and use web services for dynamic content.

Course Outcomes

After successful completion of course the students should be able

CO1 Use Javascript and XHTML to create web pages with advanced interactivity.
CO2 Program basic functions in Javascript and XHTML.
CO3 Use Javascript to create functional forms.
CO4 Us Javascript to control browser frames and windows.
CO5 Use cascading style sheets to design web pages.

LIST OF PROGRAMS

1. Develop and demonstrate a XHTML file that includes Javascript for the following problems:
   a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers
   b) Input: A number n obtained using prompt
   Output: A table of numbers from 1 to n and their squares using **alert**
2. a) Develop and demonstrate, using Java script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
   b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.
3. a) Design an XML document to store information about a student in an engineering college affiliated to SPMVV. The information must include 100 USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
   b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.
4. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc
   b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.
5. a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.
   b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
6. Write a Perl program to display a digital clock which displays the current time of the server.
7. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.

8. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
9. Write a Python program to perform Selection sort and Insertion sort
10. Write a Python program to perform Merge sort

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO2	-	M	H	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO4	-	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO5	-	-	M	-	H	-	-	-	-	-	-	-	H	-	-

20CSS04: SOURCE CODE MANAGEMENT USING GIT AND GITHUB

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. Using GitHub as a repository.
2. Knowing the integration options
3. Tracking of changes in the code across versions.

Course Outcomes

After successful completion of course the student should be able to

CO1 Understand why version control is a fundamental tool for coding and collaboration
CO2 Install and run Git on your local machine
CO3 Use and interact with GitHub
CO4 Collaborate with others through remote repositories

UNIT I

Introduction: A Short History of Git, What is Git?, The Command Line, Installing Git, Git Basics, Git Branching

UNIT II

Git on the Server, The Protocols, Getting Git on a Server, Generating Your SSH Public Key, Setting Up the Server, Git Daemon, Smart HTTP, Git Web, Git Lab, Third Party Hosted Options

UNIT III

GitHub, Account Setup and Configuration, Contributing to a Project ,Maintaining a Project, Managing an organization, Scripting GitHub

UNIT IV

Git Tools, Revision Selection, Interactive Staging, Stashing and Cleaning, Signing Your Work, Searching, Rewriting History Reset Demystified, Advanced Merging, Revere, Debugging with Git, Submodules, Bundling Replace

UNIT V

Git and Other Systems, Git as a Client, Migrating to Git, Git Internals, Plumbing and Porcelain, Git Objects, Git References

Textbook

1. Scott Chacon and Ben Straub, Pro Git book, second Edition.

LIST OF EXPERIMENTS

1. Basic Installation of GIT and GITHUB
2. Basic Commands on GIT (GIT cheat sheet)
3. Basic Commands on GITHUB (GITHUB Cheat sheet)
4. Create a "repository" (project) with a git hosting tool (like Bitbucket)
5. Copy (or clone) the repository to your local machine
6. Add a file to your local repo and "commit" (save) the changes

7. "Push" your changes to your main branch
8. Make a change to your file with a git hosting tool and commit
9. "Pull" the changes to your local machine
10. Create a "branch" (version), make a change, commit the change
11. Open a "pull request" (propose changes to the main branch)
12. "Merge" your branch to the main branch

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	H	-	L	H	-	-	L	-	-	-	-	H	-	-
CO2	M	M	-	L	H	L	-	-	-	-	-	-	M	-	-
CO3	-	M	-	-	H	M	-	-	-	-	-	-	M	-	-
CO4	-	M	H	-	H	-	-	-	-	-	-	-	M	-	-

20CSS06: IOS APP DEVELOPMENT

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The components and structure of mobile application development frameworks for IoS based mobiles.
2. How to work with various IoS application development frameworks.
3. The basic and important design concepts and issues of development of IoS applications.
4. The capabilities and limitations of mobile devices.

Course Outcomes

After successful completion of course the student should be able to

CO1 Design and implement various iOS applications using IoS devices.
CO2 Deploy applications to hand-held devices.

UNIT I

IOS Development Environment: Introduction to iOS SDK, What's new in iOS 9, SDK Tools, What's new in Xcode 7, Using XCode, Using Interface Builder, Using iPhone Simulator.
Swift Fundamentals: Hello Swift, Swift Playground embeddedact.com. **Swift Language Basics** Core Data Types, String Type, Tuples & Optionals, Constants & Variables, Statements & Operators, Control Flow & Decisions, Functions. **Basic Object-Oriented Programming using Swift:** Structs, Types versus instances, Member and static methods, Custom initialization & De-initialization, Classes, Initialization, Methods, Properties

UNIT II

Advanced Object-Oriented Programming using Swift: Optionals, Introducing optional, Unwrapping an optional, Optional binding, Nested Types, Generic Types, Protocol. **Memory Management:** Reference Counting Basics, Automatic Reference Count, Retain Cycles. **iPhone Application Basics:** Anatomy of an iPhone application, Application Life cycle and States. **User Interface Programming – Basics:** UIKit Framework, XIB and Interface Builder, Window & View, Basic User Controls, Labels, Text Fields, Buttons, Sliders, Picker etc., Building application screens, Alerts and Action Sheets.

UNIT III

Auto-layout and Constraints, **View Controllers:** Basics, Creating View Controllers, Content vs Container View Controllers, Orientation Management. **User Interface – Special Views:** Image View, Scroll View, Table Views, Populating and configuring Table View, Data Source and Delegate, Table View Cells, Custom Cells, Editing Table View, Collection View. **Multiple View Controllers:** Applications with Multiple Views, Presenting View Controllers, Animating View Switching, Tab based applications (Tab Bar Controller), Configuring the Tab Bar, Navigation based applications (Navigation Controller), Working with the Navigation Bar.

UNIT IV

Storyboards: Storyboard File, View Controller and Scene, Segue, Invoking a Segue, XIB and Storyboards, Table View Cell Prototype. **Multi Touch and Gestures API:** Events and Touches, Gesture Recognition. **Data Persistence – 1:** File System, SQLite. **Data Persistence – 2**: Core Data, NSUserDefaults.

UNIT V

Concurrency and Background Execution: GCD and Closures, NSOperation and NSOperationQueue, Background execution. **Networking, Connectivity etc:** Making web request, Restful services, JSON, Apple Push Notification Service. **Multimedia:** Audio and Video. **Best Practices, Profiling and Performance Tuning.**

Reference Books

1. Matt Neuburg, "iOS 10 Programming Fundamentals with Swift", O'Reilly Media Inc., 3rd Edition, 2017.
2. MikeWesterfield, "Building iPhone and iPad Electronic Projects", O'Reilly Media Inc., 2013.
3. Dan Pilone and Tracey Pilone, "Head First iPhone and iPad Development: A Learner's Guide to Creating Objective – C Applications for the IPhone and IPad", O'Reilly Media Inc., 2nd Edition, 2013.
4. Chris Apers and Daniel Paterson, "Beginning iPhone and iPad Web Apps", Apress, 2010.

LIST OF PROGRAMS

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi-threading.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	L	H	M	L	-	-	-	-	-	-	-	H	-	M
CO2	L	-	H	M	-	-	-	L	-	-	-	-	H	M	-

20CSS08: HADOOP AND APACHE SPARK

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The HDFS System with real time examples
2. Programs using Map reduce.
3. Skills to design and analyse Big Data with Apache Spark.
4. The suitable file system for the given real-world problem.

Course Outcomes

After successful completion of course the student should be able to

CO1 Identify and implement the appropriate File system to process the Big Data
CO2 Analyze and simulate the real time problems using Map Reduce
CO3 Implement and simulate the appropriate Data streaming platform
CO4 Understanding the concepts of Apache Spark.

UNIT I

Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files
.

UNIT II

Hadoop and Hadoop Distributed File Systems: A brief history of Hadoop, The Hadoop ecosystem, Hadoop release, The building blocks of Hadoop, Name node-data node, secondary name node, Job tracker, Task tracker. The Hadoop Distributed File System: The design of HDFS, HDFS concepts, Hadoop file systems.

UNIT III

Hadoop Eco systems: Hive – Architecture - data type - File format – HQL (Hibernate Query Language) – SerDe (Serializer Deserializer.) - User defined functions - Pig: Features – Anatomy - Pig on Hadoop - Pig Philosophy - Pig Latin overview - Data types - Running pig - Execution modes of Pig - HDFS commands - Relational operators - Eval Functions

UNIT IV

Big Data Streaming Platforms Big Data Streaming Platforms for Fast Data, Streaming Systems, Big Data Pipelines for Real-Time computing, Spark Streaming, Kafka, Streaming Ecosystem.

UNIT V

Introduction to Spark: Evolution of Apache Spark - Features of Apache Spark - Spark Built on Hadoop - Components of Spark - Resilient Distributed Datasets - Iterative Operations on MapReduce - Data Sharing using Spark RDD (Resilient Distributed Dataset) - Interactive Operations on Spark RDD.

Textbooks

1. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications”, Wiley Publications, 2019.
2. Tom White, “Hadoop: The Definitive Guide”, Fourth Edition, O’Reilly Publications, 2016.

3. Mohanty S, Jagadeesh M, Srivatsa H, "Big data Imperatives: Enterprise big data warehouse, BI Implementation and analytics", Apress/Springer (India), 2013.
4. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley and SAS Business Series.

Reference Books

1. DT Editorial Services, "Big Data Black Book", Dream tech Press, 2016.
2. Sima Acharya, Subhashini Chhellappan, "Bigdata and Analytics", Wiley publication
3. Srinivas Duvvuri, Bikramaditya Singhal, "Spark for Data Science", Packt Publishing, 2016.

LIST OF PROGRAMS

1. Calculate the size of a word and the number of words of that size in a text file using Hadoop and Spark.
2. Apply Map Reduce programming knowledge and write a Map Reduce program to process two text files calculate the size of word and count the number of words of that size in the text file.
3. Apply Map Reduce process to find the phone numbers who are making more than 60 mins call timings

From Phone Number	To Phone Number	Call Start time	Call End Time

4. Design and develop a program in a language of your choice for generating L_K a set of candidate k-item sets by joining L_{K-1} itself.
5. Design and develop a program in a language of your choice or partitioning trained set based on a candidate attribute.
6. Design and develop a program in a language of your choice for computing dissimilarity of objects described by numeric attributes. Use Manhattans distance measure.
7. Design and develop a Java program for implementing measures of central tendency with your examples.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	-	-	-	-	-	-	-	-	-	H	M	-
CO2	M	H	-	L	-	-	-	-	-	-	-	-	H	-	L
CO3	M	-	H	-	M	-	-	L	-	-	-	-	H	M	L
CO4	-	M	L	-	-	-	-	-	H	-	-	-	-	-	H

20CSS10:ASP - ACTIVE SERVER PAGES

Credits – 3 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The insights of the Internet programming and how to design and implement complete applications over the web.
2. The notions of Web servers and Web Application Servers,
3. Design Methodologies with concentration on Object-Oriented concepts, Client-Side Programming, Server-Side Programming, Active Server Pages, and Database Connectivity to web applications.

Course Outcomes

After successful completion of course the student should be able to

CO1 Apply knowledge learned in this course as well knowledge earned from previous courses
CO2 Design an almost error-free database structure to reflect the automated system.
CO3 Use the development products of Microsoft Visual Studio.Net® products
CO4 Implement and connect the automated system to a database stored on a web server.
CO5 Learn how to link and publish Visual Studio.Net® applications to reflect a web application.

UNIT I

INTRODUCTION TO .NET FRAMEWORK: Genesis of .Net – Features of .Net - .Net binaries – Microsoft Intermediate Language – Meta Data - .Net types and .net name spaces – Common Language Runtime – Common Type System – Common Language Specification - .Net Applications using command line compiler and visual studio .net IDE.

UNIT II

BASICS OF ASP. NET: Introducing ASP .NET – Creating and deploying ASP .NET applications – Web forms – Web controls – working with events – Rich web controls – Custom web controls – Validation controls – Debugging ASP .NET pages.

UNIT III

ADVANCED ASP .NET: ASP .NET configuration – Business objects – HTTP Handlers – Caching in ASP .NET – ASP .NET security – Localizing ASP .NET applications – Deployment projects**.**

UNIT IV

BUILDING WEB SERVICES: Introduction to web services – Web services Infrastructure – SOAP – Building a web service – Deploying and publishing web services – Finding web services – Consuming web services.

UNIT V

ADO .NET: Basics of ADO .NET – Changes from ADO – Data Table – Data Views – Data Set – Data Relation Type – ADO .NET Managed Providers – OlEDB and SQL Managed Providers – OlEDB Data Adapter Type.

Textbooks

1. Andrew Troelsen, “C# and the .Net Platform”, Apress, 2001
2. Mridula Parihar, et. al., “ASP .NET Bible”, Wiley dream tech India Pvt. Ltd., 2002.

Reference Books

1. David S. Platt, "Introducing .Net", Microsoft Press, 2002.
2. Alex Homer et. al., "Professional ASP .NET 1.1", Wiley dream tech India Pvt. Ltd., 2004.
3. Rebecaa M. Riordan, "ADO .Net step by step", Microsoft Press 2002.

LIST OF PROGRAMS

1. Working with MSIL, Metadata and Namespace
2. Usage of CLR, CTS and CLS.
3. .Net application using command line complier.
4. .Net application using visual studio .net IDE.
5. Simple ASP .Net Applications.
6. Creating web forms application projects.
7. Usage of web controls.
8. Working with events
9. Usage of Rich web controls.
10. Usage of validation controls

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	-	L	-	-	L	-	-	-	-	M	-	-
CO2	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO4	-	M	H	-	-	-	-	-	-	-	-	-	M	-	-
CO5	-	-	H	M	-	-	-	-	-	-	-	-	M	-	-

20CSS12: VFX: Visual Effects

Credits – 2 **Sessional Marks: 40**
L:T:P :: 0:1:2 **University Exam Marks: 60**

Course Objectives

To expose the students to the following:

1. The Basics of compositing using layer based compositing software.
2. The tools and techniques of compositing.
3. The categories in compositing process.

Course Outcomes

After successful completion of course the student should be able to

CO1 Gain good understanding about compositing process.
CO2 Identify major applications of compositing process used in industry.
CO3 Develop a visual effects pipeline.
CO4 Demonstrate an in-depth knowledge of grading and VFX principles, practice and system capabilities.
CO5 Create customized tools through software or scripting to allow for more creative application of visual effects techniques.

UNIT I

Visual Effects: Set Up Your VFX Content Development Workstation, The Foundation of Raster for VFX: Pixels, Color, and Alpha; The Foundation of Motion for VFX: Frames and Codecs; The Foundation of Audio for VFX: MIDI, Wave, and Sample.

UNIT II

The Foundation of 2D Vector for VFX: Point, Path, and SVG; The Foundation of 3D Vector for VFX: Models and OpenGL; Professional VFX Software: Black magic Design Fusion; VFX Pipeline Composition: Using the Flow Node Editor.

UNIT III

VFX Pipeline Animation: Using the Timeline Editor; VFX Pipeline Motion Control: Using the Spline Editor; VFX Pipeline Pixel Isolation: Animated Polyline Masking; VFX Pipeline Automated Masking: Matte Generators.

UNIT IV

VFX Pipeline Pixel Tracking: Using Motion Tracking; VFX Pipeline 3D Production: Compositing 3D Assets; VFX Pipeline 3D Rendering: Shader, Material, and Texture; VFX Pipeline 3D Modeling: 3D Text-Title Creation.

UNIT V

VFX Pipeline 3D Animation: 3D Text-Titling Modifiers; Advanced VFX Pipeline Effects: 3D Particle Systems; Advanced VFX Pipeline Physics: 3D Particle Physics; Advanced Interactive VFX: i3D Content Publishing.

Reference books

1. Wallace Jackson, “VFX fundamentals: visual special effects using fusion 8.0”, Apress, 2016
2. Karen e. Goulekas, “Visual effects in a digital world”, Elsevier, 2001
3. John Gress, “[digital] Visual Effects and Compositing”, Pearson Education, 2014.

Web References

1. http://chrisoatley.com/upcoming2015/
2. https://thewaltdisneycompany.com/employee-profile-spotlight-on-a-visualdevelopment-artist-2/
3. http://www.artofvfx.com/escape-plan-chris-wells-vfx-supervisor-hydraulx/
4. http://conceptartworld.com/artists/interview-with-visual-development-artistlandis-fields/

LIST OF PROGRAMS

1. Develop a concept. Gather some references such as photograph or a sketch.
2. Create a mind map of an environment.
3. Build a proper personality of a character and design the clothing or props the character.
4. Select couple of block buster vfx films and write up a vfx film analysis.
5. Provide proper lighting to the given model.
6. Integrate a 3d element into real photograph and match the lighting.
7. Create 5 different effects using dynamics & particle effects – fire, smoke, water, building collapse, glass breaking
8. Add a blasting effect to the given footage.
9. Add snowfall effect to the given environment.
10. Building collapse scene using dynamics

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	-	L	-	-	L	-	-	-	-	M	-	-
CO2	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	L	H	-	-	-	-	-	-	-	-	-	M	-	-
CO4	-	M	M	-	-	-	-	-	-	-	-	-	M	-	-
CO5	-	-	H	H	-	-	-	-	-	-	-	-	M	-	-