BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

B.Tech – R21 COURSE STRUCTURE
(Applicable from the batch admitted during 2021-22 and onwards)

Department of Computer Engineering (SE)

S. No.	Subject Code	Subject	L	T	P	Credits
		I-Year I–Semester	**Hours Per Week**			
1	21MA101BS	Linear Algebra and Calculus	3	1	0	4
2	21CH101BS	Chemistry	3	1	0	4
3	21EE101ES	Basic Electrical Engineering	3	0	0	3
4	21ME102ES	Engineering Workshop	1	0	3	2.5
5	21EN101HS	English	2	0	0	2
6	21CH102BS	Engineering Chemistry Lab	0	0	3	1.5
7	21EN102HS	English Language and Communication Skills Lab	0	0	2	1
8	21EE102ES	Basic Electrical Engineering Lab	0	0	2	1
		TOTAL	**12**	**2**	**10**	**19**

S. No.	Subject Code	Subject	L	T	P	Credits
		I-Year II–Semester	**Hours Per Week**			
1	21MA202BS	Advanced Calculus	3	1	0	4
2	21PH201BS	Applied Physics	3	1	0	4
3	21CS201ES	Programming for Problem Solving	3	1	0	4
4	21ME203ES	Engineering Graphics	1	0	4	4
5	21PH202BS	Applied Physics Lab	0	0	3	1.5
6	21CS202ES	Programming for Problem Solving Lab	0	0	3	1.5
		TOTAL	**10**	**3**	**10**	**19**
Mandatory Course (Non-Credit)						
7	21MC201ES	Environmental Science	2	0	0	0

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S. No.	SubjectCode	Subject	Hours Per Week			Credits
			L	T	P	
		II-Year I–Semester				
1	21EC310ES	Analog and Digital Electronics	3	0	0	3
2	21CS309PC	Software Engineering	3	0	0	3
3	21MA307BS	Computer Oriented Statistical Methods	3	0	0	3
4	21CS311PC	Computer Organization and Architecture	3	0	0	3
5	21CS303PC	Data Structures	3	0	0	3
6	21EC311ES	Analog and Digital Electronics Lab	0	0	2	1
7	21CS310PC	Software Engineering Lab	0	0	2	1
8	21CS304PC	Data Structures Lab	0	0	2	1
9	21CS312PC	IT Workshop Lab	0	0	3	1.5
10	21MA308BS	Aptitude and Critical Thinking Skills Lab	0	0	3	1.5
		TOTAL	**15**	**0**	**12**	**21**
Mandatory Course (Non-Credit)						
11	21MC303	Constitution of India	2	0	0	0

S. No.	Subject Code	Subject	Hours Per			Credits
			L	T	P	
		II-Year II-Semester				
1	21CS440PC	Discrete Mathematics	3	0	0	3
2	21CS445PC	Software Architecture and Design Patterns	3	0	0	3
3	21CS417PC	Operating Systems	3	0	0	3
4	21CS405PC	Database Management Systems	3	0	0	3
5	21CS413PC	Object Oriented Programming Through Java	3	0	0	3
6	21CS418PC	Operating Systems Lab	0	0	3	1.5
7	21CS406PC	Database Management Systems Lab	0	0	3	1.5
8	21CS414PC	Object Oriented Programming Through Java Lab	0	0	3	1.5
9	21HS401	Social Innovation in Practice	0	0	3	1.5
		TOTAL	**15**	**0**	**12**	**21**
Mandatory Course (Non-Credit)						
10	21MC402	Gender Sensitization Lab	0	0	2	0

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S. No.	Course Code	Course Title	L	T	P	Credits
III-Year I-Semester						
1	21CS531PC	Design and Analysis of Algorithms	3	0	0	3
2	21CS520PC	Python Programming	3	0	0	3
3	21CS515PC	Computer Networks	3	0	0	3
4	21CS542PC	Software Requirements & Estimation	3	0	0	3
5		Professional Elective – I	3	0	0	3
6	21CS521PC	Python Programming Lab	0	0	2	1
7	21CS516PC	Computer Networks Lab	0	0	3	1
8	21EN503HS	Advanced English Communication Skills Lab	0	0	3	1.5
9	21CS532PC	DAA Lab	0	0	3	1.5
10	21CS5174PC	Summer Internship - I	0	0	0	1
		Total Credits	**16**	**0**	**12**	**21**
Mandatory Course (Non-Credit)						
10	21MC504	Intellectual Property Rights	3	0	0	0
11	21MC506	Cyber Security	3	0	0	0

S. No.	Course Code	Course Title	L	T	P	Credits
III-Year II-Semester						
1	21CS644PC	Automata Theory and Compiler Design	3	0	0	3
2	21CS622PC	Software Testing Methodologies	3	0	0	3
3	21SM601MS	Business Economics And Financial Analysis	3	0	0	3
4		Professional Elective – II	3	0	0	3
5		Open Elective – I	3	0	0	3
6	21CS636PC	Compiler Design Lab	0	0	3	1.5
7	21CS623PC	Software Testing Methodologies Lab	0	0	3	1.5
8	21CS641PC	Scripting Languages Lab	0	0	3	1.5
9	21CS652PC	Object Oriented Analysis and Design Lab	0	0	3	1.5
		Total Credits	**15**	**0**	**12**	**21**
Mandatory Course (Non-Credit)						
10	*21MC605	Environmental Science	3	0	0	0
11	21MC607	Artificial Intelligence	3	0	0	0

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S. No.	Course Code	Course Title	L	T	P	Credits
		IV-Year I-Semester				

S. No.	Course Code	Course Title	L	T	P	Credits
1	21CS743PC	Agile Software Development	3	0	0	3
2	21CS733PC	Machine Learning	3	0	0	3
3		Professional Elective – III	3	0	0	3
4		Professional Elective – IV	3	0	0	3
5		Open Elective – II	3	0	0	3
6	21CS734PC	Machine Learning Lab	0	0	2	1
7	21CS7175PC	Summer Internship - II	0	0	0	1
8	21CS7176PC	Project Stage – I	0	0	8	4
		Total Credits	**15**	**0**	**10**	**21**

S. No.	Course Code	Course Title	L	T	P	Credits
		IV-Year II-Semester				
1		Professional Elective – V	3	0	0	3
2		Professional Elective – VI	3	0	0	3
3		Open Elective – III	3	0	0	3
4	21CS8177PC	Project Stage – II	0	0	16	8
		Total Credits	**9**	**0**	**16**	**17**

L ist of Professional Electives for CE(SE)

Subject code	Professional Elective	Subject name
21CS594PE	**Professional Elective – I**	Web Programming
21CS595PE		Image Processing
21CS596PE		Computer Graphics
21CS5152PE		Internet of Things
21CS668PE	**Professional Elective – II**	Information Retrieval Systems
21CS6101PE		Data Warehousing and Business Intelligence
21CS6153PE		Mining Massive Datasets
21CS6154PE		DevOps
21CS6155PE		Software Design Methodologies
21CS7156PE	**Professional Elective – III**	Object Oriented Analysis & Design
21CS775PE		Cloud Computing
21CS7157PE		Introduction to Data Science
21CS7107PE		Cryptography and Network Security
21CS7105PE		Scripting Languages
21CS772PE		Natural Language Processing
21CS7108PE	**Professional Elective – IV**	Quantum Computing
21CS778PE		Data Visualization Techniques
21CS7158PE		Information Storage Management
21CS7159PE		Software Project Management
21CS8160PE	**Professional Elective –V**	Mobile Application Development
21CS8161PE		Privacy Preserving in Data Mining
21CS8162PE		Cloud Security
21CS8163PE		Data Stream Mining
21CS8164PE		Exploratory Data Analysis
21CS8116PE		Web Security
21CS8165PE	**Professional Elective –VI**	Software Metrics
21CS8166PE		Computational Complexity
21CS8151PE		Block Chain Technology
21CS8167PE		Parallel and Distributed Computing
21CS8168PE		Software Quality Assurance

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21MA101BS: LINEAR ALGEBRA AND CALCULUS

B.Tech. I Year I Sem.   **L T P C**
                                                                    3 1 0 4

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series.

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

REFERENCES:
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CH101BS: CHEMISTRY

B.Tech. I Year I Sem.   L   T   P   C
                                                                              3   1   0   4

Course Objectives:
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become aperfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makesthe student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essentialfor the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understandingreaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:
- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding theproblem of water and its treatments.
- The required skills to get clear concepts on basic spectroscopy and application to medical andother fields.
- The knowledge of configurational and conformational analysis of molecules and reactionmechanisms.

UNIT - I:
Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination ofAtomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and F_2 molecules. π molecular orbitals of butadiene and benzene.
Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT - II:
Water and its treatment: Introduction – hardness of water – Causes of hardness - Types of hardness:temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT - III:
Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).
Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT - IV:
Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation alanalysis of n- butane.
Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ andchromic acid.
Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT - V:

    Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy. vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., NewDelhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

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21EE101ES: BASIC ELECTRICAL ENGINEERING

B.Tech. I Year I Sem.   **L   T   P   C**
                                                                         3   0   0   3

Course Objectives:
- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:
- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

UNIT-I: D.C. Circuits

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.
Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor.
Construction and working of synchronous generators.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS/ REFERENCE BOOKS:
1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGrawHill.
2. D.C. Kulshreshtha, ‒Basic Electrical Engineering‖, McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering‖, Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India,1989.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21ME102ES: ENGINEERING WORKSHOP

B.Tech. I Year I Sem.   **L   T P C**

                                                                                        1   0 3 2.5

Pre-requisites: Practical skill

Course Objectives:
- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipmentand machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: At the end of the course, the student will be able to:
- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes includingdrilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:
At least two exercises from each trade:
   I.   Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
  II.   Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
 III.   Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
 IV.   Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
  V.   Welding Practice – (Arc Welding & Gas Welding)
 VI.   House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII.   Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:
Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

TEXT BOOKS:
1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:
1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21EN101HS: ENGLISH

B.Tech. I Year I Sem.	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contextsand cultures.*

Learning Objectives: The course will help to
- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoreticaland practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to
- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writingand speaking skills.

SYLLABUS

UNIT I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published byCambridge University Press.
Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.**Reading:** Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' publishedby Cambridge University Press.
Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter ofRequisition, Job Application with Resume.

UNIT –III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by CambridgeUniversity Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying**- Providing Examples or Evidence

UNIT –IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published byCambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English forEngineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: **Technical Reports**- Introduction – Characteristics of a Report – Categories ofReports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing aReport.

TEXTBOOK:

1. **Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.**

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CH102BS: ENGINEERING CHEMISTRY LAB

B.Tech. I Year I Sem.   **L   T   P C**
                                                                          0   0   3 1.5

Course Objectives: The course consists of experiments related to the principles of chemistry requiredfor engineering student. The student will learn:
- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as an function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:
- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of Rf values of some organic molecules by TLC technique.

List of Experiments:
1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

REFERENCE BOOKS:
1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21EN102HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year I Sem.   **L   T   P C**

                                                                                                           0   0   2   1

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes thestudents with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:
☐ To facilitate computer-assisted multi-media instruction enabling individualized andindependent language learning
☐ To sensitize students to the nuances of English speech sounds, word accent, intonationand rhythm
☐ To bring about a consistent accent and intelligibility in students' pronunciation ofEnglish by providing an opportunity for practice in speaking
☐ To improve the fluency of students in spoken English and neutralize their mothertongue influence
To train students to use language appropriately for public speaking and interviews

Learning Outcomes: Students will be able to attain
☐ Better understanding of nuances of English language through audio- visual experience andgroup activities
    ☐ Neutralization of accent for intelligibility
☐ Speaking skills with clarity and confidence which in turn enhances their employabilityskills

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:
    a. **Computer Assisted Language Learning (CALL) Lab**
    b. **Interactive Communication Skills (ICS) Lab**

Listening Skills

Objectives
1. To enable students develop their listening skills so that they may appreciate its role in the LSRWskills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speechof people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professionalcontexts
    • Oral practice: Just A Minute (JAM) Sessions
    • Describing objects/situations/people
    • Role play – Individual/Group activities

➢ **The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus isvery limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effectiveteaching/learning and timesaving in the Lab)**

Exercise – I
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:
Understand: Communication at Work Place- Spoken vs. Written language.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave –Introducing Oneself and Others.

Exercise – II CALL

Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III CALL

Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV CALL

Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.**ICS**

Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V CALL

Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.*Practice:*

Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1.   Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the followingspecifications:

            i)   Computers with Suitable Configuration

            ii)   High Fidelity Headphones

2.   Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21EE102ES: BASIC ELECTRICAL ENGINEERING LAB

B.Tech. I Year I Sem.   **L   T   P C**

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Course Objectives:
- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:
- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor

No-Load Characteristics of a Three-phase Alternator

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21MA202BS: Advanced Calculus
Common for All Branches

B.Tech. I Year II Sem.   **L   T   P   C**
                                                                        3   1   0   4

Course Objectives: To learn
- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to
- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE
Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{as}, sin ax , cos ax, polynomials in x, $e^{as}V(x)$ and x V(x); method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT-IV: Vector Differentiation
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

REFERENCES:
1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21PH201BS: APPLIED PHYSICS

B.Tech. I Year II Sem.   L   T   P C
                                                                             3   1   0 4

Course Objectives:
- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: Upon graduation:
- The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
- The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cellsand so on.
- Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent waveequation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p- n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT-III: Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT-V: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and

susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains,Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCE BOOKS:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: ‒Optoelectronic Materials and Devices‖ by Monica Katiyar and Deepak Gupthaon NPTEL

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS201ES: PROGRAMMING FOR PROBLEM SOLVING

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives:
- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn
- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - 1: Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, processor,operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntaxand Logical Errors in compilation, object and executable code , Operators, expressions andprecedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,The main method and command line arguments
Bitwise operations: Bitwise AND, OR, XOR and NOT operators
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branchingwith if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops
I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions availablein C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures
Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Pre-processor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data toexisting files, Writing and reading structures using binary files, Random access using fseek, ftell andrewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parametersand return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions andlibraries
Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursivefunctions
Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of differentdata types

UNIT - V: Introduction to Algorithms:

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a givenset, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21ME203ES: ENGINEERING GRAPHICS

B.Tech. I Year II Sem.   **L   T   P   C**
                                                                   1   0   4   4

Pre-requisites: Nil
Course objectives:
- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:
- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I
Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone,Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions

Introduction to CAD: (For Internal Evaluation Weightage only):
Introduction to CAD Software Package Commands - Free Hand Sketches of 2D - Creation of 2DSketches by CAD Package

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:
1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21PH202BS: APPLIED PHYSICS LAB

B.Tech. I Year II Sem.   **L   T   P C**
                                                                                                    0   0 3 1.5

List of Experiments:

1. Energy gap of P-N junction diode:
    To determine the energy gap of a semiconductor diode.

2. Solar Cell:
    To study the V-I Characteristics of solar cell.

3. Light emitting diode:
    Plot V-I and P-I characteristics of light emitting diode.

4. Stewart – Gee's experiment:
    Determination of magnetic field along the axis of a current carrying coil.

5. Hall effect:
    To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect:
    To determine work function of a given material.

7. LASER:
    To study the characteristics of LASER sources.

8. Optical fibre:
    To determine the bending losses of Optical fibres.

9. LCR Circuit:
    To determine the Quality factor of LCR Circuit.

10. R-C Circuit:
    To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS202ES: PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. I Year II Sem.   L T P C
                                                                        0 0 3 1.5

Course Objectives: The students will learn the following:
- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:
- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:
a. Write a simple program that prints the results of all the operators available in C (including pre/post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion andcasting. Take the values form standard input.

Simple numeric problems:
a. Write a program for fiend the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark
<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f.   5 x 2 = 10
g.   5 x 3 = 15
h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:
a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut+(1/2)at^2$where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1.

Subsequent terms are found by adding the preceding two terms in the sequence. Writea C program to generate the first n terms of the sequence.

    f.   Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

    g.   Write a C program to find the roots of a Quadratic equation.

    h.   Write a C program to calculate the following, where x is a fractional value.i. 1- x/2 +x^2/4-x^3/6

j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometricprogression: 1+x+x^2+x^3+ .... +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

    a.   Write a C program to find the minimum, maximum and average in an array of integers.

    b.   Write a functions to compute mean, variance, Standard Deviation, sorting of n elements insingle dimension array.

    c.   Write a C program that uses functions to perform the following:

    d.   Addition of Two Matrices

    e.   ii. Multiplication of Two Matrices

    f.   iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row andcolumn counts may not be same.

    g.   Write C programs that use both recursive and non-recursive functions

    h.   To find the factorial of a given integer.

    i.   ii. To find the GCD (greatest common divisor) of two given integers.

    j.   iii. To find x^n

    k.   Write a program for reading elements using pointer into array and display the values usingarray.

    l.   Write a program for display values reverse order from array using pointer.

    m.   Write a program through pointer variable to sum of n elements from array.

Files:

    a.   Write a C program to display the contents of a file to standard output device.

    b.   Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

    c.   Write a C program to count the number of times a character occurs in a text file. The file nameand the character are supplied as command line arguments.

    d.   Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values aregiven in the command line. (hint: convert the strings using atoi function)

Now the program asks for an index and a value from the user and the value at that index shouldbe changed to the new value in the file. (hint: use fseek function)

The program should then read all 10 values and print them back.

    e.   Write a C program to merge two files into a third file (i.e., the contents of the firs t file followedby those of the second are put in the third file).

Strings:

    a.   Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

    b.   Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

    c.   Write a C program that uses functions to perform the following operations:

    d.   To insert a sub-string in to a given main string from a given position.

    e.   ii. To delete n Characters from a given position in a given string.

    f.   Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

    g.   Write a C program that displays the position of a character ch in the string S or – 1 if S doesn_tcontain ch.

    h.   Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

    a. Write a menu driven C program that allows a user to enter n numbers and then choose betweenfinding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.

    b. Write a C program to construct a pyramid of numbers as follows:

```
1           *           1           1           *
1 2         * *         2 3         2 2         * *
1 2 3       * * *       4 5 6       3 3 3       * *
                                                *
                                    4 4 4 4     * *
                                                *
```

Sorting and Searching:

    a. Write a C program that uses non recursive function to search for a Key value in a given
    b. list of integers using linear search method.
    c. Write a C program that uses non recursive function to search for a Key value in a given
    d. sorted list of integers using binary search method.
    e. Write a C program that implements the Bubble sort method to sort a given list of
    f. integers in ascending order.
    g. Write a C program that sorts the given array of integers using selection sort in descending order
    h. Write a C program that sorts the given array of integers using insertion sort in ascending order
    i. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

    i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
    ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)
    iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
    iv. Hall of India
    v. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
    vi. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
    vii. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

*21MC201ES: ENVIRONMENTAL SCIENCE

B.Tech. I Year II Sem.   **L   T   P   C**
                                                                                                   3   0   0   0

Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981,Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedicalwaste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and itsexplosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversity Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivate Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21EC312ES: ANALOG AND DIGITAL ELECTRONICS

	L	T	P	C
B.Tech. II Year I Sem.	3	0	0	3

Prerequisite: Analog Electronics

Course Objectives:
- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:
- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Learn Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Know about the logic families and realization of logic gates.

UNIT - I

Diodes and Applications: p-n junction diode, V-I characteristics, diode resistance, diode capacitance, Zener diode, Tunnel diodes, photo diode.
Diode Applications - clipping circuits, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II

BJT: Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CC, CB Amplifiers.

UNIT - III

FETs and Digital Circuits: Construction and Operation of JFET, Volt- Ampere Characteristics, Comparison of BJT and FET, Small Signal Model**,** MOSFET Characteristics in Enhancement and Depletion mode, analysis of CS and CD amplifiers
Digital Circuits: Number systems and Conversions, Complements of Numbers, basic theorems and properties, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations, RTL, DTL, DCTL, TTL gates.

UNIT – IV:

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method,
Combinational Logic Circuits: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Encoders, Decoders.

UNIT - V

Sequential Circuits: Latches, Flip Flops, Excitation Table of all Flip Flops, Conversion from one type of Flip-Flop to another.
Registers and Counters: Shift Registers**,** Design and operation of Asynchronous and Synchronous Counters, Modulo N – Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS:

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS309PC: SOFTWARE ENGINEERING

B.Tech. II Year I Semester   L T P C
                                                                                    3 0 0 3

Course Objectives
- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes
- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

UNIT - I
Introduction to Software, Software Myths, A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), Process Patterns, Process Assessment.
Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT - III
Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design, Software Architecture, Data design, Architectural styles and patterns, Architectural Design, **Conceptual model of UML:** basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, Metrics for testing.

UNIT - V
Metrics for Process and Products: Software measurement, metrics for software quality.
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.
Quality Management: Quality concepts, software quality assurance, software reviews,software reliability, the ISO 9000 quality standards.

TEXT BOOKS:
1.Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:
1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21MA307BS-COMPUTER ORIENTED STATISTICAL METHODS

                                                L T P C

B.Tech. II Year I Semester   3 0 0 3

Course Objectives: To learn
- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of this paper the student must be able to
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I
Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule.
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT - II
Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.
Discrete Probability Distributions: Introduction and Motivation, Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT - III
Continuous Probability Distributions : Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t –Distribution, F-Distribution.

UNIT - IV
Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.
Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT - V
Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:
1. *Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.*
2. *S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.*
3. *S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi*

REFERENCE BOOKS:
1. *T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons Ltd,2004.*
2. *Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.*

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS311PC-COMPUTER ORGANIZATION AND ARCHITECTURE

B.Tech. II Year I Semester   L T P C
                                                                                                 3 0 0 3

Course Objectives:
- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes:
- Understand the basics of instructions sets and their impact on processor design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.
- Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
- Design a pipeline for consistent execution of instructions with minimum hazards.
- Recognize and manipulate representations of numbers stored in digital computers

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.
Register Transfer Language and Micro operations: Register Transfer Language, Register Transfer,
Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.
Basic Computer Organization and Design: Instruction Codes, Computer Registers Computer.

UNIT - II

Micro programmed Control: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

UNIT - III
Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT - IV
Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt Direct memory Access.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory.

UNIT - V
Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

TEXT BOOK:
1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:
1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS303PC-DATA STRUCTURES

B.Tech. II Year I Semester   L T P C
                                                                                                                3 0 0 3

Course Objectives:
- Exploring Basic Data Structures Such as Stacks and Queues.
- Introduces a Variety of Data Structures Such as Hash Tables, Search Trees, Tries, Heaps, Graphs.
- Introduces Sorting And Pattern Matching Algorithms

Course Outcomes:
- Ability to Select the Data Structures that Efficiently Model the Information in a Problem.
- Ability to Assess Efficiency Trade-Offs among Different Data Structure Implementations or Combinations.
- Implement and Know the Application of Algorithms for Sorting and Pattern Matching.
- Design Programs Using a Variety of Data Structures, Including Hash Tables, Binary and General Tree Structures, Search Trees, Tries, Heaps, Graphs, and AVL-Trees.

UNIT - I
Introduction to Data Structures, Abstract Data Types, Types of Data Structures, Linked List, Types of Linked List, Linked List Operations and Implementation.

UNIT - II
Stacks: Operations, Array and Linked Representations of Stacks, Stack Applications- Expression Evaluation, Recursion, Keeping Track of Function Calls.
Queues: Operations, Array and Linked Representation of Queues, Queue Applications.

UNIT – III
Dictionaries: Linear List Representation, Skip List Representation, Operations - Insertion, Deletion and Searching.
Hash Table Representation: Hash Functions, Collision Resolution Techniques-Separate Chaining, Open Addressing Linear Probing, Quadratic Probing, Double Hashing, Re-hashing, Extendible Hashing.

UNIT - IV
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black Trees, Splay Trees.

UNIT - V
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Merge Sort and Heap Sort.
Pattern Matching and Tries: Pattern Matching Algorithms- Brute Force, The Boyer – Moore Algorithm and The Knuth-Morris-Pratt Algorithm.

TEXT BOOKS:
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:
1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21EC313ES - ANALOG AND DIGITAL ELECTRONICS LAB

B.Tech. II Year I Semester   L T P C
                                                                                          0 0 2 1

Course Objectives

- To introduce components such as diodes, BJTs and FETs.

- To know the applications of components.

- To give understanding of various types of amplifier circuits

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

- Know the characteristics of various components.

- Understand the utilization of components.

- Design and analyze small signal amplifier circuits.

- Postulates of Boolean algebra and to minimize combinational functions

- Design and analyze combinational and sequential circuits

- Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Full Wave Rectifier with & without filters

2. Common Emitter Amplifier Characteristics

3. Common Base Amplifier Characteristics

4. Common Source amplifier Characteristics

5. Measurement of h-parameters of transistor in CB, CE, CC configurations

6. Input and Output characteristics of FET in CS configuration

7. Realization of Boolean Expressions using Gates

8. Design and realization logic gates using universal gates

9. generation of clock using NAND / NOR gates

10. Design a 4 – bit Adder / Subtractor

11. Design and realization a Synchronous and Asynchronous counter using flip-flops

12. Realization of logic gates using DTL, TTL, ECL, etc.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS310PC-SOFTWARE ENGINEERING LAB

B.Tech. II Year I Semester   L T P C
                                                                 0 0 2 1

Course Objectives:
- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:
- Ability to translate end-user requirements into system and software requirements
- Ability to generate a high-level design of the system from the software requirements
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:
1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

TEXT BOOKS:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3.The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS304PC-DATA STRUCTURES LAB

B.Tech. II Year I Semester   L T P C
                                                                              0 0 2 1

Course Objectives:
- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:
- Ability to develop C programs for computing and real-life applications using basic elements like
- control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on Single Linked List.:
        i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

2. Write a program that uses functions to perform the following operations on Double Linked List.:
        i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

3. Write a program that uses functions to perform the following operations on Circular Linked List.:
        i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

4. Write a program that implement Stack (its operations) using
        i) Arrays   ii) Pointers

5. Write a program that implement Queue (its operations) using
        i) Arrays   ii) Pointers

6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
        i) Bubble sort   ii) Selection sort   iii) Insertion sort

7. Write programs to perform the following searching operations for a Key value in a given list of integers:
        i) Linear search   ii) Binary search

8. Write a program to implement the Tree Traversal Methods.

9. Write a program to implement the Graph Traversal Methods.

TEXT BOOKS:
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:
1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS312PC-IT WORKSHOP LAB

B.Tech. II Year I Semester   L T P C
          0 0 3 1.5

Task 1: Different generations of computers, computing environments, Identify the peripherals of a computer, components in CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral.

Task 2: Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 3: A practice on disassembling the components of a PC and assembling them to back to working condition

Task 4: Identification of the various similarities and dissimilarities in the features of Windows and Linux Operating Systems.

Task 5: Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

Task 6: Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

Task 7: Software Troubleshooting (Demonstration):. Identification of a problem and fixing the PC for any software issues Internet & Networking Infrastructure

Task 8: Identification of various Networking Devices and Transmission Media highlighting their importance.

Task 9: Configuring the network settings to connect to the Internet. Use various web browser settings. Creating Basic, Static Web Pages using HTML.

Task 10: Use Word Processor Software Tool, Spread Sheet Software Tool, Presentation Tool, Data Storage Tool (All are from Libra Office suite)

Task11: Use LaTeX and Word to create Project Certificates

Reference Books:

1. Introduction to Information Technology, ITL Education solution limited by David Anfinsen.
2. IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinsen.
3. LaTeX Companion-Leslie Lamport, PHI/Pearson.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21MA308BS-APTITUDE AND CRITICAL THINKING SKILLS PRACTICE

B.Tech. II Year I Semester   L T P C
                                                                0 0 3 1.5

Course Objectives:
- To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.
- To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
- To critically evaluate numerous possibilities related to puzzles.

Course Outcomes:

     The student will be able to
- Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests.
- Solve questions related to Time and distance and time and work etc. from company specific and other competitive tests.
- Understand and solve puzzle related questions from specific and other competitive tests

UNIT I

NUMERICAL ABILITY:

Simplification, BODMAS, Fractions, Decimals, Squares, Square Roots, Cubes, Cube Roots, Speed Maths, LCM & HCF

UNIT II

Numerical computation: Applications based on Numbers, Chain Rule, Ratio Proportion

Numerical Reasoning: Problems related to Number series, Analogy of numbers, Classification of numbers, Letter series, Seating arrangements, Directions, blood relations and puzzle test.

UNIT III

Numerical estimation – I, Applications Based on Time and work, Time and Distance

Combinatory: Counting techniques, Permutations, Combinations and Probability

Numerical estimation – II, Applications based on Percentages, Profit Loss and Discount, Simple interest and Compound Interest Partnerships.

UNIT IV

Data interpretation: Data interpretation related to Averages, Mixtures and allegations, Bar charts, Pie charts, Venn diagrams, Application to industry in Geometry and Menstruation

UNIT V

Critical Thinking: Alphabet Test, Coding-Decoding, Statement and Conclusion, Statement and Arguments, Statement and Assumption, Calendars, Clocks, Cubes and dice, Counting of figures.

Books for practice
1. Quantitative aptitude by R S Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications

References
1. Barron‟s by Sharon Welner Green and IraK Wolf (Galgotia Publications pvt. Ltd.)
2. Quantitative Aptitude by U Mohan Rao Scitech publications
3. Quantitative Aptitude by Arun Sharma McGrawhill publications
4. Quantitative Aptitude by Ananta Asisha Arihant publications
5. Quantitative Aptitude by Abhijit Guha
6. Quantitative Aptitude by Pearson publications
7. Material from „IMS, Career Launcher and Time Institutes for Competitive exams.

Elementary and Higher Algebra by H. S. Hall an S. R. Knight

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21MC303-CONSTITUTION OF INDIA

B.Tech. II Year I Sem.   L T/P/D C
                                                                                                                        3 0/0/0 0

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the ―basic structure‖ of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of ―Constitutionalism‖ – a modern and progressive concept historically developed by the thinkers of ‒liberalism‖ – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of ‒constitutionalism‖ in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India‗s legacy of ―diversity‖. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be ‒static‖ and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it―as one of the strongest court in the world‖.

Course content
1.   Meaning of the constitution law and constitutionalism
2.   Historical perspective of the Constitution of India
3.   Salient features and characteristics of the Constitution of India
4.   Scheme of the fundamental rights
5.   The scheme of the Fundamental Duties and its legal status
6.   The Directive Principles of State Policy – Its importance and implementation
7.   Federal structure and distribution of legislative and financial powers between the Union and the States
8.   Parliamentary Form of Government in India – The constitution powers and status of the President of India
9.   Amendment of the Constitutional Powers and Procedure
10.   The historical perspectives of the constitutional amendments in India
11.   Emergency Provisions: National Emergency, President Rule, Financial Emergency
12.   Local Self Government – Constitutional Scheme in India
13.   Scheme of the Fundamental Right to Equality
14.   Scheme of the Fundamental Right to certain Freedom under Article 19
15.   Scope of the Right to Life and Personal Liberty under Article 21

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS440PC-DISCRETE MATHEMATICS

B.Tech. II Year II Semester   L T P C
                                                                                                     3 0 0 3

Course Objectives:
- Introduces the elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory,
- permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:
- Ability to understand and construct precise mathematical proofs
- Ability to use logic and set theory to formulate precise statements
- Ability to analyze and solve counting problems on finite and discrete structures
- Ability to describe and manipulate sequences
- Ability to apply graph theory in solving computing problems

UNIT - I
The Foundations: Logic and Proofs: Propositional Logic, Normal Forms, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II
Basic Structures, Sets, Binary Relations ,Functions, Sequences, Sums, Sequences & Summations, Relations and Their Properties, n-array Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations.

UNIT - III
Algorithms, Induction and Recursion: Algorithms, the Growth of Functions, Complexity of Algorithms.
Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

UNIT - IV
Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Bayes' Theorem, Expected Value and Variance
Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion

UNIT - V
Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.
Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees

TEXT BOOK:
1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7th Edition, TMH.

REFERENCES BOOKS:
1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS445PC-SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

B.Tech. II Year II Semester   L T P C
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Course Objectives:

- To highlight the evolution of patterns.
- To learn how to add functionality to designs using various architecture designs
- To learn about Creational and Structural Design Patterns
- To know about Behavioral Design Patterns.
- To learn applying the design patterns in real time case studies.

Course Outcomes:

- Analyze the architectural patterns, reference models and structures
- Analyze the architecture evaluations, design decision making, software product lines.
- Apply various types of Creational and Structural patterns
- Apply various types of Behavioral patterns
- Analyze the applying of various types of patterns within a Case Study example.

UNIT- I
Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.
Creating Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT-II
Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, and CBAM.
Moving from one system to many: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT-III
Patterns: Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.
Creational and Structural patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Adapter, Bridge, Composite, Façade, Flyweight.

UNIT-IV
Behavioral patterns: Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy. Template Method, Visitor.

UNIT-V
Case Studies: A-7E, a case study in utilizing architectural structures,
Air Traffic Control: a case study in designing for high availability,
Celsius Tech: a case study in product line development

TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education 1st Edition (1st Jan 2015).

REFERENCES:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Pattern Oriented Software Architecture, F.Buschmann &others, John Wiley & Sons.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS417PC-OPERATING SYSTEMS

B.Tech. II Year II Semester
L T P C
3 0 0 3

Course Objectives:
- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:
- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I
Operating System - Introduction, Structures – OS **operations**, Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls, OS design implementations.

UNIT - II
Process and CPU Scheduling - Process concepts, **Process, Process control blocks** , Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec.

UNIT - III
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV
Memory Management and Virtual Memory - Logical versus Physical Address Space, Cache Memory, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms. Thrashing, dynamic memory allocation.

UNIT - V
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open creates, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:
1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS405PC-DATABASE MANAGEMENT SYSTEMS

B.Tech. II Year II Semester   L T P C
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.Course Objectives:
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction
- Control, concurrency control, storage structures and access techniques.

Course Outcomes:
- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Architecture of DBMS,Classification of DBMS.
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, Weak Entity sets and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms,
BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal Form, E.F.Codd rules.

UNIT - IV

Transaction Processing Concept: Transaction Concept, Transaction State, Implementation of Atomicity and Durability.
Concurrency Control Techniques: Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Indexing: Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Indexed Sequential
Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.
Database Security & Authorization: Introduction to DB Security issues, Discretionary access control based on granting /recovery of privileges.

TEXT BOOKS:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS413PC-OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B.Tech. II Year II Semester   L T P C
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Course Objectives:
- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate
- to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:
- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

Unit - I

Object-Oriented Thinking- Why Java? History Features Of Java, JVM and Its Architecture, Object-Oriented Concepts. Java Buzzwords, Data Types, Variables and Arrays, Operators, Expressions, Control Statements, Introducing Classes And Objects, String Handling Methods.

Inheritance– Inheritance Concept, Inheritance Basics, Types of Inheritance, Pros and Cons of Inheritance. Member Access, Constructors, Creating Multilevel Hierarchy, Super Keyword Uses, Using Final Keyword With Inheritance, Polymorphism, Method Overloading, Method Overriding, Abstract Classes, java.lang.Object Class.

Unit - II

Packages- Defining a Package, Classpath, Access Protection, Importing Packages.

Interfaces- Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces and Extending Interfaces.

Stream Based I/O (java.io) – The Stream Classes-Byte Streams and Character Streams, Reading Console Input and Writing Console Output, File Class, Reading and Writing Files, Random Access File Operations, The Console Class, Serialization, Enumerations, Boxing, Auto Boxing.

Unit - III

Exception Handling - Fundamentals of Exception Handling, Exception Types, Using Try And Catch, Multiple Catch Clauses, Nested Try Statements, throw, throws and finally, Built- In Exceptions, Creating Own Exceptions. Multithreading- Thread, Differences Between Thread-Based Multitasking and Process-Based Multitasking, Thread Life Cycle, Creating Threads, Thread Priorities, Synchronizing Threads, Inter Thread Communication.

Unit - IV

The Collections Framework (java.util)- Collections Overview, Collection Interfaces, The Collection Classes-Array List, Linked List, Hash Set, Tree Set. Accessing A Collection Via An Iterator, Using An Iterator, The For-Each Alternative, Comparators, Arrays, Dictionary, Hash Table, Map Properties, Stack, Vector. More Utility Classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

Unit - V

GUI Programming with Swing – Introduction, Limitations of AWT, MVC Architecture, Components, Containers. Exploring AWT Controls, Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation Event Model- Events, Event Sources, Event Listeners, Event Classes, Handling Mouse And Keyboard Events, Adapter Classes, Inner Classes, Anonymous Inner Classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, Passing Parameters to Applets. Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons-JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScrollPane, JList, JComboBox, Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

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

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS418PC-OPERATING SYSTEMS LAB

B.Tech. II Year II Semester   L   T   P   C

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Course Objectives:
- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:
- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory

6. Write C programs to simulate the following memory management techniques
   a) Paging b) Segmentation

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley

2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI

2. Operating System - A Design Approach-Crowley, TMH.

3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI

4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education

5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS406PC-DATABASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year II Semester   L T P C
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Course Objectives:
- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:
- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCES BOOKS:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS414PC-OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

B.Tech. II Year II Semester   L T P C
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Course Objectives:
- To write programs using abstract classes.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:
- Able to write programs for solving real world problems using java collection frame work.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

1. Use LINUX and My SQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Experiments:
1. Write Java Programs on Method Overloading and Method Overriding   .
2. Write Java Programs on the Following
   a. Single Level Inheritance
   b. Multi-Level Inheritance
   c. Hierarchical Inheritance
3. Write a Java Program on String Handling Functions.
4. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
5. Write a Java Program to Achieve Multiple Inheritance using Interface.
6. Write a Java Program to Create User-Defined Package and Importing the Package.
7. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
9. Write the Applet Programs on the following.
   a) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named ─Compute‖ is clicked.

10. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

11. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.

12. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with ―Stop‖ or ―Ready‖ or ―Go‖ should appear above the buttons in selected color. Initially, there is no message shown.

13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

14. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

15. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

16. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

17. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21HS401-SOCIAL INNOVATION IN PRACTICE

B.Tech. II Year II Semester   L T P C
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COURSE OBJECTIVES:
The course should enable the students to:
- Understand social innovation concepts and approaches.
- Understand the community problems, social and economical change.
- Identify new and unaddressed social needs.
- Analysis of social innovation disclosures in different sectors.

Design innovative solutions with Social impact through application of new models of leadership, collective intelligence and creativity techniques.

UNIT-I
INTRODUCTION TO SOCIAL INNOVATION
Core definitions, core elements and common features of social innovation, a topology of social innovations, history of social innovation, social and economic change, Swachh Bharat, Unnat Bharat Abhiyan, National Service Scheme (NSS).

UNIT-II
INTERACTION AND ENGAGEMENT WITH SOCIETY
Engage with community, interact with them to understand the community problems, Understanding social and economical change individuals, organizations and movements.

UNIT-III
PROCESS OF SOCIAL INNOVATION
Understanding the pain/need, description and problem definition, social and economic constraints for affordable and appropriate technology.

UNIT-IV
SOCIAL INNOVATION ACROSS FOUR SECTORS IN INDIA AND GLOBAL SCENARIO
The four sectorsthe non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors

UNIT-V
SOCIAL INNOVATION CASE STUDIES
Designing and implementing social innovations, report writing and documentation, presentation of the case studies with a focus on impact and vision on society**.**

TEXT BOOKS:

1. The Power of Social Innovation: How Civic Entrepreneurs Ignite Community Networks for Good 1st Edition by Stephen Goldsmith, Michael R. Bloomberg, Gigi Georges, Tim Glynn Burke.
2. The Open Book of Social Innovation: Ways to Design, Develop and Grow Social Innovation Paperback March, 2010 by Robin Murray, Julia Caulier-Grice, Geoff Mulgan.

REFERENCE BOOKS:
1. Social innovator series: ways to design, develop and grow social innovation, the open book of social innovation by robin murray julie caulier-grice geoff mulgan.
2. The International Handbook on Social Innovation: Collective Action, Social Learning and Transdisciplinary Research Paperback by Frank Moulaert , Diana MacCallum. Guide to Social Innovation by Johannes HAHN and Laszlo ANDOR.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE

(UGC-AUTONOMOUS)

21MC402-GENDER SENSITIZATION LAB

B.Tech. II Year II Sem.   L T/P/D C

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COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes:
- Students will have developed a better understanding of important issues related to gender in
- contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and
- legal aspects of gender. This will be achieved through discussion of materials derived from
- research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to
- counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and
- economics.
- Men and women students and professionals will be better equipped to work and live together as
- equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide
- protection and relief to women, the textbook will empower students to understand and respond to
- gender violence.

UNIT - I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. GrowingupMale.FirstlessonsinCaste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- ―My Mother doesn't Work.‖ ―Share the Load.‖-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -

Gender Development Issues-Gender, Governance and Sustainable Development-Gender and HumanRights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE
The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a HumanRights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: ―Chupulu".

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives.Thinking about Sexual Violence Blaming the Victim-―I Fought for my Life‖

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- *Classes will consist of a combination of activities: dialogue-based lectures, discussions,collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to thetopics given in the syllabus on "Gender".*
- **ESSENTIAL READING**: The Textbook, ―*Towards a World of Equals: A Bilingual Textbook on Gender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote,
  Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu
  published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:
- ✓ Discussion & Classroom Participation: 20%
- ✓ Project/Assignment: 30%
- ☐ End Term Exam: 50%

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS531PC-DESIGN AND ANALYSIS OF ALGORITHMS

B.Tech. III Year I Sem.

L	T	P	C
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Course Objectives:
- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch andbound methods) and mention problems for which each technique is appropriate
- Describes how to evaluate and compare different algorithms using worst-, average and best case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NPcomplete.

Course Outcomes:
- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a   specified application
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance ofprograms

UNIT I:

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis- Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort,Stassen's matrix multiplication.

UNIT II:

 Disjoint Sets: Disjoint set operations, union and find algorithms.
Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring.

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairsshortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum costspanning trees, Single source shortest path problem.

UNIT V:

Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch andBound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard andNP-Complete classes, Cook's theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahniand Rajasekharam,Galgotia publications pvt. Ltd.
2. Foundations of Algorithm, 4th edition, R. Neapolitan and K. Naimipour, Jones andBartlett Learning.
3. Design and Analysis of Algorithms, P. H. Dave, H. B. Dave, Pearson Education,2008.

REFERENCES:

1. Computer Algorithms, Introduction to Design and Analysis, 3rd Edition,Sara Baase,Allen, Van, Gelder, Pearson Education.
2. Algorithm Design: Foundations, Analysis and Internet examples, M. T. Goodrich and R. Tomassia, John Wiley and sons.
3. Fundamentals of Sequential and Parallel Algorithm, K. A. Berman and J. L. Paul,CengageLearning.
4. Introducation to the Design and Analysis of Algorithms, A. Levitin, PearsonEducation.
5. Introducation to Algorithms, 3rd Edition, T. H. Cormen, C. E. Leiserson, R. L. Rivest,and C. Stein, PHI Pvt. Ltd.
6. Design and Analysis of algorithm, Aho, Ullman and Hopcroft, Pearson Education,2004.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS520PC: PYTHON PROGRAMMING

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                                            3   0   0   3

Course Objectives:
- Learn Syntax and Semantics and Create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular Expressions in Python.
- Implement Object Oriented Programming Concepts in Python.
- Build Web Services and Introduction to Network and Database Programming in Python.

Course Outcomes:
- Examine Python Syntax and Semantics and be Fluent in the Use of Python Flow Control and Functions.
- Demonstrate Proficiency in Handling Strings and File Systems.
- Create, Run and Manipulate Python Programs Using Core Data Structures like Lists, Dictionaries andUse Regular Expressions.
- Interpret the Concepts of Object-Oriented Programming as Used in Python.
- Implement Exemplary Applications Related to Network Programming, Web Services and Databases inPython.

UNIT - I
Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II
FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, StandardFiles, File System, File Execution.
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, RaisingExceptions, Assertions, Standard Exceptions, *Creating Exceptions, Functions.
Types of Arguments. Why Exceptions (Now)? Why Exceptions at All? Exceptions and the sys Module, RelatedModules.
Modules: Built-in Functions, User Defined Functions, Packages, Other Features of Modules

UNIT - III
Regular Expressions: Introduction, Special Symbols and Characters, Res and Python
Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global InterpreterLock, Thread Module, Threading Module, Related Modules

UNIT - IV
GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modulesand Other GUIs
WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced WebClients, CGI-Helping Servers Process Client Data, Building CGI Application, Web (HTTP) Servers.

UNIT - V
Database Programming: Introduction, Advantages of DBMS, Types of Databases: MySQL Database, Working with MySQL Database, Python Database Application Programmer's Interface (DB-API), Using MySQL from Python.
TEXT BOOK:
1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Learning Python, Mark Lutz, O'Really
5. Core Python Programming, R. Nageshwar Rao, Dreamtech Press, Third Edition

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS515PC- COMPUTER NETWORKS

B.Tech. III Year I Sem.   **L   T   P   C**

                                                                       3   0   0   3

Course Objectives

- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication betweenmachines in a network and the protocols of the various layers.

Course Outcomes

- Gain the knowledge of the basic computer network technology.
- Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Obtain the skills of subletting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied in networkdesign and implementation.

UNIT – I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. **Physical Layer:** Guided Transmission media: Twisted Pairs, Coaxial Cable, Fiber Optics, Wireless Transmission,the Public Switched Telephone Networks, Mobile Telephone Systems.

UNIT - II

Data link layer: Design issues, Framing, Error Detection and Correction.
Elementary data link protocols: Simplex Protocol, A Simplex Stop and Wait Protocol for an Error-Free Channel, A Simplex Stop and Wait Protocol for Noisy Channel.
Sliding Window Protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go-Back-N, A Protocol Using Selective Repeat, Example Data Link Protocols.
Medium Access sub layer: The Channel Allocation Problem, Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access Protocols, Ethernet, Collision Free Protocols. Wireless LANs, Data Link Layer Switching, BroadBand Wireless, Bluetooth.

UNIT - III

Network Layer: Design Issues, Routing Algorithms: Shortest Path Routing, Flooding, Hierarchical Routing, Broadcast, Multicast, Distance Vector Routing, Congestion Control Algorithms, Internetworking, The Network Layer In The Internet, Quality Of Service.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport Protocols, Connection Management, TCP and UDPProtocols.

UNIT - V

Application Layer –Domain Name System, SNMP, Electronic Mail; The World WEB, HTTP, SMTP, FTP.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TM

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS542PC- SOFTWARE REQUIREMENTS & ESTIMATION

B.Tech. III Year I Sem.	L	T	P	C
	3	0	0	3

Course Objectives:

- Students will demonstrate knowledge of the distinction between critical and non- critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling, and risk assessment/management.
- Students will author a software requirements document.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will author a formal specification for a software system.
- Students will demonstrate an understanding of distributed system architectures and application architectures.
- Students will demonstrate an understanding of the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will demonstrate proficiency in software development cost estimation
- Students will author a software testing plan.
-

UNIT – I : Software Requirements
Essential Software requirementS, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management Software Requirements Engineering Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality,

UNIT – II : Software Requirements Management

Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain Software Requirements Modeling Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

UNIT – III : Software Estimation:

Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation Size Estimation: Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

UNIT – IV Effort, Schedule and Cost Estimation:

What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cos Estimation

UNIT – V : Tools for Requirements Management and Estimation:

Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation, Software Estimation Tools: Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools

TEXT BOOK:
1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata Mc Graw Hill.

REFERENCE BOOKS:
1. Software Requirements by Karl E. Weigers, Microsoft Press.
2. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.
4. Estimating Software Costs, Second edition, Capers Jones, TMH, 2007.
5. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.
6. Measuring the software process, William A. Florac& Anita D. Carleton, Pearson Education, 1999.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS594PC- WEB PROGRAMMING (Professional Elective-I)

B.Tech. III Year I Sem.   L   T   P   C
                                                                 3   0   0   3

Course Objectives: The student should be able to:
- Understand the technologies used in Web Programming.
- Know the importance of object-oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web-based application using sockets.

Course Outcomes: Upon Completion of the course, the students will be able to
- Design web pages.
- Use technologies of Web Programming.
- Apply object-oriented aspects to Scripting.
- Create databases with connectivity using JDBC.
- Build web-based application using sockets.

UNIT - I
SCRIPTING: Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML 5- CSS3- HTML 5 canvas - Web site creation using tools.

UNIT – II
JAVA: Introduction to object-oriented programming-Features of Java – Data types, variables and arrays –Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/ Output – Files – Utility Classes – String Handling.

UNIT – III
JDBC: JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– Inet Address class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

UNIT – IV
APPLETS: Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet.The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

UNIT – V
XML AND WEB SERVICES: Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT-Webservices-UDDI-WSDL-Java web services – Web resources.

TEXT BOOKS:
1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS:
1. John Pollock, Javascript - A Beginners Guide, 3rd Edition –- Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE

(UGC-AUTONOMOUS)

21CS595PC- IMAGE PROCESSING (Professional Elective-I)

B.Tech. III Year I Sem.   **L T P C**

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Course Objectives
- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes
- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

UNIT - I
Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT - II
Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III
Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, LeastMean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV
Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT - V
Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image CompressionModels, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:
1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education,2nd Ed, 2004.

REFERENCE BOOKS:
1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L.Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS596PC- COMPUTER GRAPHICS (Professional Elective-I)

B.Tech. III Year I Sem.   **L T P C**
                                                   3 0 0 3

Course Objectives:
- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes:
- Acquire familiarity with the relevant mathematics of computer graphics.
- Be able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications

UNIT - I
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid- point circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT – II : 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations betweencoordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgemanpolygon clipping algorithm.

UNIT – III : 3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve,Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT – IV :3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations,composite transformations.viewing: Viewing pipeline, viewing coordinates, view volume and general projection transformsand clipping.

UNIT – V : Computer animation: Design of animation sequence, general computer animation functions, rasteranimation, computer animation languages, key frame systems, motion specifications

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-treemethods and area sub-division methods

TEXT BOOKS:
1. "Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner andHughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS5152PC- INTERNET OF THINGS (Professional Elective-I)

B.Tech. III Year I Sem.	L	T	P	C
	3	0	0	3

Course Objectives:
- To introduce the terminology, technology and its applications.
- To introduce the concept of M2M (machine to machine) with necessary protocols.
- To introduce the Python Scripting Language which is used in many IoT devices.
- To introduce the Raspberry PI platform, that is widely used in IoT applications.
- To introduce the implementation of web-based services on IoT devices.

Course Outcomes:
- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect themto network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify theapplications of IoT in Industry.

UNIT - I
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III
Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV
IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communicationAPIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, UniversitiesPress, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS521PC-PYTHON PROGRAMMING LAB

B.Tech. III Year I Sem.   **L   T   P   C**
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Course Objectives
- To be able to introduce core programming basics and program design with functions using Pythonprogramming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcome
- Student should be able to understand the basic concepts scripting and the contributions of scriptinglanguage
- Ability to explore python especially the object-oriented concepts, and the built in objects of Python.
- Ability to create practical and contemporary applications such as TCP/IP network programming, Webapplications, discrete event simulations

List of Experiments:
1. Write a Program to Demonstrate Different Number Data Types In Python.
2. Write a Program to Perform Different Arithmetic Operations On Numbers In Python.
3. Write a Program to Create, Concatenate and Print a String and Accessing Sub-String from a Given String.
4. Write a Python Script to Print the Current Date in the Following Format ―Sun May 29 02:26:23IST 2017‖
5. Write a Program to Create, Append, And Remove Lists in Python.
6. Write a Program to Demonstrate Working With Tuples in Python.
7. Write a Program to Demonstrate Working With Dictionaries in Python.
8. Write a Python Program to Find Largest of Three Numbers.
9. Write a Python Program to Convert Temperatures to and From Celsius, Fahrenheit.[Formula : C/5 = F-32/9].
10. Write a Python Program to Construct the Following Pattern, Using a Nested For Loop.

   ```
   *
   * *
   * * *
   * * * *
   * * *
   * *
   *
   ```

11. Write a Python Script that Prints Prime Numbers Less Than 20.
12. Write a Python Program to Find Factorial of a Number Using Recursion.
13. Write a Program that Accepts the Lengths of Three Sides of a Triangle as Inputs. The Program Output Should Indicate Whether or Not the Triangle Is a Right Triangle (Recall from the Pythagorean Theorem that in a Right Triangle, the Square of One Side Equals the Sum of the Squares of the Other Two Sides).
14. Write a Python Program to Define a Module to Find Fibonacci Numbers and Import the Module to another Program.
15. Write a Python Program to Define a Module and Import a Specific Function in that Module to another Program.
16. Write a Script Named Copyfile.Py. This Script Should Prompt the User for the Names of Two Text Files.The Contents of The First File Should be Input and Written to the Second File.
17. Write a Program that Inputs a Text File. The Program Should Print all of the Unique Words in the File inAlphabetical Order.
18. Write a Python Class to Convert an Integer to a Roman Numeral.
19. Write a Python Class to Implement Pow(x, n).
20. Write a Python Class to Reverse a String Word by Word.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS516PC: COMPUTER NETWORKS LAB

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                                                 0   0   3   1

Course Objectives
- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and
- observe its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes
- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

List of Experiments

1. Implement the data link layer farming methods such as character, character-stuffing and bit stuffing.

2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP

3. Develop a simple data link layer that performs the flow control using the sliding window protocol and loss recovery using the Go-Back-N mechanism.

4. Implement Dijsktra's algorithm to compute the shortest path through a network

5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.

6. Implement distance vector routing algorithm for obtaining routing tables at each node.

7. Implement data encryption and data decryption

8. Write a program for congestion control using Leaky bucket algorithm.

9. Write a program for frame sorting technique used in buffers.

10. Wireshark

i. Packet Capture Using Wire shark

ii. Starting Wire shark

iii. Viewing Captured Traffic

iv. Analysis and Statistics & Filters.

11. How to run Nmap scan

12. Operating System Detection using Nmap

13. Do the following using NS2 Simulator

i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

vi. Simulate to Plot Congestion for Different Source/Destination

vii. Simulate to Determine the Performance with respect to Transmission of Packets

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21CS503HS: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                                  0   0   3   1.5

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary -
   Starting a conversation – responding appropriately and relevantly – using the right body language– Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing –improving one's writing.
4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM Sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.
5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, Intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5thEdition.

REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill2009

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS532PC: DESIGN AND ANALYSIS OF ALGORITHM LAB

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                0   0   3   1.5

Course Objectives:
- To write programs in java to solve problems using divide and conquer strategy.
- To write programs in java to solve problems using backtracking strategy.
- To write programs in java to solve problems using greedy and dynamic programming techniques.

Course Outcomes:
- Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

List of Experiments:

1. Write a java program to implement Quick sort algorithm for sorting a list of integers in ascending order
2. Write a java program to implement Merge sort algorithm for sorting a list of integers in ascending order.
3. Write a java program to implement the dfs algorithm for a graph.
4. Write a. java program to implement the bfs algorithm for a graph.
5. Write a java programs to implement backtracking algorithm for the N-queens problem.
6. Write a java program to implement the backtracking algorithm for the sum of subsets problem.
7. Write a java program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
8. Write a java program to implement greedy algorithm for job sequencing with deadlines.
9. Write a java program to implement Dijkstra's algorithm for the Single source shortest path problem.
10. Write a java program that implements Prim's algorithm to generate minimum cost spanning tree.
11. Write a java program that implements Kruskal's algorithm to generate minimum cost spanning tree
12. Write a java program to implement Floyd's algorithm for the all pairs shortest path problem.
13. Write a java program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
14. Write a java program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

TEXT BOOK:
1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:
1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21MC504: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	0

UNIT – I
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)
21MC506: CYBER SECURITY

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                               3   0   0   0

Prerequisites: NIL
Course objectives:
- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes: The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT - I
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV
Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. **Cybercrime and Cyber terrorism:** Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V
Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:
1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS644PC: AUTOMATA THEORY AND COMPILER DESIGN

B.Tech. III Year II Sem.   **L   T   P   C**
                                                                                               3   0   0   3

Course Objectives: Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.

Course Outcomes:
1. Graduates should be able to understand the concept of abstract machines and their power to recognize the languages.
2. Attain the knowledge of language classes & grammar relationship among them with the help of Chomsky hierarchy.
3. Ability to understand the design of a compiler given features of the languages.
4. Ability to implement practical aspects of automata theory.
5. Gain Knowledge of powerful compiler generation tools.

UNIT - I
Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.
Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing.

UNIT - II
Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.
Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

UNIT - III
Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT - IV
Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.
Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

UNIT - V
Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:
1. Introduction to Theory of computation. Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCE BOOKS:
1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Cengage Learning.
3. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group.

4. Principles of Compiler Design, V.Raghavan, TMH.
5. Engineering a Compiler, K.D.Cooper, L.Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation – Kamala Krithivasan and Rama R, Pearson.
7. Modern Compiler Design, D.Grune and others,Wiley-India.
8. A Text book on Automata Theory, S.F.B.Nasir, P.K.Srimani, Cambridge Univ. Press.
9. Automata and Languages, A.Meduna, Springer.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS622PC: **SOFTWARE TESTING METHODOLOGIES**

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives
- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test automation and management using latest tools.

Course Outcomes:
- Design and develop the best test strategies in accordance to the development model.

UNIT - I
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs
Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II
Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III
Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT - IV
State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V
Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Winrunner).

TEXT BOOKS:
1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS:
1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21SM601MS: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year II Sem.   **L   T   P   C**
                                                    3   0   0   3

Course Objective:
- To learn the basic Business types, impact of the Economy on Business and Firms specifically.
- To analyze the Business from the Financial Perspective.

Course Outcome:
- The students will understand the various Forms of Business and the impact of economic variables on the Business.
- The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.
- The Students can study the firm's financial position by analysing the Financial Statements of a Company

UNIT – I
Introduction to Business and Economics:
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.
Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II
Demand and Supply Analysis:
Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.
Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III
Production, Cost, Market Structures & Pricing:
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.
Cost analysis: Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.
Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV
Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V
Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS668PE: INFORMATION RETRIEVAL SYSTEMS (Professional Elective-II)

B.Tech. III Year II Sem.	L	T	P	C
	3	0	0	3

Course Objectives:
- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems.

Course Outcomes:
- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT - I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

UNIT - II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction.
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT - III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

UNIT - IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext.
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

UNIT - V
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems.
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.

TEXT BOOK:
1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition,Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS:
1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms,Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS6101PE: DATA WAREHOUSING AND BUSINESS INTELLIGENCE (Professional Elective-II)

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:
1. This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
2. Students will learn how to design and create a data warehouse, and how to utilize the process of extracting, transforming, and loading (ETL) data into data warehouses.

Course Outcomes:
1. Understand architecture of data warehouse and OLAP operations.
2. Understand Fundamental concepts of BI and Analytics
3. Application of BI Key Performance indicators
4. Design of Dashboards, Implementation of Web Analytics
5. Understand Utilization of Advanced BI Tools and their Implementation.
6. Implementation of BI Techniques and BI Ethics.

UNIT - I
DATA WAREHOUSE: Data Warehouse-Data Warehouse Architecture- Multidimensional Data Model-Data cube and OLAP Technology-Data Warehouse Implementation -DBMS schemas for Decision support - Efficient methods for Data cube computation.

UNIT - II
Business Intelligence: Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.

UNIT - III
BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business intelligence -Value driven and Information use.

UNIT - IV
Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)

UNIT - V
Business intelligence implementation-Business Intelligence and integration implementation-connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI.

TEXT BOOKS:
1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER, Elsevier.
2. Rajiv Sabherwal "Business Intelligence" Wiley Publications, 2012.

REFERENCE BOOKS:
1. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009.
2. David Loshin, Business Intelligence - The Savy Manager's Guide Getting Onboard with Emerging IT, Morgan Kaufmann Publishers, 2009.
3. Philo Janus, Stacia Misner, Building Integrated Business Intelligence Solutions with SQLServer, 2008 R2 & Office 2010, TMH, 2011.

4. Business Intelligence Data Mining and Optimization for decision making [Author: Carlo-Verellis] [Publication: (Wiley)]
5. Data Warehousing, Data Mining & OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007
6. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.
7. Data Mining Introductory and Advanced topics –MARGARET H DUNHAM, PEA.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS6153PE: MINING MASSIVE DATASETS (Professional Elective-II)

B.Tech. III Year II Sem.   L   T   P   C
                                                                                                3   0   0   3

Course Objectives:
1. This course will cover practical algorithms for solving key problems in mining of massive datasets.
2. This course focuses on parallel algorithmic techniques that are used for large datasets.
3. This course will cover stream processing algorithms for data streams that arrive constantly, page ranking algorithms for web search, and online advertisement systems that are studied in detail.

Course Outcomes:
1. Handle massive data using MapReduce.
2. Develop and implement algorithms for massive data sets and methodologies in the context of data mining.
3. Understand the algorithms for extracting models and information from large datasets
4. Develop recommendation systems.
5. Gain experience in matching various algorithms for particular classes of problems.

UNIT - I
Data Mining-Introduction-Definition of Data Mining-Statistical Limits on Data Mining,MapReduce and the New Software Stack-Distributed File Systems, MapReduce, Algorithms Using MapReduce.

UNIT - II
Similarity Search: Finding Similar Items-Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Distance Measures. Streaming Data: Mining Data Streams-The Stream Data Model, Sampling Data in a Stream, Filtering Streams.

UNIT - III
Link Analysis-PageRank, Efficient Computation of PageRank, Link Spam. Frequent Itemsets Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream. Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism.

UNIT - IV
Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation. Recommendation Systems - A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

UNIT - V
Mining Social-Network Graphs-Social Networks as Graphs, Clustering of Social-Network Graphs, Partitioning of Graphs, Simrank, Counting Triangles.

TEXT BOOKS:
1. Jure Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3rd Edition.

REFERENCE BOOKS:
1. Jiawei Han & Micheline Kamber, Data Mining – Concepts and Techniques 3rd Edition Elsevier.
2. Margaret H Dunham, Data Mining Introductory and Advanced topics, PEA.
3. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS6154PE: DEVOPS (Professional Elective-II)

B.Tech. III Year II Sem.	L	T	P	C
	3	0	0	3

Course Objectives: The main objectives of this course are to:
1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in DevOps and related methodsto reach a continuous delivery capability.
3. Implement automated system update and DevOps lifecycle.

Course Outcomes: On successful completion of this course, students will be able to:
1. Identify components of Devops environment.
2. Describe Software development models and architectures of DevOps.
3. Apply different project management, integration, testing and code deployment tool.
4. Investigate different DevOps Software development models.
5. Assess various Devops practices.
6. Collaborate and adopt Devops in real-time projects.

UNIT - I
Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT - II
Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. **DevOps influence on Architecture:** Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III
Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV
Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V
Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development
Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS:
1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOK:
1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS6154PE: SOFTWARE DESIGN METHODOLOGIES (Professional Elective-II)

B.Tech. III Year II Sem.   L   T   P   C
                                                                                             3   0   0   3

Course Objectives:
- A broad and critical understanding of all the processes for engineering high quality software and the principles, concepts and techniques associated with software development
- An ability to analyze and evaluate problems and draw on the theoretical and technical knowledge to develop solutions and systems
- A range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle
- An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

UNIT - I
Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths.
A Generic view of process: Software engineering - A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.
Process models: The waterfall model, Incremental process models, Evolutionary process models, specialized process models, The Unified process.

UNIT - II
Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT - III
Design Engineering: Design process and Design quality, Design concepts, the design model, pattern-based software design. Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into software architecture. Software Design Approaches, Structured Analysis, Structured Design.

UNIT - IV
Object Oriented Concepts and Principles, Object Oriented Analysis, Object Oriented Design, Modeling component-level design: Designing class-based components, conducting component level design, object constraint language, designing conventional components.

UNIT - V
User Interface Design, Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation. Coding and Documentation.

Text Books:
1. Software Engineering: A practitioner's Approach, Roger S Pressman, sixth edition. McGraw Hill International Edition, 2005 (Unit 1, 2, 3, 5)
2. Software Engineering by Jibitesh Mishra, Ashok Mohanty. Pearson. (Unit 4, 5)

Reference Books:
1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS636PC: COMPILER DESIGN LAB

B.Tech. III Year II Sem.   L   T   P   C
                                                                       0   0   3   1.5

Course Objectives:
- To understand the various phases in the design of a compiler.
- To understand the design of top-down and bottom-up parsers.
- To understand syntax directed translation schemes.
- To introduce lex and yacc tools.

Course Outcomes:
- Ability to design, develop, and implement a compiler for any language.
- Able to use lex and yacc tools for developing a scanner and a parser.
- Able to design and implement LL and LR parsers.

List of Experiments
1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive Parsing algorithm
3. Write a C program to generate three address code.
4. Implement SLR(1) Parsing algorithm
5. Design LALR bottom up parser for the given language

```
<program> ::= <block>
<block> ::= { <variabledefinition><slist> }
 | { <slist> }
<variabledefinition> ::= int <vardeflist> ;
<vardeflist> ::= <vardec> | <vardec> , <vardeflist>
<vardec> ::= <identifier> | <identifier> [ <constant> ]
<slist> ::= <statement> | <statement> ; <slist>
<statement> ::= <assignment> | <ifstatement> | <whilestatement>
 | <block> | <printstatement> | <empty>
<assignment> ::= <identifier> = <expression>
 | <identifier> [ <expression> ] = <expression>
<ifstatement> ::= if <bexpression> then <slist> else <slist> endif
 | if <bexpression> then <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print ( <expression> )
<expression> ::= <expression><addingop><term> | <term> | <addingop><term>
<bexpression> ::= <expression><relop><expression>
<relop> ::= < | <= | == | >= | > | !=
<addingop> ::= + | -
<term> ::= <term><multop><factor> | <factor>
<multop> ::= * | /
<factor> ::= <constant> | <identifier> | <identifier> [ <expression>]
 | ( <expression> )
<constant> ::= <digit> | <digit><constant>
<identifier> ::= <identifier><letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9
<empty> has the obvious meaning
```

Comments (zero or more characters enclosed between the standard C/Java-style comment brackets
/*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The
declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Note
also that you should worry about the scoping of names.
A simple program written in this language is:
```
{ int a[3],t1,t2;
 t1=2;
 a[0]=1; a[1]=2; a[t1]=3;
 t2=-(a[2]+t1*6)/(a[2]-t1);
 if t2>5 then
 print(t2);
 else {
 int t3;
```

```
t3=99;
t2=-25;
print(-t1+t2*t3); /* this is a comment
on 2 lines */
}
endif
}
```

TEXT BOOK

1.Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCE BOOKS

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly

2. Compiler Construction, Louden, Thomson.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS623PC: SOFTWARE TESTING METHODOLOGIES LAB

B.Tech. III Year II Sem.

L	T	P	C
0	0	3	1.5

Course Objectives
- To provide knowledge of Software Testing Methods.
- To develop skills in software test automation and management using latest tools.

Course Outcome
- Design and develop the best test strategies in accordance to the development model.

List of Experiments

1. Recording in context sensitive mode and analog mode

2. GUI checkpoint for single property

3. GUI checkpoint for single object/window

4. GUI checkpoint for multiple objects

5. a) Bitmap checkpoint for object/window

a) Bitmap checkpoint for screen area

6. Database checkpoint for Default check

7. Database checkpoint for custom check

8. Database checkpoint for runtime record check

9. a) Data driven test for dynamic test data submission

 b) Data driven test through flat files

c) Data driven test through front grids

d) Data driven test through excel test

10. a) Batch testing without parameter passing

b) Batch testing with parameter passing

11. Data driven batch

12. Silent mode test execution without any interruption

13. Test case for calculator in windows application

TEXT BOOKS

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.

2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS

1. The craft of software testing - Brian Marick, Pearson Education.

2. Software Testing Techniques – SPD(Oreille)

3. Software Testing in the Real World – Edward Kit, Pearson.

4. Effective methods of Software Testing, Perry, John Wiley.

5. Art of Software Testing – Meyers, John Wiley.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS641PC: SCRIPTING LANGUAGES LAB

B.Tech. III Year II Sem.

L	T	P	C
0	0	3	1.5

Course Objectives

- This course introduces the script programming paradigm.
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL.

Course Outcomes

- Comprehend the differences between typical scripting languages and typical system and application programming languages.
- Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
- Acquire programming skills in scripting language.

UNIT - I
Introduction: Ruby, Rails, The structure and Excution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT III
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 IV
Advanced perl ,Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects,interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT V
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.
Tk: Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

Course Objectives

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS652PC: OBJECT ORIENTED ANALYSIS AND DESIGN LAB

B.Tech. III Year II Sem.   L   T   P   C
                                                                            0   0   3   1.5

Course Objectives
1. The main objective is to become familiar with all phases of OOAD and master the main features of the UML.
2. Ability to analyze and solve challenging problems in various domains.
3. Learn the Object design Principles and understand how to apply them towards implementation.

Course Outcomes
1. Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.
2. Design Class and Object Diagrams that represent Static Aspects of a Software System.
3. Design and analyze component and deployment diagrams of a software systems.
4. Understand various stages and phases of software project.

List of Experiments
1. The student should take up the case study of Unified Library Application which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
2. Draw the following diagrams using UML for an ATM system whose description is given below. UML diagrams to be developed are:
1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

Description for an ATM System
The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500 and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) – both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.
The ATM must be able to provide the following services to the customer:
1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between any two accounts linked to the card.

4. A customer must be able to make a balance inquiry of any account linked to the card.
5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine. The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.) If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back. If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful

transaction The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on"position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

6. Study of any testing tool (e.g. Win runner)

7. Study of any web testing tool (e.g. Selenium)

8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)

9. Study of any test management tool (e.g. Test Director)

10. Study of any open source-testing tool (e.g. Test Link)

TEXT BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.

2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

3. Ivar Jacobson, Grady Booch, James Rumbaugh: The Unified Software Development Process,
Pearson Edition.

REFERENCE BOOKS

1. Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.

2. Pascal Roques: Modeling Software Systems Using UML2, WILEY Dreamtech India Pvt. Ltd.

3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.

4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGraw Hill.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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*21MC605: ENVIRONMENTAL SCIENCE

B.Tech. III Year II Sem.   L   T   P   C
                                                                      3   0   0   0

Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e- Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981,Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedicalwaste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods ofbaseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and itsexplosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Conceptof Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversityGrants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivateLtd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearningPvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21MC507: ARTIFICIAL INTELLIGENCE

B.Tech. III Year II Sem.   L   T   P   C
                                                                                          3   0   0   0

Course Objectives: To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning. Study of Markov Models enable the student ready to step into applied AI.

UNIT - I
Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents
Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT - II
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning
Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward
Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III
Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic
Reasoning, Other Knowledge Representation Schemes
Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule,
Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving,
Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge
Acquisition.

TEXT BOOK:
1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-
Hall, 2010.

REFERENCE BOOKS:
1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill
publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving,
Pearson Education, 6th ed., 2009.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS743PC: AGILE SOFTWARE DEVELOPMENT

B.Tech. IV Year I Sem.   L   T   P   C
                                                                   3   0   0   3

Course Objectives: The objectives of this subject are to:
1. Organize Agile Software Development, Extreme Programming and Software DevelopmentRhythms.
2. Describe their unique features relative to traditional software practices.
3. Examine their applications in the real world and address their impacts on developing software.

Course Outcomes: Upon completion of the subject, students will be able to:
1. Summarize the agile methodologies: extreme programming, scrum, and feature driven programming.
2. Apply the Twelve XP Practices and Illustrate pair programming and its characteristics.
3. Apply XP to a small project.
4. Examine Feature-Driven Development and Regaining Control.
5. Relate Agile Modeling and RUP and Choose Tools to help with Agile Development.

UNIT - I
Introduction: Agile Methods, Agile Manifesto, and Agile Modeling Introduction, What Is Agile, The Agile Manifesto, Agile Methods, XP: Extreme Programming, DSDM, SCRUM, Feature-Driven Development, Modeling Misconceptions, Agile Modeling, Tools of Misconceptions, Updating Agile Models

UNIT - II
Extreme Programming: Introduction, Core XP Values, The Twelve XP Practices, About Extreme Programming, Planning XP Projects, Test First Coding, Making Pair Programming Work

UNIT - III
Agile Modeling and XP: Introduction, The Fit, Common Practices, Modeling Specific Practices, XP Objections to Agile Modeling, Agile Modeling and Planning XP Projects, XP Implementation Phase

UNIT - IV
Feature-Driven Development: Introduction, Incremental Software Development, Regaining Control: TheMotivation behind FDD, Planning an Iterative Project, Architecture Centric, FDD and XP

UNIT - V
Agile Methods with RUP and PRINCE2 and Tools and Obstacles: Agile Modeling and RUP, FDD and RUP, Agile Methods and Prince2, Tools to Help with Agile Development, Eclipse: An Agile IDE, Obstacles to Agile Software Development, Management Intransigence, The Failed Project Syndrome, Contractual Difficulties, Familiarity with Agility.

TEXT BOOKS:

1. Agile software construction, 1/e, John hunt, springer, 2005.
2. Agile and Iterative Development: a manager's guide, Addison-Wesley Craig Larman, [PearsonEducation] - 2004.

REFERENCE BOOKS:

1. The Art of Agile Development, Pearson, Robert C. Martin, Juli, James Shore, Chromatic, 2013,O'Reilly Media.
2. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc 2008.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS733PC: MACHINE LEARNING

B.Tech. IV Year I Sem.   L   T   P   C
                                                                                                3   0   0   3

Course Objectives
- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

Course Outcomes
- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

UNIT - I
Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**
Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II
Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.
Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.
Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.
Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV
Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOK

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK

2. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS7156PE: OBJECT ORIENTED ANALYSIS & DESIGN (Professional Elective-III)

B.Tech. IV Year I Sem.   L   T   P   C
                                                                     3   0   0   3

Course Objectives:
1. The main objective is to become familiar with all phases of OOAD and master the main features of the UML.
2. Ability to analyze and solve challenging problems in various domains.
3. Learn the Object design Principles and understand how to apply them towards implementation.

Course Outcomes:
1. Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the. views of UML Architecture and SDLC.
2. Design Class and Object Diagrams that represent Static Aspects of a Software System.
3. Design and analyze component and deployment diagrams of a software systems
4. Understand various stages and phases of software projects.

UNIT - I
Introduction to UML: The meaning of Object Orientation, Object identity, Encapsulation, information hiding, polymorphism, generosity, Importance of modeling, principles of modeling, object-oriented modeling, conceptual model of the UML, Architecture. Basic Structural Modeling: Classes, Relationships, common Mechanisms and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - II
Collaboration Diagrams: Terms, concepts, depicting a message, polymorphism in collaboration, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, call back mechanism, broadcast messages. Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams. Advanced Behavioral Modeling: Events and signals, state machines, processes and threads, time and space, state chart
diagrams. Interactions, Interaction diagrams.

Unit - III
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. The Unified process: use case driven, architecture centric, iterative and incremental. The Four Ps: people, project, product and process. Use case driven process: why use case, capturing use cases, analysis, design and implementation to realize the use cases, testing the use cases. Architecture-centric process: Architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

UNIT - IV
Iterative incremental process: Iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration. The Generic Iteration Workflow: Phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed to assess the iteration and phases. Inception Phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

UNIT - V
Elaboration Phase: Elaboration phase in brief, early in the elaboration phase ,the architectural elaboration iteration workflow, execute the core workflow –requirements to test. Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow. Transition phase: early in the transition phase, activities in transition phase. Case Study: Automation of a Library, Simulation of a Company

TEXT BOOKS:
1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEYDreamtech India Pvt. Ltd.
3. Ivar Jacobson, Grady Booch, James Rumbaugh: The Unified Software Development Process,
Pearson Edition.

REFERENCE BOOKS:
1. Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGraw Hill

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS)

21CS775PE: CLOUD COMPUTING (Professional Elective-III)

B.Tech. IV Year I Sem.   L   T   P   C
                                                                          3   0   0   3

Course Objectives:
- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:
- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

UNIT - I
Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing,Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III
Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud,Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjrasoft, Aneka Platform

TEXT BOOK:
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7157PE: INTRODUCTION DATA SCIENCE (Professional Elective-III)

B.Tech. IV Year I Sem.

L T P C
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BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7107PE: CRYPTOGRAPHY AND NETWORKK SECURITY (Professional Elective-III)

B.Tech. IV Year I Sem.

L	T	P	C
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Course Objectives:
- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

Course Outcomes:
- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

UNIT - I
Security Concepts: 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, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III
Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.
Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV
Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)
Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V
Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange
Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:
1. Cryptography and Network Security - Principles and Practice: William Stallings, PearsonEducation, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, WileyIndia, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7105PE: SCRIPTING LANGUAGES (Professional Elective-III)

B.Tech. IV Year I Sem.   L   T   P   C
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Course Objectives:
1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL

Course Outcomes:
1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT – I : Introduction: Ruby, Rails, The structure and Excution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and WebservicesRubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II : Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT - III : 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 – IV: Advanced perl,Finer points of looping, pack and unpack, filesystem, eval, ,data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT – V:TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and BoltsInternet Programming, Security Issues, C Interface. TkTk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The PramaticProgammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:
1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS772PE: NATURAL LANGUAGE PROCESSING (Professional Elective-III)

B.Tech. IV Year I Sem.   L   T   P   C

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Course Objectives
- Introduce to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

Course Outcomes
- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT - I
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing,Multilingual Issues

UNIT - III
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - IV
Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V
Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure **Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS
1. Multilingual natural Language Processing Applications: From Theory to Practice –Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOK
1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7108PE: QUANTUM COMPUTING (Professional Elective-IV)

B.Tech. IV Year I Sem.	L	T	P	C
	3	0	0	3

Course Objectives:
1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics

Course Outcomes:
1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT - I
Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. **Complex Numbers:** Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers.

UNIT - II
Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.
Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT - III
Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. **Quantum Hardware:** Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT - IV
Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

UNIT - V
Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. **The Impact of Quantum Computing on Cryptography:** Asymmetric Cryptography, Specific Algorithms, Specific Applications.

TEXT BOOKS:
1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

REFERENCE BOOKS:
1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
3. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS778PE: DATA VISUALIZATION TECHNIQUES (Professional Elective-IV)

B.Tech. IV Year I Sem.   L   T   P   C
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Course Objective:
To understand various data visualization techniques.

Course Outcomes:
1. Visualize the objects in different dimensions.
2. Design and process the data for Virtualization.
3. Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.
4. Apply the virtualization techniques for research projects. (K1, K3).

UNIT - I
Introduction and Data Foundation: Basics - Relationship between Visualization and Other Fields -The Visualization Process - Pseudo code Conventions - The Scatter plot. Data Foundation - Types of Data - Structure within and between Records - Data Preprocessing - Data Sets

UNIT - II
Foundations for Visualization: Visualization stages - Semiology of Graphical Symbols - The Eight Visual Variables - Historical Perspective - Taxonomies - Experimental Semiotics based on Perception Gibson's Affordance theory – A Model of Perceptual Processing.

UNIT - III
Visualization Techniques: Spatial Data: One-Dimensional Data - Two-Dimensional Data – ThreeDimensional Data - Dynamic Data - Combining Techniques. Geospatial Data: Visualizing Spatial Data - Visualization of Point Data -Visualization of Line Data - Visualization of Area Data - Other Issues in Geospatial Data Visualization Multivariate Data: Point-Based Techniques - Line- Based Techniques -Region-Based Techniques - Combinations of Techniques – Trees Displaying Hierarchical Structures – Graphics and Networks- Displaying Arbitrary Graphs/Networks.

UNIT - IV
Interaction Concepts and Techniques: Text and Document Visualization: Introduction - Levels of Text Representations - The Vector Space Model - Single Document Visualizations -Document Collection Visualizations - Extended Text Visualizations Interaction Concepts: Interaction Operators -Interaction Operands and Spaces - A Unified Framework. Interaction Techniques: Screen Space -Object-Space -Data Space -Attribute Space- Data Structure Space - Visualization Structure - Animating Transformations -Interaction Control

UNIT - V
Research Directions in Virtualizations: Steps in designing Visualizations – Problems in designing effective Visualizations-Issues of Data. Issues of Cognition, Perception, and Reasoning. Issues of System Design Evaluation, Hardware and Applications.

TEXT BOOKS:
    1. Matthew Ward, Georges Grinstein and Daniel Keim, "Interactive Data Visualization Foundations, Techniques, Applications", 2010.
    2. Colin Ware, "Information Visualization Perception for Design", 2nd edition, Margon Kaufmann Publishers, 2004.

REFERENCE BOOKS:
    1. Robert Spence "Information visualization – Design for interaction", Pearson Education, 2ndEdition, 2007.
    2. Alexandru C. Telea, "Data Visualization: Principles and Practice," A. K. Peters Ltd, 2008.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7158PE: INFORMATION STORAGE MANAGEMENT (Professional Elective-IV)

B.Tech. IV Year I Sem.   L   T   P   C
                                                                                          3   0   0   3

Course Objectives:
1. To understand the basic components of Storage System Environment.
2. To understand the Storage Area Network Characteristics and Components.
3. To examine emerging technologies including IP-SAN.
4. To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
5. To understand the local and remote replication technologies.

Course Outcomes:
1. Understand the logical and physical components of a Storage infrastructure.
2. Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
3. Understand the various forms and types of Storage Virtualization.
4. Describe the different roles in providing disaster recovery and business continuity capabilities.
5. Distinguish different remote replication technologies.

UNIT - I
Introduction to Storage Technology: Data proliferation and the varying value of data with time &usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

UNIT - II
Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. Modular arrays, Component architecture of intelligent disk subsystems, Disk physical structurecomponents, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end tohost storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

UNIT - III
Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (iSCSI, FCIP, iFCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage - solutions overview including technologies like virtualization & appliances.

UNIT - IV
Introductions to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques. Managing & Monitoring: Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and proactive management best practices, Provisioning &configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

UNIT - V
Securing Storage and Storage Virtualization: Define storage security. List the critical security attributes for information systems, describe the elements of a shared storage model and security extensions, Define storage security domains, List and analyze the common threats in each domain, Identify different virtualization technologies, describe block-level and file level virtualization technologies and processes.

TEXT BOOKS:
1. Marc Farley Osborne, "Building Storage Networks", Tata McGraw Hill, 2001.
2. Robert Spalding and Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, 2003.
3. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education Ltd., 2002.

REFERENCE BOOKS:

1. Gerald J Kowalski and Mark T Maybury," Information Storage Retrieval Systems theory &Implementation", BS Publications, 2000.
2. Thejendra BS, "Disaster Recovery & Business continuity", Shroff Publishers & Distributors, 2006.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS7158PE: SOFTWARE PROJECT MANAGEMENT (Professional Elective-IV)

B.Tech. IV Year I Sem.   L   T   P   C
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Course Objectives
1. To develop skills in software project management
2. The topics include-software economics; software development life cycle; artifacts of the
process; workflows; checkpoints; project organization and responsibilities; project control and process instrumentation.

Course Outcomes
1. Gain knowledge of software economics, phases in the life cycle of software development,
project organization, project control and process instrumentation.
2. Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
3. Design and develop software product using conventional and modern principles of software project management

UNIT - I
Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software economics, pragmatic software cost
estimation.

UNIT - II
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT - III
Life cycle phases: Engineering and production stages, inception, Elaboration, construction,
transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective. Work Flows of the process: Software process workflows, Iteration workflows.

UNIT - IV
Checkpoints of the process: Major milestones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation building blocks, The Project Environment.

UNIT - V
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates. Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions. Case Study: The command Center Processing and Display system- Replacement (CCPDS-R).

TEXT BOOKS:
1. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS:
1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education. 2005.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS734PC: MACHINE LEARNING LAB

B.Tech. IV Year I Sem.   L   T   P   C
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Course Objective: The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate those using python.

Course Outcomes: After the completion of the course the student can able to:
- understand complexity of Machine Learning algorithms and their limitations;
- understand modern notions in data analysis-oriented computing;
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments
1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

    medium skiing design   single twenties no -> highRisk

    high   golf   trading   married forties yes -> lowRisk

    low   speedway transport married thirties yes -> medRisk

    medium football banking   single thirties yes -> lowRisk high

          flying   media   married fifties yes -> highRisk

    low   football security   single twenties no -> medRisk medium

    golf   media   single thirties yes -> medRisk

    medium golf   transport married forties yes ->

    lowRisk high skiing banking   single thirties yes -

    > highRisk low golf   unemployed married forties yes ->

    highRisk

    Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

TEXT BOOK

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS8160PE: MOBILE APPLICATION DEVELOPMENT (Professional Elective-V)

B.Tech. IV Year II Sem.   L   T   P   C
                                                                                               3   0   0   3

Course Objectives
- To demonstrate their understanding of the fundamentals of Android operating systems.
- To improves their skills of using Android software development tools.
- To demonstrate their ability to develop software with reasonable complexity on mobile platform.
- To demonstrate their ability to deploy software to mobile devices.
- To demonstrate their ability to debug programs running on mobile devices.

Course Outcomes
- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Student will be able to develop, deploy and maintain the Android Applications.

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Typesof Android applications, Best practices in Android programming, Android tools
Android application components – Android Manifest file, Externalizing resources like values, themes,layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II
Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III
Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS
Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity
Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV
Persistent Storage: Files – Using application specific folders and files, creating files, reading data fromfiles, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V
Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013.

REFERENCE BOOK:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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21CS8161PE: PRIVACY PRESERVING IN DATA MINING (Professional Elective-V)

B.Tech. IV Year II Sem.   L   T   P   C
                                                                             3   0   0   3

Course Objectives:
1. The aim of the course is to introduce the fundamentals of Privacy Preserving Data Mining Methods
2. The course gives an overview of - Anonymity and its Measures, Multiplicative Perturbation for Privacy-Preserving Data Mining, techniques for Utility-based Privacy Preserving Data

Course Outcomes:
1. Understand the concepts of Privacy Preserving Data Mining Models and Algorithms.
2. Demonstrate a comprehensive understanding of different tasks associated in Inference Control Methods for Privacy-Preserving Data Mining.
3. Understand the concepts of Data Anonymization Methods and its Measures.
4. Evaluate and Appraise the solution designed for Multiplicative Perturbation.
5. Formulate, Design and Implement the solutions for Utility-based Privacy Preserving Data.

UNIT - I
Introduction, Privacy-Preserving Data Mining Algorithms, The Randomization Method, Group Based Anonymization, Distributed Privacy-Preserving Data Mining

UNIT - II
Interface Control Methods
Introduction, A Classification of Microdata Protection Methods, Perturbative Masking Methods, Non-Perturbative Masking Methods, Synthetic Microdata Generation, Trading off Information Loss and
Disclosure Risk.

UNIT - III
Measure of Anonymity
Data Anonymization Methods, A Classification of Methods, Statistical Measure of Anonymous, Probabilistic Measure of Anonymity, Computational Measure of Anonymity, reconstruction Methods forRandomization, Application of Randomization

UNIT - IV
Multiplicative Perturbation ,Definition of Multiplicative Perturbation, Transformation Invariant Data Mining Models, Privacy Evaluation for Multiplicative Perturbation, Attack Resilient Multiplicative Perturbation, Metrics for
Quantifying Privacy Level, Metrics for Quantifying Hiding Failure, Metrics for Quantifying Data Quality.

UNIT - V
Utility-Based Privacy-Preserving Data Types of Utility-Based Privacy Preserving Methods, Utility-Based Anonymization Using Local Recording, The Utility-Based Privacy Preserving Methods in Classification Problems, Anonymization Marginal: Injection Utility into Anonymization Data Sets.

TEXT BOOK:
1. Privacy – Preserving Data Mining: Models and Algorithms Edited by Charu C. Aggarwal and S. Yu, Springer.

REFERENCE BOOKS:
1. Charu C. Agarwal, Data Mining: The Textbook, 1st Edition, Springer.
2. J. Han and M. Kamber, Data Mining: Concepts and Techniques, 3rd Edition, Elsevier.
3. Privacy Preserving Data Mining by Jaideep Vaidya, Yu Michael Zhu and Chirstopher W. Clifton

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
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CLOUD SECURITY (Professional Elective-V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:
- Cloud Computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user.
- The objective of the course is to learn about how the data can be distributed to the different data centres available to many users over the internet.

UNIT-I
Cloud Computing Architectural Framework: Cloud Benefits, Business scenarios, Cloud Computing Evolution, cloud vocabulary, Essential Characteristics of Cloud Computing, Cloud deployment models, Cloud Service Models, Multi- Tenancy, Approaches to create a barrier between the Tenants, cloud computing vendors, Cloud Computing threats, Cloud Reference Model, The Cloud Cube Model, Security for Cloud Computing, How Security Gets Integrated.

UNIT-II
Compliance and Audit: Cloud customer responsibilities, Compliance and Audit Security Recommendations. Portability and Interoperability: Changing providers reasons, Changing providers expectations, Recommendations all cloud solutions, IaaS Cloud Solutions, PaaS Cloud Solutions, SaaS Cloud Solutions.

UNIT-III
Traditional Security, Business Continuity, Disaster Recovery, Risk of insider abuse, Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility, Vendor Security Process (VSP).

UNIT-IV
Data Center Operations:
Data Center Operations, Security challenge, Implement Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Encryption and Key Management: Encryption for Confidentiality and Integrity, Encrypting data at rest, Key Management Lifecycle, Cloud Encryption Standards, Recommendations.

UNIT-V
Identity and Access Management:
Identity and Access Management in the cloud, Identity and Access Management functions, Identity and Access Management (IAM) Model, Identity Federation, Identity Provisioning Recommendations, Authentication for SaaS and Paas customers, Authentication for IaaS customers, Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations. Virtualization: Hardware Virtualization, Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations.

Text Books:
1. Cloud computing, by Ray Rafael's.
2. Cloud Computing Security: Foundations and Challenges, John R. Vacca.

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21CS8163PE: DATA STREAM MINING (Professional Elective-V)

B.Tech. IV Year II Sem.	L	T	P	C
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Course Objectives:
1. The aim of the course is to introduce the fundamentals of Data Stream Mining.
2. The course gives an overview of – Mining Strategies, methods and algorithms for data stream mining.

Course Outcomes:
1. Understand how to formulate a knowledge extraction problem from data streams.
2. Ability to apply methods / algorithms to new data stream analysis problems.
3. Evaluate the results and understand the functioning of the methods studied.
4. Demonstrate decision tree and adaptive Hoeffding Tree concepts

UNIT - I
MOA Stream Mining, Assumptions, Requirements, Mining Strategies, Change Detection Strategies, MOA Experimental Settings, Previous Evaluation Practices, Evaluation Procedures for Data Streams, Testing Framework, Environments, Data Sources, Generation Speed and Data Size, Evolving Stream Experimental Setting.

UNIT - II
Hoeffding Trees, The Hoeffding Bound for Tree Induction, The Basic Algorithm, Memory Management, Numeric Attributes, Batch Setting Approaches, Data Stream Approaches.

UNIT - III
Prediction Strategies, Majority Class, Naïve Bayes Leaves, Adaptive Hybrid, Hoeffding Tree Ensembles, Data Stream Setting, Realistic Ensemble Sizes.

UNIT - IV
Evolving Data Streams, Algorithms for Mining with Change, A Methodology for Adaptive Stream Mining, Optimal Change Detector and Predictor, Adaptive Sliding Windows, Introduction, Maintaining Updated Windows of Varying Length.

UNIT - V
Adaptive Hoeffding Trees, Introduction, Decision Trees on Sliding Windows, Hoeffding Adaptive Trees,Adaptive Ensemble Methods, New methods of Bagging using trees of different size, New method of bagging using ADWIN, Adaptive Hoeffding Option Trees, Method performance.

TEXT BOOK:
1. DATA STREAM MINING: A Practical Approach by Albert Bifet and Richard Kirkby.

REFERENCE BOOKS:
1. Knowledge discovery from data streams by Gama João. ISBN: 978-1-4398-2611-9.
2. Machine Learning for Data Streams by Albert Bifet, Ricard Gavalda; MIT Press, 2017.

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21CS8164PE: EXPLORATORY DATA ANALYSIS (Professional Elective-V)

B.Tech. IV Year II Sem.　　　　　　　　　　　　　　　　　　　　　L　T　P　C
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Course Objectives:
1. Handle missing data in the real-world data sets by choosing appropriate methods.
2. Summarize the data using basic statistics. Visualize the data using basic graphs and plots.
3. Identify the outliers if any in the data set.
4. Choose appropriate feature selection and dimensionality reduction.
5. Techniques for handling multi-dimensional data.

UNIT - I:
Introduction to Exploratory Data Analysis: Data Analytics lifecycle, Exploratory Data Analysis (EDA)– Definition, Motivation, Steps in data exploration, The basic data types Data Type Portability.

UNIT - II:
Preprocessing - Traditional Methods and Maximum Likelihood Estimation: Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics,
Missing data handling, Improving the accuracy of analysis. Preprocessing Bayesian Estimation: Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and Pooling Phase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data.

UNIT - III:
Data Summarization & Visualization: Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D Statistical data analysis.

UNIT - IV:
Outlier Analysis: Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data. Feature Subset Selection: Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features selection.

UNIT - V
Dimensionality Reduction: Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling, Correspondence Analysis.

TEXT BOOKS:
1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt.

REFERENCE BOOKS:
1. Charu C. Aggarwal, "Data Mining The Text book", Springer, 2015.
2. Craig K. Enders, "Applied Missing Data Analysis", The Guilford Press, 2010.
3. Inge Koch, "Analysis of Multivariate and High dimensional data", Cambridge University Press, 2014.
4. Michael Jambu, "Exploratory and multivariate data analysis", Academic Press Inc., 1990.
5. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC press, 2015.

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21CS8116PE: WEB SECURITY (Professional Elective-V)

B.Tech. IV Year II Sem.   L   T   P   C
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Course Objectives:
- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes: Students should be able to
- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

UNIT - I
The Web Security, The Web Security Problem, Risk Analysis and Best Practices.
Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II
The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III
Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV
Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

UNIT - V
Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:
1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

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21CS8165PE: SOFTWARE METRICS (Professional Elective-VI)

B.Tech. IV Year II Sem.   L   T   P   C
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Course Objectives:
1. Understand the basic techniques of data collection and how to apply them.
2. Learn software metrics that define relevant metrics in a rigorous way.

Course Outcomes:
1. Perform some simple statistical analysis relevant to software measurement data.
2. Use from practical examples both the benefits and limitations of software metrics for quality control and assurance.
3. Understand internal product attributes and its structures.
4. Understand and analyze software quality metrics.

UNIT - I
Measurement Theory: Fundamentals of measurement – Measurements in Software Engineering –Scope of Software metrics – Measurement theory – Goal based framework – Software measurement validation.

UNIT - II
Data Collection And Analysis: Empirical investigation – Planning experiments – Software metrics data collection – Analysis methods – Statistical methods.

UNIT - III
Product Metrics: Measurement of internal product attributes – Size and structure – External product attributes – Measurement of quality.

UNIT - IV
Quality Metrics: Software quality metrics – Product quality – Process quality – Metrics for software maintenance – Case studies of Metrics Program – Motorola – HP and IBM.

UNIT - V
Management Metrics: Quality management models – Rayleigh Model – Problem Tracking report (PTR) model – Reliability growth model – Model evaluation – Orthogonal defect classification.

TEXT BOOKS:
1. Software Metrics, Normal. E – Fentor Shari Lawrence Pfllegar, International Thomson Computer Press, 1997.
2. Software Metrics; A Rigorous approach Fenter Norman, E., Chapmen & Hall, London.

REFERENCE BOOKS:
1. Metric and Models in Software Quality Engineering, Stephen H.Kin, Addison Wesley, 1995.
2. Measuring Software Process, William. A. Florac and Aretitor D Carletow, Addison –Wesley, 1995

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21CS8166PE: COMPUTATIONAL COMPLEXITY (Professional Elective-VI)

B.Tech. IV Year II Sem.   L   T   P   C
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Course Objectives:
1. Introduces to theory of computational complexity classes.
2. Discuss about algorithmic techniques and application of these techniques to problems.
3. Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
4. Discuss about Graph based algorithms and approximation algorithms.
5. Discuss about search trees.

Course Outcomes:
1. Ability to classify decision problems into appropriate complexity classes.
2. Ability to specify what it means to reduce one problem to another, and construct reductions for simple examples.
3. Ability to classify optimization problems into appropriate approximation complexity classes.
4. Ability to choose appropriate data structure for the given problem.
5. Ability to choose and apply appropriate design method for the given problem.

UNIT - I
Computational Complexity: Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The P versus NP problem and why it's hard

UNIT - II
Algorithmic paradigms: Dynamic Programming – Longest common subsequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack problem, Divide and Conquer – Merge sort, binary search, quick sort.

UNIT - III
Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic rimality Testing, De-Randomization Advanced Algorithms.

UNIT - IV
Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

UNIT - V
Advanced Data Structures and applications: Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps, Disjoint sets, Union by Rank and Path Compression

TEXT BOOKS:
1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers, 2001.
4. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition,
Addison-Wesley Professional, 1998.
5. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

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21CS8151PE: BLOCK CHAIN TECHNOLOGY (Professional Elective-VI)

B.Tech. IV Year II Sem.

L	T	P	C
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Course Objectives: To Introduce block chain technology and Cryptocurrency.

Course Outcomes:
1. Learn about research advances related to one of the most popular technological areas today.
2. Understand Extensibility of Blockchain concepts.
3. Understand and Analyze Blockchain Science.
4. Understand Technical challenges, Business model challenges.

UNIT - I
Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding.

UNIT - II
Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment.

UNIT - III
Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

UNIT - IV
Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

UNIT - V
Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOK:
1. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.

REFERENCE BOOKS:
1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education
2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition
3. Bradley Lakeman, Blockchain Revolution: Understanding the Crypto Economy of the Future. A Non-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN: 1393889158.

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21CS8167PE: PARALLAL AND DISTRIBUTED COMPUTING (Professional Elective-VI)

B.Tech. IV Year II Sem.
L   T   P   C
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Course Objectives:
- To learn core ideas behind parallel and distributed computing.
- To explore the methodologies adopted for parallel and distributed environments.
- To understand the networking aspects of parallel and distributed computing.
- To provide an overview of the computational aspects of parallel and distributed computing.
- To learn parallel and distributed computing models.

Course Outcomes:
- Explore the methodologies adopted for parallel and distributed environments.
- Analyze the networking aspects of Distributed and Parallel Computing.
- Explore the different performance issues and tasks in parallel and distributed computing.
- Tools usage for parallel and distributed computing.
- Understanding high performance computing techniques.

UNIT - I
Parallel and Distributed Computing— Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations - Parallel Algorithms— Introduction to Parallel Models and Algorithms- Sorting - Matrix Multiplication- Convex Hull- Pointer Based Data Structures.

UNIT - II
Synchronization- Process Parallel Languages- Architecture of Parallel and Distributed Systems-Consistency and Replication- Security- Parallel Operating Systems.

UNIT - III
Management of Resources in Parallel Systems- Tools for Parallel Computing- Parallel Database Systems and Multimedia Object Servers.

UNIT - IV
Networking Aspects of Distributed and Parallel Computing- Process- Parallel and Distributed Scientific Computing.

UNIT - V
High-Performance Computing in Molecular Sciences- Communication Multimedia Applications for Parallel and Distributed Systems- Distributed File Systems.

TEXT BOOKS:
1. Jacek Błażewicz, et al., "Handbook on parallel and distributed processing", Springer Science & Business Media, 2013.
2. Andrew S. Tanenbaum, and Maarten Van Steen, "Distributed Systems: Principles and Paradigms". Prentice-Hall, 2007.

REFERENCE BOOKS:
1. George F.Coulouris, Jean Dollimore, and Tim Kindberg, "Distributed systems: concepts and design", Pearson Education, 2005.
2. Gregor Kosec and Roman Trobec, "Parallel Scientific Computing: Theory, Algorithms, and Applications of Mesh Based and Meshless Methods", Springer, 2015

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21CS8168PE: SOFTWARE QUALITY ASSURANCE (Professional Elective-VI)

B.Tech. IV Year II Sem.   L   T   P   C
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Course Objectives: Assurance of software quality using metrics, factors and process standards.

Course Outcomes:
1. Understand software quality challenge
2. Classify software requirements
3. Understand the models for cost of software quality
4. Implement software quality standards

UNIT - I
The software quality challenge: The uniqueness of software quality assurance, The environments for
which SQA methods are developed.
What is software quality? What is software? Software errors, faults and failures, Classification of the causes of software errors,
Software quality – definition, Software quality assurance – definition and objectives, Software quality assurance and software
engineering

UNIT - II
Software quality factors: The need for comprehensive software quality Requirements, Classifications of software requirements
into software quality factors, Product operation software quality factors, Product revision software quality factors, Product
transition software quality factors, Alternative models of software quality factors, Who is interested in the definition of quality
Requirements? Software compliance with quality factors.

UNIT - III
Software quality metrics: Objectives of quality measurement, Classification of software quality metrics, Process metrics,
Product metrics, Implementation of software quality metrics, Limitations of software metrics. Costs of software quality:
Objectives of cost of software quality metrics, The classic model of cost of software quality, An extended model for cost of
software quality, Application of a cost of software quality system, Problems in the application of cost of software, quality
metrics.

UNIT - IV
SQA project process standards – IEEE software engineering standards: Structure and content of IEEE software engineering
standards, IEEE/EIA Std 12207 – software life cycle processes, IEEE Std 1012 – verification and validation, IEEE Std 1028 –
reviews. Management and its role in software quality assurance: Top management's quality assurance activities, Department
management responsibilities for quality assurance, Project management
responsibilities for quality assurance.

UNIT - V
The SQA unit and other actors in the SQA system The SQA unit, SQA trustees and their tasks, SQA committees and their tasks,
SQA forums – tasks and methods of operation

TEXT BOOK:
1. Software Quality Assurance From theory to implementation, DANIEL GALIN, Pearson Education.

REFERENCE BOOK:
   1.   Metrics and Models In Software Quality Engineering, Kan Pearson Education.