B. Tech. (Computer Science and Engineering- Intelligent Systems)

(2017 Regulations)

(Minimum Credits to be earned:190)

FIRST YEAR ENGINEERING SCHEME

SEMESTER-I

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTMT101	Linear Algebra and Calculus	3	1	0	4	40	60	100
17BTPY102	Engineering Physics	3	0	0	3	40	60	100
17BTEG104	English Communication	2	1	0	3	50	--	50
17BTCS105	Fundamentals of Computer Programming	3	0	0	3	40	60	100
17BTEC106	Basics of Electrical and Electronics Engineering	3	1	0	4	40	60	100
17BTME107	Engineering Graphics	3	0	1	4	40	60	100
17BTPY111	Physics Laboratory	0	0	2	1	40	60**	100
17BTCS112	C Programming Laboratory	0	0	4	2	40	60**	100
17BTME113	Engineering Practices	0	0	2	1	50	--	50
Total		**17**	**3**	**9**	**25**	**380**	**420**	**800**

SEMESTER-II

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTMT201	Differential Equation and Advanced Calculus	3	1	0	4	40	60	100
17BTCH202	Engineering Chemistry	3	0	0	3	40	60	100
17BTCE203	Materials Engineering	3	1	0	4	40	60	100
17BTCS204	Principles of Digital Systems	3	1	0	4	40	60	100
17BTCS205	Object Oriented Programming in C++	3	0	0	3	40	60	100
17BTEG206	Professional Communication	3	0	2	4	100	--	100
17BTCH211	Chemistry Laboratory	0	0	2	1	40	60**	100
17BTCS212	C++ Programming Laboratory	0	0	4	2	40	60**	100
Total		**18**	**3**	**8**	**25**	**380**	**420**	**800**

CA = Continuous Assessment, FE= Final Examination,

****Final Lab exam will be conducted with viva-voce of the respective practical (50 exam +10 viva = 60)**

SECOND YEAR ENGINEERING SCHEME

SEMESTER-III

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTMT301	Integral Calculus & Transform Techniques	3	1	0	4	40	60	100
17BTCS302	Data Structures	4	0	0	4	40	60	100
17BTCS303	Computer Organization &Architecture	4	0	0	4	40	60	100
17BTCS304	Microprocessors and Interfacing	4	0	0	4	40	60	100
17BTCS305	Discrete Mathematics	3	1	0	4	40	60	100
17BTCS311	Data Structures Laboratory	0	0	2	1	40	60**	100
17BTCS312	Microprocessors and Interfacing Laboratory	0	0	4	2	40	60**	100
17BTCS320	Mini Project –I	0	0	4	2	100	--	100
	Total	**18**	**2**	**10**	**25**	**380**	**420**	**800**

SEMESTER-IV

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTCS401	Advanced Data Structure & Algorithms	4	0	0	4	40	60	100
17BTMT402	Probability and Queuing Theory	3	1	0	4	40	60	100
17BTCS403	Computer Graphics	4	0	0	4	40	60	100
17BTCS404	Theory of Computation	3	1	0	4	40	60	100
17BTCS405	Economics for Engineers	3	1	0	4	40	60	100
17BTCS411	Advanced Data Structure Lab	0	0	2	1	40	60**	100
17BTCS412	Computer Graphics Lab	0	0	4	2	40	60**	100
17BTCS421	Mini Project-II	0	0	4	2	100	--	100
	Total	**17**	**3**	**10**	**25**	**380**	**420**	**800**

CA = Continuous Assessment, FE= Final Examination,

****Final Lab exam will be conducted with viva-voce of the respective practical (50 exam +10 viva = 60)**

THIRD YEAR ENGINEERING SCHEME

SEMESTER-V

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTIS 501	Design and Analysis of Algorithms	3	1	0	4	40	60	100
17BTIS 502	Software Engineering Methodology	3	1	0	4	40	60	100
17BTIS 503	System Programming and Operating systems	4	0	0	4	40	60	100
17BTIS 504	Database Management Systems	4	0	0	4	40	60	100
17BTIS 505	Artificial Intelligence	4	0	0	4	40	60	100
17BTIS 511	Programming Lab-I	0	0	2	1	40	60**	100
17BTIS 512	Programming Laboratory – II	0	0	4	2	40	60**	100
17BTIS 521	Mini Project –III	0	0	4	2	100	--	100
Total		**18**	**2**	**10**	**25**	**380**	**420**	**800**

SEMESTER-VI

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTIS 601	Computer Networks	4	0	0	4	40	60	100
17BTIS 602	Environmental Engineering	3	1	0	4	40	60	100
17BTIS 603	Operations Research	4	0	0	4	40	60	100
17BTIS 604	Machine Learning-I	3	1	0	4	40	60	100
17BTIS 6_ _	Elective-I	3	0	0	3	40	60	100
17BTIS 611	Programming Laboratory – III	0	0	2	1	40	60**	100
17BTIS 612	Programming Laboratory – IV	0	0	4	2	40	60**	100
17BTIS 621	Mini Project-IV	0	0	4	2	100	--	100
Total		**17**	**2**	**10**	**24**	**380**	**420**	**800**

CA = Continuous Assessment, FE= Final Examination,

****Final Lab exam will be conducted with viva-voce of the respective practical (50 exam +10 viva = 60)**

FOURTH YEAR ENGINEERING SCHEME

SEMESTER-VII

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTIS 701	Machine Learning-II	3	1	0	4	40	60	100
17BTIS 702	Big Data Analytics	4	0	0	4	40	60	100
17BTIS 703	Data Mining	4	0	0	4	40	60	100
17BTIS 7_ _	Elective-II	3	1	0	4	40	60	100
17BTIS 7_ _	Elective-III	3	1	0	4	40	60	100
17BTIS 711	Programming Laboratory –V	0	0	2	1	40	60**	100
17BTIS 712	Programming Laboratory VI	0	0	4	2	40	60**	100
17BTIS 721	Project Phase-I	0	0	4	2	100	--	100
Total		**17**	**3**	**10**	**25**	**380**	**420**	**800**

SEMESTER-VIII

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
17BTIS8_ _	Elective-IV	3	0	0	3	40	60	100
17BTIS8_ _	Elective-V	3	0	0	3	40	60	100
17BTIS 821	Project Phase-II	0	0	20	10	100	200	300
Total		**6**	**0**	**20**	**16**	**180**	**320**	**500**

CA = Continuous Assessment, FE= Final Examination,

****Final Lab exam will be conducted with viva-voce of the respective practical (50 exam +10 viva = 60)**

SEMESTER	SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5	SEMESTER 6	SEMESTER 7	SEMESTER 8
CREDITS	25	25	25	25	25	24	25	16
TOTAL CREDITS	190							

LIST OF ELECTIVES*

**(Syllabus under revision by Board of Studies)*

Course Code	COMPUTER ELECTIVES
	ELECTIVE I
17BTIS631	Soft Computing
17BTIS632	Digital Signal Processing
17BTIS633	Internet of Things
	ELECTIVE II
17BTIS731	Natural Language Processing
17BTIS732	Image Processing
17BTIS733	Real Time Operating Systems and Embedded systems
	ELECTIVE III
17BTIS734	Knowledge based AI
17BTIS735	Computer Vision
17BTIS736	Artificial Neutral Network
	ELECTIVE IV
17BTIS831	Optimization Techniques
17BTIS832	Game Theory
17BTIS833	Reinforcement Learning & Decision Making
	ELECTIVE V
17BTIS834	Emerging trends in data science/Open elective
17BTIS835	Deep Learning
17BTIS836	Intelligent systems

	***Color codes indicate the pre-requisite and simultaneous subjects.**

SEMESTER - I

17BTIS101: LINEAR ALGEBRA AND CALCULUS 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

MATRICES 9

Rank, Normal Form, System of Linear Equations, linear Dependence and Independence And Orthogonal Transformations, Eigen Vectors, Cayley – Hamilton Theorem , Application to problems in Engineering (Translation and Rotation of Matrix

LINEAR ALGEBRA AND MAPPING 9

Basic concepts in linear algebra: vector spaces, Subspaces, linear independence and dependence of vectors, bases, dimensions. Row and Column Linear mappings, representation by matrices, rank-nullity theorem.

LIMIT, CONTINUITY AND DIFFERENTIATION OF UNIVARIATE FUNCTION 9

Limit, Continuity, indeterminate forms, L'Hospital Rule, Evaluation of limits, Mean value Theorems,Differential Calculus: Successive Differentiation, Leibnitz Theorem.

INFINITE SERIES &EXPANSION OF FUNCTIONS 9

Infinite Sequences, Infinite Series, Alternating Series, Test for Convergence, Absolute and Conditional Convergence, range of Convergence, Taylor's series And McLaurin's Series

INTEGRAL CALCULUS AND FOURIER SERIES 9

Integral Calculus: Reduction Formula, Beta and Gamma Functions,**Fourier Series**: Definition, Dirichlet's condition, Full range Fourier series Half range Fouries series , Harmonic analysis and application to problem in Engineering

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, 10th edition.
2. Maurice D. Weir, Joel Hass, Frank R. Giordano, "Thomas' Calculus", Pearson Education, 12th edition, .

REFERENCES

1. Serge Lang, "Linear Algebra", Springer, 3rd edition, .
2. Howard Anton and Chris Rorres, "Elementary Linear Algebra", John Wiley and Sons, 10th edition, .
3. C.R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publications, New Delhi, .
4. Peter V. O' Neil, Advanced Engineering Mathematics, Thomson Brooks/Cole, Singapore, 7th edition
5. Shanti Narayan, "Differential Calculus", S. Chand and Company, New Delhi, .

George Simmons, "Differential Equation with Applications".

17BTIS102: ENGINEERING PHYSICS 3003

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

ACOUSTICS & ULTRASONICS **9**

Classification of sound - characteristics of musical sound - intensity - loudness - decibel - Reverberation - Reverberation time, Absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics - production - Magnetostriction and Piezoelectric oscillator – properties- applications of ultrasonics with particular reference to detection of flaws in metal (Non - Destructive testing NDT) -SONAR.

WAVE OPTICS & APPLICATIONS **9**

Interference – Interference in uniform and non-uniform thickness thin films, fringe width, formation of Newton's rings and its application (i) for the determination of wavelength of incident light or radius of curvature of a given palno-convex lens,(ii) for the determination of refractive index of a given liquid, Applications of interference (i) Testing of optical flatness of surfaces,(ii) Anti-reflection coating.

Diffraction – Fraunhofer diffraction at Single slit, plane diffraction grating, Conditions for maxima and minima.Polarization - Generation and Analysis of Plane polarized, circularly polarized and elliptically polarized light, LCD (as an example of polarization).

LASER & PHOTONICS **9**

Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission – metastable state-population inversion - pumping action - active medium - laser characteristics - Ruby laser – He:Ne laser - Semiconductor laser - applications

Optical fiber - fiber optic communication system- Photonics crystals-Photonics crystal fiber

QUANTUM MECHANICS & NANOTECHNOLOGY **9**

Need and origin of quantum concept, Wave-particle duality, Uncertainty Principle, Illustration of it by electron diffraction at single slit, Significance & normalization of wave function, Schrodinger wave equation: time independent & dependent, Eigen functions & Eigen values, particle in a rigid box and non-rigid box .

Origin of Nanotechnology, Nanomaterials-Synthesis by physical, chemical, biological, mechanical method, Optical-electrical-magnetic-structural-mechanical properties of nanomaterial, Applications of Nanotechnology.

GREEN ENERGY PHYSICS **9**

Introduction to Green energy – **Solar energy:** Energy conversion by photovoltaic principle – Solar cells – **Wind energy:** Basic components and principle of wind energy conversion systems – **Ocean energy:** Wave energy – Wave energy conversion devices – Tidal energy – **Geothermal energy:** Geothermal sources – **Biomass:** Biomass and bio-fuels – bio-energies from wastages – **Fuel cells**

TEXT BOOKS

1. ArtherBeiser, "Concepts of Modern Physics", Tata Mcgraw Hill, 1994.
2. John Buck,"Fundamentals of Optical Fibers", , 2004.
3. Avadhanulu M N and KshirSagar P G, "A Text Book of Engineering Physics", 2010.
4.

REFERENCES

1. Hecht E, "Optics", Pearson Education, 2017.
2. Sulabha K. Kulkarni, "Nanotechnology: Principles and Practices", Springer, 2015.
3. Godfrey Boyle, "A Renewable Energy: Power sustainable future",Oxford University Press, UK, 2012.

17BTEG104: ENGLISH COMMUNICATION 2103

CA : 50 Marks No. of Total Lectures = 30 Hours

ESSENTIALS OF EFFECTIVE ORAL COMMUNICATION 5

Introduction to the process of effective communication- developing confidence, self-concept, clarity of thought - audience analysis- overcoming barriers to communication- body language- paralanguage, presentation techniques, and short speeches.

READING COMPREHENSION 4

Developing reading skills like skimming and scanning for information, critical reading, inferential, cognition, and analytical skills- appropriate reading texts to be used from general, scientific, and literary genres - review of a short story.

PRINCIPLES OF CLEAR WRITING 6

The fundamental aspects of formal writing like objectivity, conciseness, clarity, simplicity, coherence, parallelism, unity, cohesion, and accuracy to be focused – descriptive writing - guidelines for writing expository, analytical, descriptive, and argumentative essays or articles –writing for focus: writing in different ways to create an emphasis and focus to be focused – samples from news items, creative articles, and reports to be used.

NOTE –MAKING, SUMMARIZING AND PARAPHRASING 1

Passages pertaining to general and science topics to be used to train students in note-making, summarizing and paraphrasing.

TECHNICAL WRITING 2

Technical style, mechanics, critical evaluation of different types of technical texts and different genres of technical writing – transcoding – interpretation of the information represented in graphical elements like graphs, tables, charts, and diagrams.

CLOZE TEST AND SPOTTING ERRORS 4

Passages with numbered gaps to be used to provide training in the use of vocabulary, syntax, and reading comprehension - spotting common errors in the use of language functions and guidelines for rectifying the same.

CORRESPONDENCE

Principles of official, social, and e-mail correspondence to be focused. **3**

GROUP COMMUNICATION - Group discussions and role-plays. **4**

LISTENING - Exercises using language laboratory. **1**

TEXT BOOKS

1. Monograph prepared by the Faculty, Department of English, in 2012.

REFERENCES

1. Dorothy E Zemach and Lynn Stafford Yilmaz, "Writers at Work**:** The Essay", Cambridge University Press, Cambridge, 2008.
2. AyshaViswamohan, "English for Technical Communication", Tata Mc-Graw – Hill Publishing Company Ltd., New Delhi, 2008.
3. Mark Ibboston,"Cambridge English for Engineering", Cambridge University Press, UK, 2011.
4. E. Suresh Kumar and P. Sreehari, "A Handbook for English Language Laboratories", Osmania University, Hyderabad, 2011.

17BTCS105: FUNDAMENTALS OF COMPUTER PROGRAMMING 3 0 0 3

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

FUNDAMENTALS OF COMPUTER 9

Computer Architecture, hardware, software. Introduction to System Software- Operating System, Editor, Complier, Assembler, Linker, Loader. Problem solving using computers, Introduction to computer programming, Introduction to program planning tools- algorithm, flowcharts, pseudo codes, Software Development Life Cycle, Introduction to open source operating systems and programming languages, Introduction to program development environments: BOSS and GCC. Introduction to types of programming languages: Machine-level, Assembly level and high level languages, scripting languages, natural languages

INTRODUCTION AND BASICS OF C 9

Basics of structured programming, History and basic features of C, basic syntax, structure of a C program, declarations, constants, Variables, variable types: local, global, data types, character set, keywords and comments, writing basic 'C' program, header files, type casting. Operators and Decision Control: Operators and expressions, conditional expressions. Operators- assignment, arithmetic, relational, logical, increment and decrement, precedence and associativity of operators, type conversions, Input and Output functions- scanf and printf.

DECISION CONTROL & ARRAYS IN 'C' 9

if, if-else, nested if-else, cascaded if-else and switch Statement, loop control structures: for, while, do-while loops, break and continue. Arrays in 'C': Concept, declaration, initialization, assessing elements, operations, Multidimensional array Strings in 'C'**:** Concept, declaration, initialization and string manipulation functions, library functions

FUNCTIONS& POINTERS IN 'C' 9

Definition, function call, call by value and call by reference, return statement, standard library functions and user defined functions, passing array as function parameter, recursion, function using pointer. Pointers in 'C': Concept**,** address operators, pointer variable declaration, pointer assignment, pointer initialization

STRUCTURES, FILE HANDLING AND MEMORY MANAGEMENT 9

Introduction to structure and enumeration, declaration of structure, initialization, declaration of structure variable and accessing members, declaration of union and accessing members, array of structure, typedef. File I/O: Open, Close, Read and write operations on files, Command line arguments, Basics of memory management: functions for allocation and de-allocation of memory (malloc, free)

TEXT BOOKS

1. Kernighan B W and Ritchie D M, "C Programming Language (ANSI C)", Prentice Hall of India Private Limited, New Delhi, 2010

REFERENCES

1. Herbert Schildt, "C – The Complete Reference", Tata McGraw Hill Publishing Company, Fourth Edition, New Delhi, 2010.
2. Pradip Dey and Manas Ghosh," Programming in C", Oxford University Press, New Delhi, 2009.
3. Deitel and Deitel, "C How to Program", Pearson Education, sixth Edition, New Delhi, 2011.
4. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.

17BTEC106: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

D.C. CIRCUITS AND A.C. CIRCUITS 9

Classification of network, Ohm's law, KCL, KVL, network simplification using star-delta / delta-star transformations mesh analysis, network theorems (Superposition, Thevenin, Norton, Maximum power transfer theorems).

Generation of alternating voltages, fundamentals of ac circuits, behaviour of pure R, L, C in ac circuits, concept of phasor and its representation ,series RL, RC and RLC circuits and parallel circuits, series and parallel resonance, concept of Impedance and admittance, power triangle and power factor.

ELECTRICAL MACHINES 9

(a) Electromechanical energy conversion: Types of ac and dc motors,Characteristics and applications, ac generators.Single phase transformer: Construction, principle of working, emf equation, ratios, regulation, losses, efficiency, condition for maximum efficiency, O.C & S.C. test, introduction to instrument transformer and auto-transformer.

(b) Poly-Phase A.C. circuits: Concept of three phase supply, phase sequence, balanced and unbalanced load, voltages, currents and power relations in three phase balanced star and delta connected loads with phasor diagrams.

SEMICONDUCTOR, DIODES AND DIODE CIRCUITS 9

Metals, semiconductors and insulators, Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors.

PN Junction diode : characteristic and analysis, Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's), Varactor diodes and tunnel diodes, BJT, characteristics and biasing circuits.

Rectifiers: Half wave, full wave and Bridge rectifier circuits and their analysis.

DIGITAL ELECTRONICS 9

Introduction, digital signals, Basic digital gates and universal gates: AND, OR, NOR, NOT, NAND, EX-OR, EX-NOR, Boolean algebra, Optimized implementation of logic functions: K map, minimization of SOP, POS , Arithmetic circuits, Multiplexer, De-multiplexer, Flip flops: Basic latch, Gated SR, JK flip flop, D flip flop, T flip flop, Shift registers, Counters, Introduction to microprocessors and micro-controllers and their applications.

TRANSDUCERS 9

Definition, classification, Selection criteria, Sources of error for parameter under measurement, Transducer specifications, test condition & operating conditions, Ultrasonic transducer, Temperature transducer, Linear variable differential transducer, Load cell, Flow measurement, Strain gauge, Elastic transducers.

Application of transducers: Digital thermometer, Electronics weighing machine

REFERENCES

1. Vincent Del Toro, "Electrical Engineering Fundamentals", PHI, 2nd edition, 2011.
2. V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, (Revised Edition)
3. Edward Hughes "Electrical and Electrical Technology", Pearson Education (Tenth edition)
4. Paul Horowitz, "Art of Electronics", Cambridge LPE.
5. Allen Mottershed, "Electronics Devices and Circuit an Introduction", PHI.
6. C.D.Jhonson, "Process control and instrumentation", PHI (Fifth edition).
7. H. S. Kalsi, "Electronics Instrumentation" Tata McGraw Hill.
8. Nagrath And Kothari, "Electrical Machines", Tata McGraw Hill.

17BTME107: ENGINEERING GRAPHICS 3 014

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

ORTHOGRAPHIC PROJECTIONS & ISOMETRIC PROJECTIONS 9

Reference planes, types of orthographic projections – First angle projections, Methods of obtaining orthographic views by First angle method,Sectional orthographic projection.

Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, Construction of Isometric view from given orthographic views.

PROJECTIONS OF LINES & PLANES 9

Introduction of points, lines & planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, Types of line, traces, inclinations, and true lengths of the lines ,Introduction of perpendicular and oblique planes, Different cases of plane figures (of different shapes) making different angles with one or both reference planes, Obtaining true shape of the plane figure.

PROJECTION OF SOLIDS & DEVELOPMENT OF SOLID 9

Introduction of solids, different types of solids, Projection of solid inclined to one and both references plane, Simple cases when solid is placed in different positions, Axis, faces and lines lying on the faces of the solid making given angles, Development of all type of prisms, cylinders and cones.

CURVES USED IN ENGINEERING PRACTICE 9

Conic section- like ellipse, parabola & hyperbola by diretrix focus method rectangular Archimedean Spiral, Helix on cylinder, involutes of circle, Cycloid of circle.

DRAFTING TECHNOLOGY AND FREEHAND SKETCHING 9

Layout of drawing sheets, sizes of drawing sheets Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension, Symbols used on drawing, surface finish symbols, welding symbols, Free hand sketching -- FV and TV of standard machine parts, Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints.

TERM WORK:

Five A2 (594X420mm) (Half imperial) size drawing sheet as detailed below:

Sheet No. 1 : ORTHOGRAPHICS & ISOMETRIC VIEW : Two problems on orthographic view & Isometric views.

Sheet No. 2 : PROJECTIOINS OF LINES & PLANES :Two problems on lines & planes.

Sheet No. 3 : PROJECTION OF SOLIDS : Two problems on solids.

Sheet No. 4 : ENGINEERING CURVES: To draw any four curves mentioned in the detailed syllabus.

Sheet No. 5 : FREEHAND SKETCHING:Four problems on machine parts and joints

TEXT BOOKS

1. N. D. Bhatt, “Elementary Engineering Drawing”, Chartor Publishing house, Anand, India.
2. D. N. Johle, “Engineering Drawing”, Tata Mcgraw-hill Publishing Co. Ltd.
3. K. L. Narayana and P. Kannaiah,”Textbook on Engineering Drawing”,Scitech Pub, 2010.

REFERENCES

1. P. S. Gill, “Engineering Graphics”, S K Kataria and Sons, Reprint 2013 edition (2013)
2. N. D. Bhatt, “Machine Drawing”, Chartor Publishing House, Anand, India.
3. Warren J. Luzzader, “Fundamentals of Engineering Drawing”, Prentice Hall of India, New Delhi.
4. Fredderock E. Giesecke, Alva Mitchell & others, “Principles of Engineering Graphics”, Maxwell McMillan Publishing.

17BTPY111: PHYSICS LABORATORY 0021

CA : 40 Marks FE : 60 Marks No. of Total Hours = 15

LIST OF EXPERIMENTS (ANY EIGHT EXPERIMENTS)

1. Determination of velocity of ultrasonic waves in liquid using ultrasonic interferometer
2. (a)Measurement of sound pressure level
   (b)Determination of absorption coefficient of sound of given material
3. Determination of wavelength of monochromatic light source using Newton's Ring
4. Determination of wavelength of spectral lines by using a plane diffraction grating
5. Verification of Malus law for polarization of light
6. Determination of wavelength and beam divergence of He Ne laser beam
7. Study of V-I characteristics of Solar Cell
8. Determination of numerical aperture of an optical fiber
9. Working of a Fuel Cell.

17BTCS112: C PROGRAMMING LABORATORY **0042**

CA : 40 Marks FE : 60 Marks No. of Total Hours = 30

List of Assignments:

1. Write a C program to swap two numbers with and without using third variable.
2. Write a C Program to accept Principle Amount, Rate of Interest, and Duration and calculate Simple & Compound Interest.

OR

3. An Employee is offered 105% DA, 20% HRA on Basic Salary of Rs.15,000/-, Write a C program to calculate her/ his Gross salary.
4. Write a C program to accept the length of three sides of a triangle and to test and print the type of triangle as equilateral, isosceles or right angled or none.
5. Write a C program to display prime numbers between 1to100.
6. Write a C Program to find mean and standard deviation of an array.

OR

7. Write a C program to accept n numbers using an array and sort them in ascending order.
8. Write a C program to perform addition, subtraction and multiplication of two 3x3 matrices.
9. Write a C program to perform following string operations using switch-case:
    a. Total number of characters in the string
    b. Total number of vowels in the string
    c. Total number of occurrence of particular character in the string

OR

10. Write a C program to check whether given string is palindrome or not.
11. Write a C program to carry out following operations on strings using library functions
    a) To concatenate a string B to string A
    b) To find the length of a given string
    c) To compare two strings A and B
    d) To copy a string B to another string A
12. Write a C program to create simple calculator using function call by value and call by reference.
13. Write a C program to compute the factorial of the given positive integer using recursion.
14. A college library is maintaining records of books. Each book is having ISBN, Name of Book, Author, Price and Number of copies. Write a C program using structure to perform following operations:
    a. Add a new Book
    b. Delete a Book
    c. Modify Book Information
    d. Display all books record
15. Write a C program to copy array A to B using pointer.

OR

16. Write a C program to search an element in an array using pointer.
17. Write a C program to find whether given number is perfect square or not. Take input using command line argument.
18. Write a C program to copy contents of one file to another file.

17BTME113: ENGINEERING PRACTICES **0021**

CA : 50 Marks Total No of Hours : 15

JOB: ANY TWO JOBS OF THE FOLLOWINGS.

i. Carpentry shop

Any marketable job involving at least one joint like T-Joint, Mortise and Tennon joint, Dovetail joint.

Assignment on

- Study of joints in door panels, wooden furniture

ii. Tin Smithy Shop

Any one sheet metal manufacturing component like tray, scoop, funnel etc.

Assignment on :

- Write a procedure on manufacturing of any one job.

iii. Machine shop

Simple turning operations on lathe machine at least six operations.

Turning - Facing, chamfering and step turning, Grooving, Taper turning and knurling

Assignment on

- Study of construction features of Head stock, Tail stock, Apron gear box.

iv. Welding shop

Any two types of joints like T-Joint, but joint, lap joints etc.

Assignment on

- Study on types of joints used in Industrial trusses

.

DEMONSTRATION ON

(a) Smithy operations like the production of 'S' Type hook.
(b) Foundry operation like mould preparation for flange.

ASSIGNMENT

1. Safety in workshop e.g fire safety, electric shock, machine protection etc.
2. Write a procedure of any one job manufacturing.
3. To Study and practice the various operations that can be performed in Lathe, drilling, milling machines etc.

.

SEMESTER-II

17BTMT201: DIFFERENTIAL EQUATIONS AND CALCULUS 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

DIFFERENTIAL EQUATIONS

9

Definition, Order and Degree of D.E. Formation of DE.Solution of variables separable DE.Exact DE. Linear and reducible to these types

APPLICATION OF DIFFERENTIAL EQUATION 9

Application of DE to Orthogonal trajectories. Newton's law of cooling , Kirchhoff's law of electrical circuits, Motion under gravity, Rectilinear motion, Simple Harmonic motions, One Dimensional conduction of heat , Chemical Problem.

PARTIAL DIFFERENTIATION AND APPLICATIONS 9

Partial Derivatives, Euler's Theorem on Homogeneous functions, Implicit Function, Total derivatives, Change of Independent Variables. Jacobian and their applications, Maxima and Minima of function of two variables, Lagrange's undermined multipliers.

INTEGRAL CALCULUS AND TRACING OF CURVES 9

Differentiation under integral sign, Error Function, Cartesian, polar and parametric curves. Rectification of curves.

MULTIPLE INTEGRATION 9

Double and triple Integrations, Applications to area, Volume, mean and root mean square values. Mass, centre of gravity and M.I.

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, 10th edition .
2. Maurice D. Weir, Joel Hass, Frank R. Giordano, "Thomas' Calculus", Pearson Education, 12th edition, .

REFERENCES

1. Calculus for Scientists and Engineers by K.D Joshi, CRC Press.
2. A Course in Calculus and Real Analysis (1st edition) by SudhirGhorpade and BalmohanLimaye, Springer-Verlag, New York.
3. Advanced Engineering Mathematics by C.R. Wylie, McGraw Hill Publications, New Delhi.
4. Advanced Engineering Mathematics (7th edition) by Peter V. O' Neil, Thomson. Brooks / Cole, Singapore.
5. Differential Calculus by Shanti Narayan, S. Chand and company, New Delhi
6. Differential Equation with Applications By George Simmons

17BTCH202: ENGINEERING CHEMISTRY 3 0 0 3

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

WATER TREATMENT AND GREEN CHEMICAL PROCESSES 9

Water quality parameters -Hardness of water - estimation of hardness (EDTA method) COD/BOD – determination Alkalinity - determination - disadvantages of using hard water in boilers: Scale, sludge formation - prevention - Internal conditioning and External conditioning - desalination – reverse osmosis and electro dialysis - domestic water treatment.Principles of green chemistry, environmentally benign synthetic methods.

ORGANIC POLYMERS 9

Classification of polymers - types of polymerization reactions - mechanism of polymerization, properties of polymers - strength, dissolution, elasticity and crystallinity -Preparation and properties of important resins: Polystyrene, PVC, PMMA, Polyester, Teflon, Bakelite and Epoxy resins –Elastomers, Engineering polymers, compounding of plastics -moulding methods - injection, extrusion, Fibre reinforced plastics.

FUELS AND COMBUSTION 9

Types of fuels, calorific value and its determination, Solid fuel-Proximate and ultimate analysis of coal, Liquid fuel-Petroleum, power alcohol & biodiesel, Gaseous fuels, fuel cells & their types, Combustion mechanism.

CORROSION AND ITS CONTROL 9

Dry and wet corrosion, mechanism of corrosion, control of corrosion-cathodic protection, anodic protection, surface conversion techniques, Metallic and non-metallic coatings.

SOLID STATE CHEMISTRY 9

Introduction to solid state chemistry, Miller indices, Basic crystal structure, Bravais space lattices, unit cell, Radius ratio, Calculation of density of unit cell, defects- Frenkel, Schottky, Bragg's law & X-ray diffraction technique.

TEXTBOOKS

1. S. S. Dara, "A Textbook of Engineering Chemistry", S.Chand& Company Ltd.,15th edition, New Delhi.
2. O.P.Vermani&A.K.Narula, "Applied Chemistry Therory& Practical",.

REFERENCES

1. H. V. Keer, "Principles of Solid State", Wiley Publication, .
2. V. Gowarikar, N.V.Vishwanathan and JaydevShreedhar, "Polymer Science", Wiley Publications.
3. H.H. Uhlig and R.W. Revie, "Corrosion and its Control", Wiley Publications,4th Edition,.
4. A. I. Vogel, "A Textbook of Quantitative Inorganic Analysis", Longman Publication Ltd, 4th Edition, 2000.
5. Shashi Chawla, "Essentials of Experimental Engineering Chemistry", DhanpatRai& Co. Delhi, 2001.

17BTCE203: MATERIALS ENGINEERING 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

ELECTRONIC AND PHOTONIC MATERIALS 9

Electronic Materials: Fermi energy and Fermi–Dirac distribution function – Variation of Fermi level with temperature in intrinsic and extrinsic semiconductors – Hall Effect – Superconducting Materials: Normal and High temperature superconductivity – Applications.
Photonic Materials: LED – LCD – Photo conducting materials – Photo detectors

CRYSTAL STRUCTURE 9

Crystal geometry and Crystal Imperfections: Unit Cell, Crystal structure, Bravais lattice, atomic packing, coordination number, radius ratio, crystal structures of metallic elements, crystal directions and planes, Miller indices, Polymorphism or Allotropy. Crystal structure and correlated properties. Diffusion processes; Crystallization: Mechanism of crystallization

MAGNETIC AND DIELECTRIC MATERIALS 9

Magnetic Materials: Classification of magnetic materials based on spin – Hard and soft magnetic materials – Magnetic bubbles and their applications – Magnetic thin films
Dielectric Materials: Polarization mechanisms in dielectrics – Frequency and temperature dependence of polarization mechanism – Dielectric loss –Piezoelectric, pyro electric and ferroelectric materials and their applications.

MATERIALS CHARACTERIZATION 9

X-ray diffraction, Principles of Scanning Electron Microscope(SEM) , Tunnelling Electron Microscope (TEM), Atomic Force Microscopy(AFM), Fourier transform Infrared spectroscopy (FTIR) – Ultraviolet and visible spectroscopy (UV-Vis) – Thermo gravimetric Analysis (TGA) – Differential Thermal Analysis (DTA).

MODERN ENGINEERING MATERIALS 9

Modern Engineering Materials: Smart materials – Chromic materials (Thermo, Photo and Electro) – Rheological fluids – Metallic glasses – Ceramics
Bio-materials: Classification of bio-materials (based on tissue response) –Comparison of properties of some common biomaterials – Biosensor.
Nanomaterials: fullerenes – Graphene – Carbon nanotubes- Potential uses of nanomaterials in electronics, robotics, computers, sensors, sports equipment, Medical applications of nanomaterials.

TEXT BOOKS

1. William D Callister ,"Material Science and Engineering", John Wiley and sons, New York, 2013.
2. Thiruvadigal.J.D, Ponnusamy,S..Sudha.D. and Krishnamohan M., “Materials Sciences”, Vibrant Publication, Chennai, 2013.
3. Rajendran.V, “Materials Science”,Tata McGraw- Hill,New Delhi,2011.

REFERENCES

1. Rolf.E. Hummel, “Electronic Properties of Materials”, 4th ed., Springer, New York, 2011.
2. Dennis.W. Prather, “Photonic Crystals: Theory, Applications, and Fabrication”, John Wiley & Sons, Hoboken, 2009.
3. James R. Janesick, “Scientific Charge-Coupled Devices”, Published by SPIE - The International Society for Optical Engineering, Bellingham, Washington, 2001.
4. SeverialDumitriu, “Polymeric Biomaterials” Marcel Dekker Inc, CRC Press, Canada 2001.
5. T.Pradeep, “A Text Book of Nanoscience and Nanotechnology”, Tata McGraw Hill, New Delhi, 2012.
6. Sam Zhang, “Materials Characterization Techniques”, CRC Press, 2008.

17BTCS204: PRINCIPLES OF DIGITAL SYSTEMS 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

NUMBER SYSTEMS 9

Review of binary, decimal, octal and hexadecimal number systems – Interconversion between number systems- Number representations: signed, unsigned, fixed point, floating point numbers- One's complement - Two's complement addition, subtraction- Computer codes: BCD, Gray code - Error detection and correction codes - parity codes- Hamming codes.

COMBINATIONAL AND SEQUENTIAL CIRCUITS 9

Implementation of combinational circuits,Flip-flops- Types- latches - Level triggering, edge triggering- Master slave configuration – Counters: Asynchronous / Ripple, Synchronous , Modulo- n –Design procedure – Shift registers - Ring counter - Johnson counter.

LOGIC FAMILIES 9

Introduction to different logic families; TTL inverter - circuit description and operation; CMOS inverter - circuit description and operation; Structure and operations of TTL and CMOS gates; Electrical characteristics of logic gates – logic levels and noise margins, fan-out, propagation delay, transition time, power consumption and power-delay product

INTRODUCTION TO COMPUTER ARCHITECTURE 9

Evolution of computer architecture, The Von Neumann Architecture, Harvard Architecture, Introduction to ALU, System Bus, Timing and Control Circuitry, I/O Devices.

MEMORY ORGANIZATION 9

Introduction, Classification and characteristics of memories–RAM organization–Write operation–Read operation–Memory decoding-ROM organization–Types of ROM.

TEXT BOOKS

1. Morris Mano M, "Digital Design ", Prentice-Hall of India, New Delhi, 2006.
2. Floyd T L, "Digital Fundamentals ", Pearson Education, Eighth Edition, New Delhi, 2009.

REFERENCES

1. Tokheim R L., "Digital Electronics - Principles and Applications ", Tata McGraw Hill Publishing Company, New Delhi, 2001.
2. William I Fletcher, "An Engineering Approach to Digital Design ", Prentice-Hall of India, New Delhi, 1996.
3. Morris Mano, "Computer System Architecture", Prentice Hall of India, Third Edition, New Delhi, 2006.

17BTCS205: OBJECT ORIENTED PROGRAMMING IN C++ 3 0 0 3

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

OBJECT ORIENTED PARADIGM 9

Evolution of Programming Paradigm, Structured versus object oriented development, Popular OOP languages-Introduction to C++,Java, Python, Merits and demerits of OO methodology

ELEMENTS OF OBJECT ORIENTED PROGRAMMING 6

Objects, classes, encapsulation, data abstraction, Inheritance, polymorphism

CLASSES AND OBJECTS 9

Class specification, Class objects-static objects, dynamic objects, Accessing Class members, Access specifiers-public,private,protected, Defining Member functions, Accessing Member functions within the Class, Data hiding (Encapsulation), Empty classes, Constant parameters and Member functions, Friend functionConstructors and Destructors:Class constructors: parameterized constructors, constructor overloading, Constructors with default arguments, Destructors, Class design steps.

INHERITANCE 9

Inheritance example, Main class and derived class, Protected data, Use of Inheritance, Constructors and destructors in derived class, Single inheritance, Multiple inheritance, Multi-level inheritance, Abstract classes

POLYMORPHISM 9

Polymorphism example, Demonstrating Polymorphic behavior, Operator overloading-overloading unary operators and overloading binary operators, Rules for overloading operators, Function overloading, Virtual functions.

TEXT BOOKS

1. Venugopal K R , Rajkumar Buyya and Ravishankar T, " Mastering C++", Tata McGrawHill Publishing Company, New Delhi, 2009.

REFERENCES

1. Bjarne Stroustrup, "Programming: Principles and Practice using C++", Addison-Wesley, Massachusetts, USA, 2008.
2. P. Deitel and H. Deitel, "How to Program JAVA", Pearson,9th edition,
3. Herbert Schildt, "C++: The Complete Reference", Fourth Edition Tata McGraw Hill Publishing Company, New Delhi, 2011 8
4. Deital & Deital, "C++: How To Program", Seventh Edition, PHI Learning, New Delhi, 2010.
5. Ashok N Kamthane, "Object Oriented programming with ANSI & Turbo C++", Pearson Education, New Delhi, 2009

17BTEG206: PROFESSIONAL COMMUNICATION **3024**

CA : 100 Marks No. of Total Lectures = 40 Hours

LANGUAGE TRAINING, SOFT SKILLS (4+4+4+4)

Reading Comprehension: Critical, inferential, analytical, and interpretative Reading tasks – reading texts from different genres- assessment components modelled on IELTS, TOEFL, & GRE examinations.

L**anguage Focus – Writing:** Context based Syntax, vocabulary, and special language functions like idioms and phrases, connectives, style, Tone, and emphasis techniques- academic and professional writing- describing visual information like graph/table/chart/diagram- drafting letters, emails, mini- reports

Professional Communication –Oral Skills: Principles of group communication, interviewing, and making presentations- group discussions, role plays, mock interviews- talking about some visual information- giving and receiving instructions.

Soft Skills: Intrapersonal communication- developing self-concept, handling Perceptual differences, Demonstrating Positive attitude, body language Interpersonal Skills- Team spirit, Body Language, Business etiquette, Negotiation skills.

SEMINAR PRESENTATION AND TECHNICAL REPORT WRITING (12+12)

Writing Coherent Project Report: Overview structure of reports, gathering informations - synopsis / abstract - title – headings – table of contents – list of figures – list of tables – list of appendices – chapters – structured paragraphs – inferences, conclusions – figures – tables – flow charts – complete design (headers and footers).- **Plagiarism**.
Each student will be required to submit a technical report based on the guidelines provided by the department.

Project Presentation: Each student will be required to make one technical presentation for minimum 15 minutes duration in this course. Individual topics will be assigned to the students by the department.

REFERENCES

1. Monograph prepared by Faculty, Department of English, 2013.
2. Sureshkumar E. ,Sreehari P. and Savithri J. ,"Communication Skills and Soft Skills: An Integrated Approach", Dorling Kindersley (India) Pvt. Ltd., India, 2011.
3. Roger Gower, "Real Writing with Answers", Cambridge University Press, Cambridge, 2008.
4. Sheryl Lindell-Roberts, "Technical Writing for Dummies", Hungry Mills, Inc, 2001.
5. Arora V. N. and Laxmi Chandra, "Improve Your Writing", Oxford University Press, New Delhi,2008.

17BTCH211: CHEMISTRY LABORATORY 0021

CA : 40 Marks FE : 60 Marks No. of Total Hours = 15

LIST OF EXPERIMENTS (ANY EIGHT EXPERIMENTS)

1. To determine the hardness of water by EDTA Method.
2. To determine Chemical Oxygen Demand of a water sample.
3. To determine average molecular weight of a polymer by end-group analysis.
4. To synthesis and characterize polystyrene.
5. To perform proximate analysis of coal.
6. To determine gross calorific value of a fuel sample by calorimetry method.
7. To perform electroplating of nickel on copper.
8. To study the corrosion of a metal.
9. To perform volumetric analysis using a pH meter.
10. To determine density of a liquid fuel.

17BTCS212: C++ PROGRAMMING LABORATORY 0042

CA : 40 Marks FE : 60 Marks No. of Total Hours = 30

Assignment List:

1. Implement using class with arrays. Consider a shopping list of items for which we place an order with a dealer every month. The list includes details such as code number and price of each item. Write a program to perform following operations:
    a. Adding an item in list
    b. Deleting item from list
    c. Printing total value of order
2. Write a program to define a class to represent Bank account. Include the following data members: Name of depositor, Account number, Type of account, Balance amount in the account and following member functions: Assign initial values, Deposit an amount, Withdraw an amount and Display name and balance.
3. Write a program to implement a class Complex which represents the Complex Number data type. Implement the following operations:
    a. Constructor (including a default constructor which creates the complex number (0+0i).
    b. Overloaded operator+ to add two complex numbers.
    c. Overloaded operator* to multiply two complex numbers.
4. Write a program to compute area of triangle and circle by overloading the area function.
5. A bank maintains savings and current account for customer. Savings account provides compound interest and withdrawal facility and Current account provides cheque book, but no interest and it has to maintain minimum balance to avoid service charge imposed.
   Write a program to create derived classes for Savings and Current account from Account class and include following member functions:
    a. Accept deposit from customers and update balance
    b. Display the balance
    c. Compute and deposit interest
    d. Permit withdrawal and update the balance
    e. Check for minimum balance, impose penalty and update balance
6. Create employee bio-data using following classes i) Personal record ii))Professional record iii) Academic record Assume appropriate data members and member function to accept required data & print bio-data.
7. Develop an object oriented program to create a database of student information system containing the following information: Name, Roll number, Class, division, Date of Birth, Blood group, Contact address, telephone number, driving license no. etc. Construct the database with suitable member functions for initializing and destroying the data (use of constructor and Destructor).
8. Create two classes DM and DB which stores values of distances. DM stores distances in meters and centimeters. DB stores in feet and inches. Write a program to read values for the class objects and add one object of DM with another object of DB. Use friend function to carry out addition. Object that stores result may be DM object or DB object depending on units of result.
9. Write C++ Program with base class convert declares two variables, val1 and val2, which hold the initial and converted values, respectively. It also defines the functions getinit( ) and getconv( ), which return the initial value and the converted value. These elements of convert are fixed and applicable to all derived classes that will inherit convert. However, the function that will actually perform the conversion, compute ( ), is a pure virtual function that must be defined by the classes derived from convert. The specific nature of compute ( ) will be determined by what type of conversion is taking place.
10. Design and develop the Tic-Tac-Toe Game using C++.

Semester III

17BTMT301: Integral Calculus & Transform Techniques 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

Linear Differential Equation (9)

Review of first order differential equations, linear differential equations, and homogeneous higher order linear differential equations, non-homogeneous higher order linear differential Equations with constant coefficients (method of undetermined coefficients and method of variation of parameters).

Vector Calculus (9)

Vector differentiation, gradient, divergence and curl, line and surface integrals, path Independence, statements and illustrations of theorems of Green, Stokes and Gauss.

Transform Technique (9)

Fourier Transform-Definition and Problems, Inverse Fourier Transform, Fourier integral representation Z Transform-Definition, standard properties, Transforms of standard sequence and their Inverses. Solution of simple differential equation.

Complex Variables (9)

Function of complex variable, Analytic Functions, C-R equations, Conformal mapping, bilinear transformation, Cauchy's Theorem, Cauchy Integral formula.

Numerical Techniques (9)

Picard's methods, Taylor series method, Euler's method, modified Euler's method. Runge- Kutta 4th Order method. Predictor –Corrector methods-Milne's method, Newton-Cortes Formula. Trapezoidal Rule. Simpson One –Third Rule, Simpson Three-Eight Rule.

Text Books:

- Maurice D. Weir, Joel Hass, Frank R. Giordano, "Thomas' Calculus (12th edition)", Pearson Education.
- Erwin Kreyszig, "Advanced Engineering Mathematics (10th edition)", Wiley eastern Ltd.
- Ronald E, Walpole, Sharon L. Myers, Keying Ye, "Probability and Statistics for Engineers and Scientists (8th Edition)", Pearson Prentice Hall, 2007

Reference Books:

- K.D Joshi, "Calculus for Scientists and Engineers", CRC Press.
- Sudhir Ghorpade and Balmohan Limaye, "A Course in Multivariate Calculus and Analysis", Springer Science and Business Media.
- George Simmons, "Differential Equations with Applications and Historical notes", Tata Mc-Graw Hill publishing company Ltd, New Delhi.
- C.R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publications, New Delhi.
- Peter V. O' Neil, "Advanced Engineering Mathematics (7th edition)", Thomson.Brooks /Cole, Singapore.
- Michael D. Greenberg, "Advanced Engineering Mathematics (2nd edition)", Pearson Education
- S. P. Gupta, "Statistical Methods", S. Chand & Sons, 37th revised edition, 2008

- William W. Hines, Douglas C. Montgomery, David M. Goldsman, "Probability and Statistics for Engineering", (4th Edition), Willey Student edition, 2006.

17BTCS302: Data Structures 4 0 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. INTRODUCTION TO ALGORITHM AND DATA STRUCTURES 9

Algorithms- Problem Solving, Introduction to Algorithms, Characteristics of algorithms, Algorithm design tools: Pseudo code and flowchart, Analysis of Algorithms, Complexity of algorithms- Space complexity, Time complexity, Asymptotic notation- Big-O, Theta and Omega, standard measures of efficiency. Data Structures- Data structure, Abstract Data Types (ADT), Concept of linear and Non-linear, static and dynamic, persistent and ephemeral data structures, and relationship among data, data structures, and algorithms, From Problem to Program, Algorithmic Strategies- Introduction to algorithm design strategies- Divide and Conquer, and Greedy strategy.

II. LINEAR DATA STRUCTURES USING SEQUENTIAL ORGANIZATION 9

Sequential Organization, Linear Data Structure Using Sequential Organization, Array as an Abstract Data Type, Memory Representation and Address Calculation, Inserting an element into an array, Deleting an element, Multidimensional Arrays, Two-dimensional arrays, n- dimensional arrays, Concept of Ordered List, Single Variable Polynomial, Representation using arrays, Polynomial as array of structure, Polynomial addition, Polynomial multiplication, Sparse Matrix, Sparse matrix representation, Sparse matrix addition, Transpose of sparse matrix, String Manipulation Using Array, Case Study- Use of sparse matrix in Social Networks and Maps.

III. LINKED LISTS 9

Concept, Comparison of sequential and linked organizations, Primitive operations, Realization of Linked Lists, Realization of linked list using arrays, Dynamic Memory Management, Linked list using dynamic memory management, Linked List Abstract Data Type, Linked list operations, Head pointer and header node, Types of linked list- Linear and circular linked lists, Doubly Linked List and operations, Circular Linked List, Singly circular linked list, Doubly circular linked list, Polynomial Manipulations - Polynomial addition, Multiplication of two polynomials using linked list. Generalized Linked List (GLL) concept, representation of polynomial and sets using GLL. Case Study- Garbage Collection.

IV. STACKS & QUEUES 9

Stacks- concept, Primitive operations, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization, stack operations, Multiple Stacks, Applications of Stack- Expression Evaluation and Conversion, Polish notation and expression conversion, Need for prefix and postfix expressions, Postfix expression evaluation, Linked Stack and Operations. Recursion- concept, variants of recursion- direct, indirect, tail and tree, Backtracking algorithmic strategy, use of stack in backtracking, Case Study Concept, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Advantages of using circular queues, Multi-queues, Deque, Priority Queue, Array implementation of priority queue, Linked Queue and operations, Case study- Priority queue in bandwidth management, 4 Queens problem, Android multiple tasks/multiple activities and back stack.

V. SEARCHING AND SORTING 9

Searching- Search Techniques, Sequential search, variant of sequential search- sentinel search, Binary search, Fibonacci search, Case Study- Use of Fibonacci search in non-uniform access memory storage and in Optimization of Unimodal Functions, Sorting- Types of sorting-Internal and external sorting, General sort concepts-sort order, stability, efficiency, number of passes, Bubble sort, Insertion sort,

Selection sort, Quick sort, Shell sort, Bucket sort, Radix sort, Comparison of All Sorting Methods, Case Study- Timsort as a hybrid stable sorting algorithm.

TEXT BOOKS

1. Brassard &Bratley, ―Fundamentals of Algorithmics‖, Prentice Hall India/Pearson Education, ISBN 13-9788120311312.
2. Horowitz and Sahani, ―Fundamentals of Data Structures in C++‖, University Press, ISBN 10:0716782928
3. Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in C++‖, Wiley publication,ISBN-978-81-265-1260-7

REFERENCES

1. R. Gillberg, B. Forouzn, ―Data Structures: A Pseudo code approach with C‖, Cenage Learning, ISBN 9788131503140
2. Horowitz, Sahani and Rajshekaran, ―Fundamentals of Computer Algorithms‖, University Press, ISBN-13, 9788175152571.
3. YedidyahLangsam, Moshe J Augenstein, Aron M Tenenbaum, ―Data Structures using C and C++‖ Pearson Education, ISBN 81-317-0328-2.
4. A Michael Berman, ―Data Structures via C++: Objects by Evolution‖, Oxford University Press,ISBN:0-19-510843-4
5. M. Weiss, ―Data Structures and Algorithm Analysis in C++‖, 2nd edition, Pearson Education, 2002,ISBN-81-7808-670-0

17BTCS303: COMPUTER ORGANIZATION AND ARCHITECTURE 4 0 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. COMPUTER EVOLUTION 9

Evolution (a brief history) of computers ,Designing for performance, System Architectures – Microprocessor, Micro controller and parallel processing, Von-Neumann Architecture, Data flow architecture, Computer Components, Interconnection Structures, Bus Interconnection, Floating point representation and operations- IEEE standard, arithmetic operation, Booths multiplication, Division algorithm: restoring and non-restoring division.

II. PROCESSOR ORGANIZATION 9

Processor Basics: CPU organization, CPU Bus Organization: Central BUS, Buses on periphery, Additional features: RISC and CISC types representative commercial , Coprocessors , Instruction set –Addressing modes formats Machine Instruction characteristics, types of operands, types of operations, Instruction formats, Processor organization, Register Organization, **Case study**- 8086 microprocessors,

III. MEMORY ORGANIZATION 9

Internal memory: Concept of memory, size, unit, and its organization, computer memory systems overview, hierarchy of memory in computer, memory device characteristics, random access memory, serial access memory, multilevel memories, address translation, memory allocation, advanced DRAM organization.
Cache memory: – concept of cache, performance of cache, types of cache architectures, memory mapping techniques, and page replacement policies. Case Study- Pentium 5 cache organization.
External memory: Construction and working principles of magnetic memories, magnetic disk, hard disk, magnetic tape, optical memory.

IV. I/O ORGANIZATION 9

I/O Devices: Role of I/O devices in computer, overview of commonly used I/O devices such as keyboard, VDU, mouse. External devices, I/O module and its organization, various data transfer techniques – Programmed I/O, Interrupt driven I/O, Direct memory access (DMA), I/O channels and I/O Processors, mapped I/O and I/O mapped I/O, **Case Study-** DMA Controller**.**

V. ALU AND CONTROL DESIGN ORGANIZATION 9

Data path design: Concept of data processing unit, Designing aspects related to arithmetic operations, combinational ALU and sequential ALU, advanced ALU, Pipeline processing, Case study of Intel Nehalem organization Control Circuit Design: Basic concepts related to control unit, types and design of control circuit such as micro-programmed control unit, and hard wired control unit, microinstruction formats, microinstruction sequencing, microinstruction execution, applications of microprogramming.

TEXT BOOKS

1. Computer Architecture and Organization, John P Hays, 3nd Edition, McGraw-Hill Publication, 2001,ISBN 0071004793
2. W. Stallings, ―Computer Organization and Architecture: Designing for performance‖, Pearson Education/ Prentice Hall of India, 2003, ISBN 978-93-325-1870-4, 7th Edition**.**

REFERENCES

1. Zaky S, Hamacher, "Computer Organization", 5nd Edition, McGraw-Hill Publications, 2001, ISBN 0071122184.
2. Miles Murdocca and Vincent Heuring, ―Computer Architecture and Organization- an integrated approach, Wiley India Pvt. Ltd, ISBN:978-81-265-1198-3, 2nd Edition

3. A. Tanenbaum, ―Structured Computer Organization‖, Prentice Hall of India, 1991 ISBN: 81 – 203 – 1553 – 7, 4th Edition
4. Patterson and Hennessy, ―Computer Organization and Design‖, Morgan Kaufmann Publishers In, ISBN 978-0-12-374750-1, 4th Edition.
5. Computer Architecture and Organization Lecture Notes PDF http://ece.eng.wayne.edu/~gchen/ece4680/lecture-notes/lecture-notes.html

17BTCS304:Microprocessors and Interfacing 4 0 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. INTRODUCTION TO MICROPROCESSORS 9

Basics of 8086 and 80386(Architecture and Register Set, Descriptor Tables), Addressing Modes, Memory management- Case Study of 80386, operating modes of 80386, Interrupts

II. ASSEMBLY LANGUAGE PROGRAMMING & PIPELINING ARCHITECTURE 9

Non-pipelined and pipelined machine cycle (8086), Assembler directives, simple examples; Subroutines, parameter, Instruction Formats- instruction length, allocation of bits, variable length instructions, Case Study- 80386 instruction Set

III. PERIPHERALS IC AND APPLICATIONS 9

Block diagram, Pin description and Interfacing of 8255(PPI), Interfacing of keyboard, display (8279), ADC and DAC, Brief description and application of 8259 PIC

IV. SERIAL AND PARALLEL COMMUNICATION & INTERFACING PERIPHERALS9

Brief description and application of 8253 PIT, 8251USART, Support chips 8282,8284,8286,8288

V. MICROCONTROLLERS 9

Case Study- DMA Controller Intel 8237A-study in brief, I/O channels and processors- evolution and characteristics, Math Co-processor 8087, 8051 Microcontroller and Case Study

TEXT BOOKS

1. A.Ray, K.Bhurchandi, ”Advanced Microprocessors and peripherals: Arch, Programming &Interfacing”,Tata McGraw Hill,2004 ISBN 0-07-463841-6
2. Douglas Hall, “Microprocessors & Interfacing”, McGraw Hill, Revised 2nd Edition, 2006 ISBN 0-07-100462-9

REFERENCES

1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar Pub: Penram International Serge Lang, “Linear Algebra”, Springer, 3rd edition,.
2. Introduction to 64 bit Intel Assembly Language Programming for Linux, 2nd Edition, Ray Seyfarth, ISBN10: 1478119209,
3. Intel 80386 Programmer's Reference Manual 1986, Intel Corporation, Order no.: 231630-011, December 1995.
4. James Turley, ―Advanced 80386 Programming Techniques‖, McGraw-Hill, ISBN: 10: 0078813425, 13: 978-0078813429

17BTCS305 DISCRETE MATHEMATICS 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. SETS AND PROPOSITIONS 9

Sets, Combination of sets, Finite and Infinite sets, Uncountably infinite sets, Principle of inclusion and exclusion, multi-sets, Mathematical Induction.
Propositions, Conditional Propositions, Logical Connectivity, Prepositional calculus, Universal and Existential Quantifiers, Normal forms, Rules of inference, Predicate calculus, methods of proofs.

II. PERMUTATIONS, COMBINATIONS AND DISCRETE PROBABILITY 9

Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations, binomial theorem, Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information

III. RELATIONS AND FUNCTIONS 9

A relational model for data bases, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattices, Chains and Anti chains, Compatible relations.
Functions, Composition of functions, Invertible functions, Pigeonhole Principle, Recursive function.

IV. GRAPH THEORY 9

Basic terminology, multi-graphs and weighted graphs, representation of graphs, Subgraphs, Isomorphic graphs, Complete, regular and bipartite graphs, operations on graph, paths and circuits, graph traversals, Hamiltonian and Euler paths and circuits, shortest path in weighted graphs (Dijkstra's algorithm), factors of a graph, planer graph and Traveling salesman problem, Graph Coloring.

V. TREES AND CUT SETS 9

Basic terminology and characterization of trees, rooted trees, path lengths in rooted trees, Prefix codes and optimal prefix codes, binary search trees, Tree traversal, Spanning trees, Fundamental Trees and cut sets, Minimal Spanning trees, Kruskal's and Prim's algorithms for minimal spanning trees, The Max flow-Min Cut Theorem (Transport network).

TEXT BOOKS

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th edition, McGraw-Hill, 2007, ISBN ISBN 978-0-07-338309-5
3.Lipschutz−Lipson: Schaum's Outline of Theory and Problems of Discrete Math, 2/e, Tata McGraw-Hill, 2004.

17BTCS311 Data Structures Laboratory 0 0 2 1

CA : 40 Marks FE : 60 Marks Total number of hours: 15

List of Assignments

1. A Vegetable and Fruit Mall wants to organize its vegetables and fruit products in a combination of purchasepattern of customers. Solve the problem by suggesting appropriate data structures. Design necessary class.
2. An m x n matrix is said to have a saddle point if some entry a[i][j] is the smallest value in row i and the largest value in j. Write C/ C++ function that determines the location of a saddle point if one exists.
3. Set A=(1,3, a, s, t, i} represent alphanumeric characters permitted to set the password of length 4. Write C/C++ program to generate all possible passwords.
4. Write C/C++ program for storing matrix. Write functions for
   a) Check whether given matrix is upper triangular or not
   b) Compute summation of diagonal elements
   c) Compute transpose of matrix
   d) Add, subtract and multiply two matrices
5. Write C++ program with class for String. Write the following functions:
   i. *frequency()*: that determines the frequency of occurrence of particular character in the string.
   ii. *delete()*: that accepts two integers, start and length. The function computes a new string that is equivalent to the original string, except that length characters being at start have been removed.
   iii. *chardelete()*: that accepts a character c. The function returns the string with all occurrences of c removed.
   iv. *replace()*: to make an in-place replacement of a substring w of a string by the string x. note that w may not be of same size of x palindrome to check whether given string is palindrome or not
6. Write a C++ program to realize polynomial equation and perform operations. Write the following functions:
   a) To input and output polynomials represented as bmxem+ bm-1xem-1 +….. +b0xe0.

   Your functions should overload the << and >> operators.

   b) To evaluates a polynomial at given value of x

   c) To add two polynomials

   d) To multiply two polynomials
7. Department of Computer Engineering has student's club named 'Pinnacle Club'. Students of Second, third and final year of department can be granted membership on request. Similarly one may cancel the membership of club. First node is reserved for president of club and last node is reserved for secretary of club. Write C++ program to maintain club member‘s information using singly linked list. Store student PRN and Name. Write functions to
   a) Add and delete the members as well as president or even secretary.
   b) Compute total number of members of club

c) Display members
d) Display list in reverse order using recursion
e) Two linked lists exists for two divisions. Concatenate two lists.

8. The ticket booking system of Cinemax theater has to be implemented using C++ program. There are 10 rows and 7 seats in each row. Doubly circular linked list has to be maintained to keep track of free seats at rows. Assume some random booking to start with. Use array to store pointers (Head pointer) to each row. On demand
   a) The list of available seats is to be displayed
   b) The seats are to be booked
   c) The booking can be cancelled
9. Write C++ program for storing binary number using doubly linked lists. Write functions
   a) to compute 1‘s and 2‘s complement
   b) add two binary numbers
10. Implement C++ program for expression conversion as infix to postfix and its evaluation using stack based on given conditions
    i. Operands and operator, both must be single character.
    ii. Input Postfix expression must be in a desired format.
    iii. Only '+', '-', '*' and '/ ' operators are expected
11. Implement C++ program for expression conversion-
    a) infix to prefix, b)prefix to postfix,
    c) prefix to infix, d) postfix to infix and e) postfix to prefix.
12. Write a program to implement stack and queue as an ADT.add job and delete job from queue.
13. Write a modular program using object oriented programming features to implement different sortingmethods(quick, merge, radix, shell, insertion sort)
14. Write C++ program to store roll numbers of student in array who attended training program in random order. Write function for searching whether particular student attended training program or not using linear search and sentinel search.
    b) Write C++ program to store roll numbers of student array who attended training program in sorted order. Write function for searching whether particular student attended training program or not using binary search and Fibonacci search.
15. Write C++ program to maintain club members, sort on roll numbers in ascending order. Write function _Ternary_Search‘ to search whether particular student is member of club or not. Ternary search is modified binary search that divides array into 3 halves instead of two.

TEXT BOOKS

1. Brassard &Bratley, ―Fundamentals of Algorithmics‖, Prentice Hall India/Pearson Education, ISBN 13-9788120311312.
2. Horowitz and Sahani, ―Fundamentals of Data Structures in C++‖, University Press, ISBN 10:0716782928
3. Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in C++‖, Wiley publication,ISBN-978-81-265-1260-7

REFERENCES

1. R. Gillberg, B. Forouzn, ―Data Structures: A Pseudo code approach with C‖, Cenage Learning, ISBN 9788131503140

2. Horowitz, Sahani and Rajshekaran, ―Fundamentals of Computer Algorithms‖, University Press, ISBN-13, 9788175152571.
3. YedidyahLangsam, Moshe J Augenstein, Aron M Tenenbaum, ―Data Structures using C and C++‖,Pearson Education, ISBN 81-317-0328-2.
4. A Michael Berman, ―Data Structures via C++: Objects by Evolution‖, Oxford University Press,ISBN:0-19-510843-4
5. M. Weiss, ―Data Structures and Algorithm Analysis in C++‖, 2nd edition, Pearson Education, 2002,ISBN-81-7808-670-0

17BTCS312 MICROPROCESSORS INTERFACING LAB 0 0 4 2

CA : 40 Marks FE : 60 Marks Total number of hours: 30

Suggested List of Assignments

1. Write X86/64 Assembly language program (ALP) to add array of N hexadecimal numbers stored in the memory. Accept input from the user.

2. Write X86/64 ALP to perform non-overlapped and overlapped block transfer (with and without string specific instructions). Block containing data can be defined in the data segment.

3. Write 64 bit ALP to convert 4-digit Hex number into its equivalent BCD number and 5-digit BCD number into its equivalent HEX number. Make your program user friendly to accept the choice from user for:

   a) HEX to BCD
   b) BCD to HEX
   c) EXIT.

   Display proper strings to prompt the user while accepting the input and displaying the result. (use 64-bit registers)

4. Write X86/64 ALP for the following operations on the string entered by the user. (use 64-bit registers)

   a) Enter the string
   b) Calculate Length of the string
   c) Reverse the string
   d) Check whether the string is palindrome
   e) Number of vowels and consonants in string

   Display appropriate messages to prompt the user while accepting the input and displaying the result

5. Write 8086 ALP to perform string manipulation. The strings to be accepted from the user is to be stored in data segment of program_l and write FAR PROCEDURES in code segment program_2 for following operations on the string:

   a) Concatenation of two strings
   b) Number of occurrences of a sub-string in the given string
   c) Number of spaces in the given string.

   Use PUBLIC and EXTERN directive. Create .OBJ files of both the modules and link them to create an EXE file.

6. Write X86/64 ALP to perform multiplication of two 8-bit hexadecimal numbers. Use successive addition and add and shift method. Accept input from the user. (use 64-bit registers)

7. Write 8087ALP to obtain:

   i) Mean
   ii) Variance
   iii) Standard Deviation

   For a given set of data elements defined in data segment. Also display result.

1.8255 I/O interface

8. a) Write 8086 ALP to convert an analog signal in the range of 0V to 5V to its corresponding digital signal using successive approximation ADC.

9. b) Write 8086 ALP to interface DAC and generate following waveforms on oscilloscope,

(i) Square wave (ii) Ramp wave (iii) Trapezoidal wave (iv) Stair case wave

2. 8253 counter

10. Write 8086 ALP to program 8253 in Mode 0, modify the program for hardware retrigger able Mono shot mode. Generate a square wave with a pulse of 1 ms. Comment on the difference between Hardware Triggered and software triggered strobe mode. Observe the waveform at GATE & out pin of 1C 8253 on CRO

3.8279 seven segment display

11. Write 8086 ALP to initialize 8279 and to display characters in right entry mode. Provide also the facility to display

a) Character in left entry mode.
b) Character in right entry mode.
c) Rolling display.
d) Flashing display

4. 8251 USART

12. Perform an experiment to establish communication between two 8251 systems A and B. Program 8251 system A in asynchronous transmitter mode and 8251 system B in asynchronous receiver mode. Write an ALP to transmit the data from system A and receive the data at system B

TSR Program

13. Write a TSR program in 8086 ALP to implement Real Time Clock (RTC). Read the Real Time from CMOS chip by suitable INT and FUNCTION and display the RTC at the bottom right corner on the screen. Access the video RAM directly in your routine.

TSR Program

14. Write a TSR program in 8086 ALP to implement Screen Saver. Screen Saver should get activated if the keyboard is idle for 7 seconds. Access the video RAM directly in your routine.

15. Study of Intel i5 Motherboard Block Diagram, Peripheral Connectors Pin Diagrams and functioning of I/O Hub, DDR-3 memory BUS

TEXT BOOKS

1. A.Ray, K.Bhurchandi, ”Advanced Microprocessors and peripherals: Arch, Programming &Interfacing”,Tata McGraw Hill,2004 ISBN 0-07-463841-6
2. Douglas Hall, “Microprocessors & Interfacing”, McGraw Hill, Revised 2nd Edition, 2006 ISBN 0-07-100462-9

REFERENCES

1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar Pub: Penram International Serge Lang, “Linear Algebra”, Springer, 3rd edition,.
2. Introduction to 64 bit Intel Assembly Language Programming for Linux, 2nd Edition, Ray Seyfarth, ISBN10: 1478119209,
3. Intel 80386 Programmer's Reference Manual 1986, Intel Corporation, Order no.: 231630-011, December 1995.
4. James Turley, ―Advanced 80386 Programming Techniques‖, McGraw-Hill, ISBN: 10: 0078813425, 13: 978-0078813429

17BTCS321 MINI PROJECT –I 0 0 4 2

CA : 100 Marks No. of Total hours = 30

Mini Project-I includes two parts

1. Python Programming
   - Write a Python program to get the factorial of a non-negative integer.
   - Write a Python program to solve the Fibonacci sequence using recursion.
   - Write a Python program to find the greatest common divisor (gcd) of two integers.
   - Write a Python program to converting an Integer to a string in any base.
   - Write python program for string operations- copy, concatenate, check substring, equal, reverse and length
   - Write a program in Python – to implement following operations on text file :- create , Read, calculate the frequency of each vowel, Count the words, characters, lines, white space & special characters, Write all the results into another text file
2. Student can select problem statement in a group of 4 students to implement using concept of data structures in Python.

TEXT BOOKS

1. Learning Python, Mark Lutz, O'Really Publication
2. Beginning Python: From Novice to Professional , Magnus Lie Hetland, PaperBack
3. Python in a Nutshell, Alex Martelli, O'Really Publication

REFERENCES

1. https://www.tutorialspoint.com/python/
2. https://www.learnpython.org/

Semester - IV

17BTCS401: ADVANCED DATA STRUCTURE & ALGORITHMS 4 0 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. TREES 9

Tree- basic terminology, General tree and its representation, representation using sequential and linked organization, Binary tree- properties, converting tree to binary tree, binary tree traversals in-order, pre-order, post order, level wise -depth first and breadth first, Operations on binary tree. Binary Search Tree (BST), BST operations, Threaded binary tree- concepts, threading, insertion and deletion of nodes in in-order threaded binary tree, in order traversal of in-order threaded binary tree. Case Study- Use of binary tree in expression tree-evaluation and Huffman's coding

II. GRAPHS 9

Basic Concepts, Storage representation, Adjacency matrix, adjacency list, adjacency multi list, inverse adjacency list. Traversals-depth first and breadth first, Introduction to Greedy Strategy, Minimum spanning Tree, Greedy algorithms for computing minimum spanning tree- Prim's and Kruskal's Algorithms, Dikjtra's Single Source shortest path, Topological ordering. Case study- Data structure used in Webgraph and Google map.

III. HASHING 9

Hash Table- Concepts-hash table, hash function, bucket, collision, probe, synonym, overflow, open hashing, closed hashing, perfect hash function, load density, full table, load factor, rehashing, issues in hashing, hash functions- properties of good hash function, division, multiplication, extraction, mid-square, folding and universal, Collision resolution strategies- open addressing and chaining, Hash table overflow- open addressing and chaining, extended hashing, Dictionary- Dictionary as ADT, ordered dictionaries, Skip List- representation, searching and operations- insertion, removal.

IV. SEARCH TREES, INDEXING AND MULTIWAYTREES 9

Symbol Table-Representation of Symbol Tables- Static tree table and Dynamic tree table, Introduction to Dynamic Programming, Weight balanced tree, Optimal Binary Search Tree (OBST), OBST as an example of Dynamic Programming, Height Balanced Tree- AVL tree. Indexing and Multiway Trees- Indexing, indexing techniques, Types of search tree- Multiway search tree, B-Tree, B+Tree, Trie Tree, Splay Tree, Red-Black Tree, K-dimensional tree, AA tree,Heap-Basic concepts, realization of heap and operations, Heap as a priority queue, heap sort

V. FILE ORGANIZATION 9

Sequential file organization- concept and primitive operations, Direct Access File- Concepts and Primitive operations, Indexed sequential file organization-concept, types of indices, structure of index sequential file, Linked Organization- multi list files, coral rings, inverted files and cellular partitions. External Sort- Consequential processing and merging two lists, multiday merging- a k-way merge algorithm.

TEXT BOOKS

1. Horowitz, Sahani, Dinesh Mehata, ―Fundamentals of Data Structures in C++‖, Galgotia Publisher, ISBN: 8175152788, 9788175152786.
2. M Folk, B Zoellick, G. Riccardi, ―File Structures‖, Pearson Education, ISBN:81-7758-37-5
3. Peter Brass, ―Advanced Data Structures‖, Cambridge University Press, ISBN: 978-1-107-43982-5

REFERENCES

1. A. Aho, J. Hopcroft, J. Ulman, ―Data Structures and Algorithms‖, Pearson Education, 1998,ISBN-0-201-43578-0.
2. Michael J Folk, ―File Structures an Object Oriented Approach with C++‖, Pearson Education, ISBN: 81-7758-373-5.
3. SartajSahani, ―Data Structures, Algorithms and Applications in C++‖, Second Edition, University Press, ISBN:81-7371522 X.
4. G A V Pai, ―Data Structures and Algorithms‖, The McGraw-Hill Companies, ISBN - 9780070667266.
5. Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in Java‖, Wiley Publication, ISBN: 9788126551903.

17BTMT402: PROBABILITY AND QUEUING THEORY 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. RANDOM VARIABLES 9

Discrete and continuous random variables - Moments - Moment generating functions and their properties, Binomial, Poisson, Geometric, Negative binomial, Uniform, Exponential, Gamma, Normal and Weibull distributions.

II. TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem

III. MARKOV PROCESS AND MARKOV CHAINS 9

Classification - Stationary process - Markov process- Poisson process, Discrete parameter - Markov chains - Transition probabilities, Chapman Kolmogorov equations - Limiting distributions

IV. QUEUEING THEORY 9

Markovian models – Birth and Death Queuing models- Steady state results: Single and multiple server queuing models- queues with finite waiting rooms-Queues with impatient customers: Balking and reneging

V. NON-MARKOVIAN QUEUES AND QUEUE NETWORKS 9

Finite source models- Little's Formula, M/G/1 queue- Pollaczek- Khintchine formula as special cases, series queues- open and closed networks

TEXT BOOK

1. O.C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint,2007
2. D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2004

REFERENCES

1. A.O. Allen, "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2005.
2. H.A. Taha, "Operations Research", Pearson Education, Asia, 8th edition, 2007.
3. K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, 2002.

17BTCS403: COMPUTER GRAPHICS 4 0 0 4

CA : 40 Marks **FE : 60 Marks** **No. of Total Lectures = 45 Hours**

I. GRAPHICS PRIMITIVES AND SCAN CONVERSION 9

Basic concepts, applications of computer graphics, pixel, frame buffer, resolution, aspect ratio, Plotting Primitives, Scan conversions, lines, line segments, vectors, pixels and frame buffers, vector generation, line drawing algorithms: Digital Differential Analyzer (DDA), Bresenham and parallel line algorithms, Line styles, Bresenham Circle drawing algorithm, Character generating methods.
Display Files: display file structure, algorithms and display file interpreter. Primitive operations on display file.

II. POLYGONS AND CLIPPING ALGORITHMS 9

Introduction to polygon, types: convex, concave and complex, Inside test, polygon filling algorithms – flood fill, seed fill, scan line fill and filling with patterns.
Windowing and clipping: viewing transformations, 2-D clipping: Cohen – Sutherland algorithm, Polygon clipping: Sutherland Hodgeman algorithm, generalized clipping.

III. GEOMETRIC TRANSFORMATIONS 9

2-D transformations: introduction, matrices, Translation, scaling, rotation, homogeneous coordinates and matrix representation, translation, coordinate transformation, rotation about an arbitrary point, inverse and shear transformation.
3-D transformations: introduction, 3-D geometry, primitives, 3-D transformations and matrix representation, rotation about an arbitrary axis, 3-D viewing transformations, 3-D Clipping
Projections: Parallel, orthographic and Perspective, Vanishing Points.

IV. SHADING, HIDDEN SURFACES, CURVES AND FRACTALS 9

Illumination Models: Light Sources, Ambient Light, Diffuse reflection, Specular Reflection, and the Phong model, combined diffuse and Specular reflections with multiple light sources, Shading Algorithms: Halftone, Gauraud and Phong Shading.
Hidden Surfaces: Introduction, Back face detection and removal, Algorithms for hidden surface removal
Curves: Introduction, Interpolation and Approximation, Blending function, B-Spline curve, Bezier curve, Fractals: Introduction, Classification, Applications, Fractal generation: snowflake, Triadic curve, Hilbert curve.

V. ANIMATION AND GAMING 12

Segment: Introduction, Segment table, Segment creation, closing, deleting and renaming, Visibility.
Animation: Introduction, Design of animation sequences, Animation languages, Key- frame, Morphing, Motion specification.
Colour models and applications: Properties of Light, CIE chromaticity Diagram, RGB, HSV, CMY, YIQ, Colour Selection and applications.
Gaming: Introduction, Gaming platform (NVIDIA, i860 etc.), Advances in Gaming, Advanced and Interactive Graphics Tools: Eg. OpenGL, 3D Blender, etc , Game Development for Android

TEXT BOOKS

1. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4.
2. S. Harrington, ―Computer Graphics‖, 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6

REFERENCES

1. J. Foley, V. Dam, S. Feiner, J. Hughes, ―Computer Graphics Principles and Practice‖, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.

2. D. Rogers, J. Adams, ―Mathematical Elements for Computer Graphics‖, 2nd Edition, Tata McGrawHill Publication, 2002, ISBN 0 – 07 – 048677 – 8.
3. Mario Zechner, Robert Green, ―Beginning Android 4 Games Development‖, Apress, ISBN: 978-81- 322-0575-3.
4. Donald D. Hearn, ―Computer Graphics with Open GL‖, 4th Edition, ISBN-13: 9780136053583
5. D. Rogers, ―Procedural Elements for Computer Graphics‖, 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 –4.

17BTCS404: THEORY OF COMPUTATION 3 1 0 4

CA : 40 Marks FE : 60 Marks Total Number of Lectures: 60

I. AUTOMATA THEORYAND FINITE AUTOMATA 9

Alphabet, Strings, Language, Set, Relation, Characteristics of relations, Tree, Graph, finite automaton model, acceptance of strings and languages, deterministic finite automaton and non-deterministic finite automaton, transition diagrams and Language recognizers, NFA with epsilon transitions - Significance, acceptance of languages. Conversions and Equivalence: NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output, Applications of FA.

II. REGULAR EXPRESSIONS 9

Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets. Applications of Regular expressions.

III. GRAMMAR & PUSH DOWN AUTOMATA 9

Chomsky hierarchy of languages, Production systems and Grammar, derivation trees, Context Free Grammar CFG, Ambiguity in context free grammars, Normal Forms, Pumping Lemma for Context Free Languages, Enumeration of properties of CFL. Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter-conversion. Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, inter-conversion. Introduction to DCFL and DPDA.

IV. TURING MACHINE AND COMPUTABILITY THEORY 9

Turing Machine- model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, Non-deterministic Turing machines. Comparison FSM, PDA, PM and TM, Post Correspondence problem.

V. TRACTABILITY AND INTRACTABILITY 9

Decidability and tractability, Tractable and Intractable problems, Definition of P and NP problems, NP complete and NP hard problems, Turing reducibility, Satisfiability, Cooks theorem, CNF, 3-CNF problems.

TEXT BOOKS

1. Hopcroft H.E. and Ullman J. D, Introduction to Automata Theory Languages and Computation. Pearson Education
2. K.L.P. Mishra and Chandrashekharan, "Theory of Computer Science".

REFERENCES

1. MichealSipser, Introduction to Theory of Computation, Thomson
2. Daniel Cohen, Introduction to Computer Theory, John Wiley.
3. John C Martin, Introduction to languages and the Theory of Computation, TMH
4. Lewis H.P. & Papadimitriou C.H., Elements of Theory of Computation, Pearson /PHI.

17BTCS405: ECONOMICS FOR ENGINEERS 3 1 0 4

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

I. INTRODUCTION TO ENGINEERING ECONOMICS 9

Concept, Nature and Methodology of Economics

II. DEMAND AND PRODUCTION 9

Demand: Meaning and Determinants of Demand and Supply, Law of Demand and Supply, Elasticity of Demand and Supply. Production: Meaning, production with one variable input, the law of variable proportion, the laws of returns to scale. Economies of Scale.
Case Study

III. COST AND REVENUE 9

Concepts, Classifications, Short run and long run cost curves, Revenue, Measurement of Profit.(Case Study)

IV. MARKET STRUCTURE 9

Meaning, Characteristics of different types of market Monopoly, Perfect Competition, Monopolistic Competition, Oligopoly and Duopoly.

V. MONEY AND BANKING 9

Money- Functions - Quantity theory of money , Banking -Commercial Banks – Functions – Central Bank (RBI) – Functions, Case Study in Recent Development in Banking.

TEXT BOOKS:

1. Dewett. K.K, "Modern Economic Theory", S. Chand and Company Ltd, New Delhi, 2014.
2. Lipsey& Chrystal, "Economics", Oxford University Press, 2010

REFERENCES:

1. Paul A Samuelson & William, "Economics", Tata McGraw Hill, New Delhi, 2010.
2. Jhingan M.L "Money, Banking, International Trade and Public Finance", Vrinda Publication, 2009.
3. Ahuja H.L, "Macro Economic Theory and Policy", S.Chand and Co, New Delhi, 2010.
4. Francis Cherinullem "International Economics", McGraw Hill Education, 2008.
5. Dutt and Sundaram "Indian Economy", S.Chand and Co, New Delhi, 2011.

7BTCS411: Advanced Data Structure Laboratory 0 0 2 1

CA : 40 Marks FE : 60 Marks Total Number of hours = 15

List of Experiments

1. A Dictionary stores keywords & its meanings. Provide facility for adding new keywords, deleting keywords, updating values of any entry. Provide facility to display whole data sorted in ascending/ Descending order. Also find how many maximum comparisons may require for finding any keyword. Use Binary Search Tree for implementation.
2. Accept prefix expression, and construct a binary tree and perform recursive and non-recursive traversals
3. Create Binary Search tree and find its mirror image. Print original & new tree level wise. Find height & print leaf nodes
4. Create inorder threaded binary tree and perform the traversals
5. Represent a given graph using adjacency list and perform DFS and BFS
6. Represent a given graph using adjacency list or array and find the shortest path using Dijkstra algorithm
7. Represent a given graph using adjacency list or array and generate a minimum spanning tree using kruskal and prim's algorithm
8. Create a hash table and handle the collisions using linear probing with or without replacement
9. Implementation of simple index file
10. Implementation of direct access file - Insertion and deletion of a record from a direct access file using chaining with or without replacement
11. Company maintains employee information as employee ID, name, designation and salary. Allow user to add, delete information of employee. Display information of particular employee. If employee does not exist an appropriate message is displayed. If it is, then the system displays the employee details. Use index sequential file to maintain the data.
12. A Dictionary stores keywords & its meanings. Provide facility for adding new keywords, deleting keywords, updating values of any entry. Provide facility to display whole data sorted in ascending/ Descending order. Also find how many maximum comparisons may require for finding any keyword. Use Height balance tree and find the complexity for finding a keyword
13. Consider telephone book database of N clients. Make use of a hash table implementation to quickly look up client's telephone number.
14. Implement Heap sort
15. Given sequence k = k1 <k2 < … <kn of n sorted keys, with a search probability pi for each key ki . Build the Binary search tree that has the least search cost given the access probability for each key?

TEXT BOOKS

1. Horowitz, Sahani, Dinesh Mehata, ―Fundamentals of Data Structures in C++‖, Galgotia Publisher, ISBN: 8175152788, 9788175152786.
2. M Folk, B Zoellick, G. Riccardi, ―File Structures‖, Pearson Education, ISBN:81-7758-37-5

3. Peter Brass, ―Advanced Data Structures‖, Cambridge University Press, ISBN: 978-1-107-43982-5

REFERENCES

1. A. Aho, J. Hopcroft, J. Ulman, ―Data Structures and Algorithms‖, Pearson Education, 1998,ISBN-0-201-43578-0.
2. Michael J Folk, ―File Structures an Object Oriented Approach with C++‖, Pearson Education, ISBN: 81-7758-373-5.
3. SartajSahani, ―Data Structures, Algorithms and Applications in C++‖, Second Edition, University Press, ISBN:81-7371522 X.
4. G A V Pai, ―Data Structures and Algorithms‖, The McGraw-Hill Companies, ISBN - 9780070667266.
5. Goodrich, Tamassia, Goldwasser, ―Data Structures and Algorithms in Java‖, Wiley Publication, ISBN: 9788126551903.

17BTCS412: Computer Graphics Laboratory 0 0 4 2

CA : 40 Marks FE : 60 Marks Total Number of hours = 30

The laboratory for Computer Graphics will be based on programming assignments in C++ that would include appropriate implementations of object oriented concepts and interactive graphics programming. The list of assignments include the following:

1. Line drawing algorithms (DDA and Bresenham)
2. Bresenham Circle drawing algorithm
3. Implementation of generalized algorithm for filling a polygon (convex & concave) using scan-line polygon filling method.
4. Implement Cohen-Sutherland line-clipping algorithm for given window. Draw line using mouse interfacing to draw polygon
5. Write C++ program to draw 2-D object and perform following basic transformations,
   a) Scaling
   b) Translation
   c) Rotation
6. Draw 3-D cube and perform following transformations on it using OpenGL.
   a) Scaling b) Translation c) Rotation about one axis.
7. Perform animation using segments-
   1. Moving Train
   2. Movement of Clock Pendulum
   3. Water drop falling into the water and generated waves after impact
   4. Rising Sun
8. Generate fractals for coarse lines and surfaces.
9. Implement Painter‘s algorithm for hidden surface removal

TEXT BOOKS

1. D. Hearn, M. Baker, “Computer Graphics – C Version”, 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4.
2. S. Harrington, ―Computer Graphics‖, 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6

REFERENCES

1. J. Foley, V. Dam, S. Feiner, J. Hughes, ―Computer Graphics Principles and Practice‖, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. D. Rogers, J. Adams, ―Mathematical Elements for Computer Graphics‖, 2nd Edition, Tata McGrawHill Publication, 2002, ISBN 0 – 07 – 048677 – 8.
3. Mario Zechner, Robert Green, ―Beginning Android 4 Games Development‖, Apress, ISBN: 978-81-322-0575-3.
4. Donald D. Hearn, ―Computer Graphics with Open GL‖, 4th Edition, ISBN-13: 9780136053583
5. D. Rogers, ―Procedural Elements for Computer Graphics‖, 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 –4.

17BTCS421 Mini Project –II 0 0 4 2

CA : 100 Marks Total Number of hours = 30

Mini Project-II includes two parts

1. OpenGL:
   - SDK, Extensions, GLUT, GLU, OpenGL primitives
   - Programming language: Blending, 3D viewing(camera analogy), Lighting model, Culling, Fog, Texture mapping.
   - OpenGL over Linux, Buffer rendering, Shadowing Techniques
2. Student can select problem statement in a group of 4 students to implement using concept of Computer graphics Game design in OpenGL.

TEXT BOOKS

1. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN81 – 7808 – 794 – 4.
2. S. Harrington, ―Computer Graphics‖, 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6

REFERENCES

1. J. Foley, V. Dam, S. Feiner, J. Hughes, ―Computer Graphics Principles and Practice‖, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. D. Rogers, J. Adams, ―Mathematical Elements for Computer Graphics‖, 2nd Edition, Tata McGrawHill Publication, 2002, ISBN 0 – 07 – 048677 – 8.
3. Mario Zechner, Robert Green, ―Beginning Android 4 Games Development‖, Apress, ISBN: 978-81- 322-0575-3.
4. Donald D. Hearn, ―Computer Graphics with Open GL‖, 4th Edition, ISBN-13: 9780136053583
5. D. Rogers, ―Procedural Elements for Computer Graphics‖, 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371 –4.

SEMISTER V

Course Code	Course Title				Category
17BTIS501	Design and Analysis of Algorithms				Core
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
3	1	0	40	60	4

Prerequisite:

- Basic knowledge of programming and mathematics.
- Fundamentals of Data Structure
- Basic understanding of Formal Language and Automata Theory.

Course Objectives:

- To design efficient algorithm for a given problem.
- To develop problem solving abilities using mathematical theories.
- To analyze algorithms for a given problem
- To study algorithmic examples in distributed, concurrent and parallel environments.

COURSE CONTENT

Fundamentals of Algorithms: 09

Problem solving principles: Classification of problem, problem solving strategies: Brute force Approach, Divide and Conquer Strategy, classification of time complexities (linear, logarithmic etc), Asymptotic notations, lower bound and upper bound: Best case, worst case, average case analysis, amortized analysis. Performance analysis of basic programming constructs. Recurrences: Formulation and solving recurrence equations using Master Theorem.

Greedy Strategy and Dynamic Programming 09

Greedy strategy: Principle, control abstraction, time analysis of control abstraction, knapsack problem, scheduling algorithms- activity selection problem. Dynamic Programming: Principle, control abstraction, time analysis of control abstraction, 0/1 knapsack, Chain Matrix Multiplication, Flow network

Backtracking and Branch –n-Bound 09

Backtracking: Principle, control abstraction, time analysis of control abstraction, n-queen problem, sum of subsets problem. Branch-n-Bound: Principle, control abstraction, time analysis of control abstraction, strategies : FIFO, LIFO and LC approaches, TSP, knapsack problem.

Complexity Theory: 09

Turing machine, polynomial and non-polynomial problems, deterministic and non-deterministic algorithms, P class, NP class &NP complete problems- vertex cover and 3-SAT and NP{hard problem {Hamiltonian cycle. The menagerie of complexity classes of Turing degrees. Concept of randomized and approximation algorithms: Solving TSP by approximation algorithm, Randomized sort algorithms and Approximating Max Clique.

Parallel and Concurrent Algorithms 09

Parallel Algorithms: Sequential and parallel computing, RAM &PRAM models, Amdahl's Law, Brent's theorem, parallel algorithm analysis and optimal parallel algorithms, graph problems (shortest paths and Minimum Spanning Tree, Bipartite graphs) Concurrent Algorithms: Dining philosophers problem

---

Course Outcomes: Students who complete the course will have demonstrated the ability to do the following:

- Argue the correctness of algorithms.
- Analyze algorithms using asymptotic analysis.
- Apply appropriate design strategy for a given problem

TEXT BOOKS

1. Horowitz and Sahani, "Fundamentals of Computer Algorithms", 2ND Edition. University Press, ISBN: 978 81 7371 6126, 81 7371 61262.
2. Gilles Brassard and Paul Bartley, "Fundamental of Algorithms", PHI, New Delhi.
3. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm" PHI

Reference Books:

1. Fayez Gebali, Algorithms and Parallel Computing, Willy, ISBN 978-0-470-90210-3(Indian Paperback Edition)
2 .Anany Levitin, "Introduction to the Design and Analysis of Algorithms" Pearson Education
3 .Jon Kleinberg, EvasTardos, “Algorithm Design”, Pearson Education
4. Algorithms, Kenneth Berman and Jerome Paul, Cenage Learning ISBN-13 978-81-315-0521-2R

Course Code	Course Title				Category
17BTIS502	Software Engineering Methodology				Core
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
3	1	0	40	60	4

Prerequisite:

- Basic Knowledge of Object Oriented Programming.
- Fundamentals of Programming & problem Solving

Course Objectives:

- To understand the fundamentals of Software Engineering
- To study an analysis of software requirement engineering & Modelling
- To acquire the knowledge of Scrum and Agile methodologies
- To learn software design patterns

COURSE CONTENT

Unit I – Introduction to Software Engineering (09)

The Nature of Software, The Changing Nature of Software, Professional Software Development, Software Engineering Ethics, Software Development Myths, Software Process Models- the Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Personal and Team Process Models, coping with change, The Rational Unified Process

Unit II – Requirements engineering & System modelling (09)

Requirement Analysis - Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management, ***System Modelling*** - Context models, Interaction models, Structural models, Behavioural models, Model-driven engineering, ***Architectural design*** – decisions, views & patterns, DFD.

Unit III – Agile Methodology (09)

Scrum- Roles*, Scrum activities & artefacts, Sprint – time boxed, short duration, consistent duration****, Agile Software Development*** – Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, Project Management Concepts, Agile Project

Management, Scaling Agile Methods, User stories, Agile estimating & velocity, Iterations, product backlogs, Stakeholder roles.

Unit IV – Software Design Patterns (09)

What Is a Design Pattern?, Describing Design Patterns, The Catalogue of Design Patterns, Organizing the catalogue, How Design Patterns Solve Design Problems, ***Creational patterns*** **-** Abstract Factory, Builder, Factory Method, Prototype, Singleton, ***A Case Study:*** Designing a Document Editor

Unit V – Structural & Behavioural Patterns (09)

Structural Patterns- Adapter, Composite, Façade, Proxy, ***Behavioural Patterns*** - Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Observer, State, Strategy, Template Method

---

Course Outcomes: (Students will be able to-)

- Apply the concepts of software engineering for development of Software Systems
- Analyse software feasibility
- Use scrum and agile methodology for software Modelling
- Build software design patterns to solve design issues

Text Books:

1. Ian Sommerville, 'Software Engineering', Addison-Wesley, 9th Edition, 2010, ISBN-13: 978-0137035151.
2. Kenneth S. Rubin, Essential SCRUM: A Practical Guide To The Most Popular Agile Process, Addison-Wesley, ISBN-13: 978-0-13-704329-3, 2012
3. Dean Leffingwell, Agile Software Requirements, Addison-Wesley, ISBN-13: 978-0-321-63584-6, 2011
4. Erich Gamma, Richard Helm,Ralph Johnson ,John Vlissides, Design patterns Elements of Reusable Object-Oriented Software

Reference Books:

1. Soren Lauesen, Software requirements: Styles and techniques, Addison Wesley, ISBN 0201745704, 2002
2. HASSAN GOMAA, Software Modeling and Design, Cambridge university Press, 2011, ISBN-13 978-1-107-44735-6

List of Tutorials:

Tutorial Number	Tutorial Topic
1.	Design an assignment wherein multiple teams work together for development of a software. Use appropriate software Engineering model to design, develop and integrate the system.
2.	Design a *Data Flow Diagram* for Home Automation System, military surveillance system, etc. Use appropriate tool to represent it and design software processes to maintain the integrity of the data.
3.	Discuss & apply appropriate *agile software method* for solving problems like Shopping Cart system, healthcare, etc.
4.	Design & Apply *Flyweight* pattern for IoT based Intelligent Transportation System or any.
5.	Use *bridge and decorator* structural patterns to create a model for forecast based financing which aims to create new funding mechanisms for disaster properness.
6.	Apply *Memento & Visitor* behavioural patterns to develop a solution for Home Security System/any.

Note: In addition to above mentioned tutorials, course coordinator can design more tutorials if required.

Course Code	Course Title				Category
17BTIS503	System Programming and Operating System* *(*Syllabus under revision by Board of studies)*				Core
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
3	0	0	40	60	4

Prerequisite:

- Fundamentals of Programming languages.
- Basic Data Structure concepts.

Course Objectives:

- To understand basics of System Programming.
- To learn and understand data structures used in design of system software.
- To learn, understand and use basics of compilers and tools.
- To understand functions of operating system.
- To learn and understand process, resource and memory management.

COURSE CONTENT

Unit I – Introduction to Systems Programming [09]

Fundamentals of Language Processing, Language Processing Activities, Components of System Software, Introduction to Assemblers, Elements of Assembly Language Programming, Simple Assembler scheme, Structure of an Assembler, Introduction to Macro Processors, Macro Definition and Call, Macro expansion, Advanced Macro Facilities.

Loaders: Definition of Loader. Different Loader schemes: Compile and go, General loader Scheme, Absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, overlay structure. Linkers: relocation and linking concepts, Self-relocating programs, an introduction to static and dynamic linked libraries.

Unit II – Introduction to Compiler Design [09]

Overview of the Translation Process, A Simple Compiler, The Phases of a Compiler, Overview of Compilation, Cousins of the Compiler, Grouping of Phases, Introduction to lexical Analysis, LEX, LEX specification and features. Introduction to Syntax Analyzer: Role of parsers, Types of Parsers, Top Down and Bottom Parser. Need of semantic analysis, type checking and type conversion, Intermediate languages, and Intermediate code forms- Syntax Tree, DAG, Postfix Notation, Three Address Codes, Quadruples, Triples, and Indirect Triples. Introduction to Optimization, Principle sources of Optimization, Introduction to Code Generation, Issues in Code Generation.

Unit III - Introduction to Operating System & Process Management [09]

Process: Concept of a Process, Process States, Process Description, Process Control (Process Creation, Waiting for the Process/Processes, Loading Programs into Processes and Process Termination), **Threads:** Processes and Threads, Concept of Multithreading, Types of Threads, Thread programming Using Pthreads. **Scheduling:** Uniprocessor Scheduling - Types of Scheduling, Scheduling Algorithms (Ex. FCFS, Round Robin Scheduling and SJF), Principles of Concurrency, Requirements for Mutual Exclusion, **Mutual Exclusion:** Operating System Support (Semaphores and Mutex), Example: Readers/Writers Problem, **Deadlock and Starvation:** Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategy, Example: Dining Philosophers Problem. Case Study: Linux OS.

Unit IV - MEMORY MANAGEMENT [09]

Memory Management: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging and Segmentation. Virtual Memory: Principle of Locality, Demand Paging, Page Replacement Algorithms (Ex. FIFO, Optimal, LRU and Clock), and Thrashing: Dealing with Thrashing. Case Study: Linux

Unit V - I/O and File management [09]

I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling (Ex. FCFS, SSTF & SCAN), Disk Cache. File Management: Overview, File Organization and Access, File Directories, File Allocation Methods and Free Space Management. Case Study: Linux

---

Course Outcomes: (Students will be able to)

- Analyze and synthesize system software
- Use tools like LEX & YACC.
- Understand the functions of operating system.
- Do the programming for process and thread management in OS

TEXT BOOKS

1. Systems Programming and Operating Systems, Dhamdhere D.M, TMGH
2. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, “Compilers: Principles, Techniques and Tools”, Second Edition, Pearson Education, 2014.
3. K. Cooper, L. Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers,ISBN81–8147–369 –8.
4. Kenneth Louden “Compiler Construction”, Cengage Learning.
5. Modern Operating System – Andrew S. Tanenbaum, Pearson Education India
6. Operating System Concepts - Abraham Silberschatz, Peter B. Galvin & Grege Gagne, Wiley

REFERENCES

1. Operating System : Concepts and Design - Milan Milenkovic, TMGH
2. Understanding the Linux kernel - Daniel P Bovet and Marco Cesati, O’Reilly
3. J. R. Levine, T. Mason, D. Brown, "Lex & Yacc", O'Reilly, 2012
4. Linux System Programming - Robert Love, Publisher - SPD, O’ Reilly
5. Systems programming - John J. Donovan, TMGH

Course Code	Course Title				Category
17BTIS504	Database Management Systems				Core
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
4	0	4	40	60	4

Prerequisite:

- Fundamentals of data structures
- Basic Knowledge of file handling

Course Objectives:

- To learn the concepts of database management and querying the databases.
- To be familiar with various database design techniques and practice.
- To understand various transaction processing and concurrency control.
- To study the concepts of distributed databases and their management.
- To understand technical concepts to handle big data with distributed databases.

COURSE CONTENT

Unit I – INTRODUCTION OF DATABASs and SQL 09

Database Concepts, Three-schema architecture of a database, Data Models ER model, Relational Model, ER to Table Conversion. Relational Algebra: Select, Project, Union, Set difference, Join, SQL-Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, Views, Indexes. PLSQL : Concept of Stored Procedures, Functions, Cursors, Triggers. NOSQL- MongoDB CRUD Operations, SQL VsNoSQL Databases

Unit II – DATABASE DESIGN 09

Functional Dependency, Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency Single Valued Dependencies. Single Valued Normalization: 1NF, 2NF, 3NF, BCNF. Decomposition: lossless join decomposition and dependency preservation, Multi valued Normalization (4NF), Join Dependencies and the Fifth Normal Form

Unit III - DATABASE STORAGE, PROCESSING AND TRANSACTION 09

Query processing and query optimization, Basic concept of a Transaction, Transaction Management, ACID Properties of Transactions, Concept of Schedule, Serial and Concurrent Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking based Protocol, Deadlocks-Prevention, Detection Techniques, Recovery methods : Shadow Paging and Log Based Recovery, Checkpoints

Unit IV – ADVANCE CONCEPTS OF DATABASES 09

Database Architectures: Centralized and ClientServer Architectures, Database Connectivity using Java/Python with SQL and NoSQL databases. Introduction to Parallel Databases, Architecture of Parallel Databases. Introduction to Distributed Databases, Distributed Transactions. 2PC, 3PC protocols, Introduction to Data Mining and clustering.

Unit V - EMERGING DATA HANDLING TECHNIQUES 09

Introduction to Big data, Handling large datasets using Map-Reduce and Hadoop. Introduction to Hbase data model and hbase region. Introduction to emerging database technologies- Cloud Databases, Mobile Databases, SQLite Database, XML Databases

---

Course Outcomes: (Students will be able to-)

- Apply the concepts of database design and SQL.
- Query a database using SQL, PL/SQL and NoSQL commands.
- Design and implement a big data store using HBase.
- Analyze big data using map-reduce programming.

Text Books:

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 6 th Edition, McGraw Hill Publishers, ISBN 007120413X
2. Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 8178088614
3. “MongoDB: The Definitive Guide” by Kristina Chodorow, O’Reilly Publications
4. “Principles of Distributed Database Systems”, by M. Tamer Özsu, Patrick Valduriez, Springer

References:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Elsevier
2. Big Data: Understanding How Data Powers Big Business, Bill Schmarzo, Wiley
3. Hadoop: The Definitive Guide, Fourth Edition, Tom White, O’Reilly
4. HBase: The Definitive Guide, Fourth Edition, Lars George, O’Reilly

Course Code	Course Title				Category
17BTIS505	**Artificial Intelligence*** ***(Syllabus under revision by Board of studies)***				**Core**
Contact Hours per Week			**CA**	**FE**	**Credits**
L	**T**	**D/P**			
4	0	0	**40**	**60**	**4**
Prerequisite: NA					
Course Objectives: 1. To learn fundamental concepts of networking 2. To learn signals and data transmission techniques 3. To learn data link layer and different Ethernet standards					

COURSE CONTENT

Course Code	Course Title				Category
17BTIS511	Programming Laboratory-I* *(Syllabus under revision by Board of studies)*				PL
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
0	0	2	40	60	2

COURSE CONTENT

Course Code	Course Title				Category
17BTIS512	Programming Laboratory-II				PL
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
0	0	4	40	60	2

COURSE CONTENT

1 Design sample database, draw ER diagram and apply SQL-DDL and DML queries (aggregate functions, nested sub-queries, Join operations)
2 Execute SQL queries on the sample database using MySQL and User Interface in either Java, Python, or PHP
3 Write and execute PL/SQL stored procedures and functions to perform a suitable operation on the database.
4 Write PL/SQL blocks for demonstrating triggers and cursors.
5 Design and create a suitable collection example to perform CRUD operations in MongoDB.
6 Implement MapReduce example in MongoDB with suitable dataset.
7 Use MongoDB/NoSQL/MySQL/Oracle (Any two) queries for:
1.Indexing
2.Administration
3.Aggregate
8 Execute NoSQL queries on the sample collections using MongoDB and User Interface in either Java, Python, or PHP
9 Hadoop and HBase installation on single node.
10 Using HBase perform following operations
Create a table
Add, Retrieve, Modify, and delete the record(s)
Drop the table
11 Implement MapReduce example in HBase with suitable dataset.

Course Code	Course Title				Category
17BTIS521	Mini Project-III				PR
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
0	0	4	40	60	2

Prerequisite:

- Basic Knowledge of Software Engineering
- Fundamentals of Object Oriented programming

Course Objectives:

- To analyse requirements of software systems
- To create a model of software intensive artifacts
- To understand software Modelling practices & standards

COURSE CONTENT

Course coordinator shall cover software requirements specification document, structural modelling, behavioural Modelling and Interaction Modelling.

Structural modelling includes class diagram, object diagram, component diagram, deployment diagram and package diagrams.

Behavioural Modelling includes use case modelling, state machine diagram and activity diagram.

Interaction modelling includes sequence diagram, communication, timing diagram and interaction overview diagram.

Course Outcomes: (Students will be able to-)

- Apply the concepts of software modelling for designing software systems.
- Create static and dynamic view of the software system
- Implement forward and reverse engineering to object oriented software intensive systems using modelling tool.

SEMESTER-VI

17BTIS601: COMPUTER NETWORKS 4004

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

Application Layer **9**

OSI Revisited, Principles of Network Applications, The Web and HTTP, File Transfer: FTP, SMTP, TELNET, SSH, DNS,DHCP

Transport Layer **9**

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Connection-Oriented Transport: TCP, Principles of Congestion Control, Quality of services (QoS), Differentiated services, Integrated services.

Network Layer **9**

Internetworking, Network Layer in the Internet, Virtual Circuit and Datagram Networks, Internet Protocol (IP): Forwarding and Addressing in the Internet, IPV4, ICMPV4, IPV6, Routing Algorithms, Routing protocols: RIP, OSPF, BGP

Wireless Networks **9**

Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs, Mobile IP, Wireless TCP, Wireless application protocol, WiMax.

Advanced Network Technologies **9**

VoIP, Vehicular network, Delay tolerant network, Software defined network, ATM: Overview, Protocol Architecture.

TEXT BOOKS

1. James F. Kurose, "COMPUTER NETWORKING", 6th edition, Pearson Education
2. William Stallings, "DATA AND COMPUTER COMMUNICATIONS", Eighth Edition, Pearson Education, Inc.

REFERENCES

1. A.S.Tanenbaum, "Computer Networks", 3rd. edition
2. Behrouz A. Forouzan,"DATA COMMUNICATIONS AND NETWORKING", Second Edition.

17BTIS602: ENVIRONMENTAL ENGINEERING 3104

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

BASICS OF ENVIRONMENTAL ENGINEERING 9

Definition of environment and pollutants, central and state boards for the prevention and control of environmental pollution, powers and functions of pollution control boards, penalties and procedure, duties and responsibilities of citizens for environmental protection.

INDIAN CONSTITUTION AND ENVIRONMENTAL PROTECTION 9

National Environmental policies – Precautionary Principle and Polluter Pays Principle – Concept of absolute liability – multilateral environmental agreements and Protocols – Montreal Protocol, Kyoto agreement, Rio declaration, Functions and Constitutions of SPCB and CPCB.

KEY PROVISIONS OF ENVIRONMENTAL LAWS (INDIA) 9

Wildlife Protection Act 1972, Prevention and Control of Air Pollution Act 1981, Forest Conservation Act 1981, Environment (protection) Act 1986, Hazardous waste (Management and Handling) Rules, 1989, Bio-Medical Waste (Management and Handling) Rules, 1998, Biological Diversity Act, 2002, Wild Life (Protection) Amendment Act 2002, National Green Tribunal Act, 2010.

ENERGY AND ENVIRONMENTAL POLLUTION 9

Types of energy: conventional and non-conventional. Need for harnessing alternative energies to meet the increased demand, Methods of harnessing energies. Sources, causes, effects and measures associated with: air pollution, water pollution, noise pollution, land pollution.

ECOLOGY AND ECO SYSTEM 9

Biotic and abiotic factors, impact of the human behavior and technological advancements on the environment, Need for conserving natural resources and preserving the environment, Engineeer's role in achieving sustainable development, Introduction to solid waste management, electronic wastes and its disposal.

REFERENCE BOOKS

1. Shyam Divan and Armin Roseneranz "Environmental law and policy in India "Oxford University Press, New Delhi, 2001.
2. Environmental studies by Rajgopalan- Oxford University Press.
3. Pares Distn. Environmental Laws in India (Deep, Latededn.)

ONLINE REFERENCE

1. Ministry of Environment, Forest and Climate Change: http://moef.nic .in, http://envfor.nic.in

17BTIS603: OPERATION RESEARCH* **4004**

(Syllabus under revision by Board of studies)

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

17BTIS604: MACHINE LAERNING-I* **3104**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

****(Syllabus under revision by Board of studies)***

ELECTIVE –I 17BTIS6__: AGILE COMPUTING 3003

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

INTRODUCTION TO AGILE 9

Why Agile? Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile: Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor

EXTREME PROGRAMMING (XP) **9**

The XP Lifecycle, The XP Team: The Whole Team, On-Site Customers, Programmers, Testers, XP Concepts: Refactoring, Technical Debt, Timeboxing, The Last Responsible Moment, Iterations, Velocity, Theory of Constraints, Is XP Right for Us?, The Challenge of Change, Final Preparation, Applying XP to a Brand-New Project, Applying XP to an Existing Project, Applying XP in a Phase-Based Organization, Extremities: Applying Bits and Pieces of XP

PRACTICING XP - THINKING, COLLABORATING, RELEASING 9

Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives, Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting, "Done Done", No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation

PRACTICING XP – PLANNING, DEVELOPING 9

Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating, Incremental Requirements, Customer Tests, Test-Driven Development, Refactoring, Simple Design, Incremental Design and Architecture, Spike Solutions, Performance Optimization, Exploratory Testing

MASTERING AGILITY 9

Values and Principles, Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules, Rely on People, Eliminate Waste, Deliver Value, Seek Technical Excellence

TEXT BOOKS

1. James Shore & Shane Warden, "The Art of Agile Development", 1st Edition, O'REILLY, 2007.

REFERENCES

1. LARMAN, "AGILE & INTERACTIVE DEVELOP:MANAGER GUIDE", Pearson Education, 2004
2. Robert C. Martin, "Agile Software Development, Principles, Patterns, and Practices", PHI; 2nd Edition, 2002

ELECTIVE –I 17BTIS6__: USABILITY ENGINEERING 3003

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

USABILITY ENGINEERING 9

Usability Principles, Design Process(Scenarios, Users need, Complexity of design), Benefits of a Good design, User Interface Models, Understanding and Conceptualizing Interface, Usability Testing.

HUMAN-COMPUTER INTERACTION 9

Introduction to HCI and its Disciplines, Importance of human factors in design (cultural, emotional, technological, and business), Need Satisfaction curve of technology, Levels of human computer interaction.

HUMAN-CENTERED DESIGN 9

The importance of User Interface, UI and Software Designer, Goals of UI design, Motivations for human factors in Design, Understanding user needs and requirements, usability heuristics.

MODELS 9

Fundamentals of Model, Object - Action Interface Model, Cognitive model, Hierarchical model, Linguistic model, Physical and device models, Socio-technical models, Communication and Collaboration models, Task models, Task analysis and design

DESIGN PROCESS 9

User Interface Design Process, Classes of UI design, Principles of good design, evaluating design using the principles, Choice of color, Task oriented approach for UI - Case study

GUI design process, Design of icons, Use of metaphors, GUI style guides and toolkits, Portability, GUI design and object oriented approach – Case study.

TEXTBOOKS

1. Ben Shneiderman and Catherine Plaisant, “Designing the User Interface: Strategies for Effective Human-Computer Interaction”, (5th Edition, pp. 672, ISBN 0-321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.
2. Jacob Nielsen, "Usability Engineering", Academic Press, 1993.

REFERENCES

1. Alan Dix et al, "Human - Computer Interaction", Prentice Hall, USA, 1993.
2. Theo Mandel, “Elements of User Interface Design”, John Wiley & Sons
3. Preece, Roger, Sharp, “Interaction Design”, John Wiley & Sons
4. Mark Hamelen , “Object Modeling & User Interface Design”.

ELECTIVE-I 17BTIS06__: SOFTWARE DESIGN PATTERNS 3003

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 45 Hours

BASICS OF SOFTWARE DESIGN PATTERNS 9

Introduction to Software Design, Basics of Software Design Patterns, Why study Design Patterns, Elements of Software Design Pattern, Design Patterns in Smalltalk MVC, Design Patterns Description, Design Patterns Catalog organization, Using Design Patterns to solve Design Problems, Selecting a Design Pattern, Using a Design Pattern, Types of Design Patterns- Creational, Structural, Behavioral.

CREATIONAL PATTERNS 9

Abstract Factory, Builder, Factory Method, Prototype, Singleton

STRUCTURAL PATTERNS 9

Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

BEHAVIORAL PATTERNS 9

Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor

CASE STUDY 9

Designing a Document Editor- Design Problems, Document Structure, Formatting, Creating the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation, Future of Design Patterns

TEXT BOOKS

1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, “Design Patterns: Elements of Reusable object-oriented software”, Addison-Wesley, 1995.
2. Alan Shalloway, James R. Trott, “Design Patterns Explained”, Addison-Wesley,2004

REFERENCES

1. Frank Benchmann, ReginеMeunier, Hans Rohnert, “Pattern Oriented Software Architecture”, Volume 1, 1996.
2. Eric Freeman, Bert Bates, Kathy Sierra, Elisabeth Robson, “Head First Design Patterns: A Brain-Friendly Guide”, 1st Edition, O”Reilly

17BTIS611: PROGRAMMING LABORATORY-III* **0042**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 30 Hours

****(Syllabus under revision by Board of studies)***

17BTIS612: PROGRAMMING LABORATORY -IV* **0042**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 30 Hours

(Syllabus under revision by Board of studies)

17BTIS621: MINI PROJECT-IV **0042**

CA : 100 Marks

Select a suitable problem Statement that covers the following for development for Mini-Project:

1. Write a Software Requirement Specification Document (for the given system)
2. Design the Use Case Diagram
3. Design the Activity Diagram
4. Design the Class Diagram and Object Diagram
5. Design the Sequence Diagram and Communication Diagram
6. Design the State Machine Diagram
7. Design the Component Diagram and Deployment Diagram

17BTIS711: PROGRAMMING LABORATORY V* **0021**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 30 Hours

****(Syllabus under revision by Board of studies)***

17BTIS712: PROGRAMMING LABORATORY VI* **0042**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 30 Hours

****(Syllabus under revision by Board of studies)***

17BTIS721: PROJECT PHASE- I **0042**

CA : 100 Marks No. of Total Hours= 30

1. Identification of a real life problem in thrust areas
2. developing a mathematical model for solving the above problem
3. Finalization of system requirements and specification
4. Proposing different solutions for the problem based on literature survey
5. Future trends in providing alternate solutions
6. Consolidated report preparation of the above

A Activity Planning for Practical Sessions

I Selection of Project Option and Framing the Problem to solve as a Project for the group of 3 to 4 students.

Option A: Industry Sponsored Project

Option B: Project as an Entrepreneur

Option C: Internal Project

II Internal guide allocation for the BE Project: Assistant Professor/Associate Professor/Professor having at least 5 years of full time approved experience can guide the BE Project without compromising on the quality of the work(ref. Note1).

III The project conduct and procedures are amended as detailed below:- Problem statement feasibility assessment using, satisfiability analysis and NP-Hard, NP-Complete or P type using modern algebra and relevant mathematical models.(recommended date of submission:- 8 weeks before term end)

IV Use of above to identify objects, morphism, overloading, functions and functional relations and any other dependencies. (Recommended submission date: - 6 weeks before term end) Functional dependency graphs and relevant UML diagrams or other necessities. (Recommended submission date: - 3 weeks before term end)

V Testing of problem statement using generated test data (using mathematical models, Function testing principles) selection and appropriate use of testing tools, testing of UML diagram's reliability. (Recommended submission date: - two weeks before term end)

VI The index of submission must cover above mentioned 5 heads in addition to the instructions by the guide. Students must submit a Latex Report consisting of problem definition, literature survey, platform choice, SRS (System Requirement Specification) Document in specific format and high-level design document along with Annex A: Laboratory assignments on Project Analysis of Algorithmic Design, Annex B: Lab-oratory assignments on Project Quality and Reliability Testing of Project Design at the end of term-I and Annex C: Project Planner and progress report after checking, removing/ avoiding the plagiarism. Give an additional assignment per reporting plagiarism to be submitted in the report under the Annex heading extra-work. If the project is the replica of any other previous project or work from other unrelated persons than the students team, such project should be rejected for the term work.

The term work at the end of Term-I shall be assessed and evaluated for 100 marks by the panel of examiners in the subject (Internal (preferably guide). At-least one technical paper must be submitted on the project design in the conferences/workshops in IITs, Central Universities Conferences or equivalent International Conferences Sponsored by IEEE/ACM. The examiners must seek answers regarding the suggestions given in the review comments of the paper submitted.

Term-I Project Laboratory Assignments: Tutorial Session

1. Refer Chapter 7 of 1st reference to develop the problem under consideration and justify feasibility using concepts of knowledge canvas and IDEA Matrix.

2. Project problem statement feasibility assessment using NP-Hard, NP-Complete or satisfiability issues using modern algebra and/or relevant mathematical models.

3. Use of divide and conquer strategies to exploit distributed/parallel/concurrent processing of the above to identify objects, morphisms, overloading in functions (if any), and functional relations and any other dependencies (as per requirements).

4. Use of above to draw functional dependency graphs and relevant Software modeling methods, techniques including UML diagrams or other necessities using appropriate tools.

5. lTesting of project problem statement using generated test data (using mathematical models, GUI, Function testing principles, if any) selection and appropriate use of testing tools, testing of UML diagram's reliability.

For Entrepreneurship type project additional assignments: Tutorial Session

6. To sign the MoU/agreement with the Engineering College for the Industry-on-Campus. The college shall provide the company the enclosure with lock-and-key to accommodate required table space, stabilized electricity and the Internet access. The College may host such company for rest two years and further by renewing the MoU/Agreement. The college shall provide all such documents necessary for the establishment of the company. The College shall provide all the facilities as per agreement for Rent FREE, without any charges or fees or returns whatsoever for the First Year or Academic Duration of the activity.

7. To study and establish a partnership company/proprietorship and get the PAN, MVAT, Profession Tax Number and such other necessary legal permissions.

8. Try and prepare clients list and communication with the clients or advertise the product by developing the Company WEB Site.

9. To submit Product Proposal for raising venture capital through government schemes of micro/small sector industries or through private venture capital entities.

10. To submit National/International patent/Copyright for 1st year to the Government Department of Patents and IPR.

Note 1. The guide for an entrepreneurship project shall be a full time approved Professor or Associate Professor possessing qualifications as per AICTE norms.

Note 2. If the students fails to complete the entrepreneurship assignments successfully then the project shall be treated as Internal Project for the purpose of assessment.

Note 3. All projects are expected to exploit multi-core, embedded and distributed computing wherever possible.

REFERENCES

1. Dr. Parag Kulkarni, "Knowledge Innovation Strategy", Bloomsbury Publication, ISBN: 978-93-84898-03-8, 2015
2. Dr. P.K. Sinha et.al., Electronic Health Record, IEEE Press Wiley ISBN: 978-1-118-28134-5
3. McKinsey report: Big data: The next frontier for innovation, competition, and productivity (PDF)
4. Web Resource: http://www.mckinsey.com=insights ... digital competition
5. Web Resource: http://msme.gov.in/mob/home.aspx

17BTIS711 : **Compiler Design Laboratory** **0021**

CA : 40 Marks FE : 60 Marks No. of Total Lectures = 15 Hours

The Lab assignments should include the following:

LEX

- Assignment to understand basic syntax of LEX specifications, built-in functions and Variables.
- Assignment to understand basic syntax of LEX Specifications, built in functions and Variables.

i) Write a program to find out whether given input is a letter or digit
ii) Write a program to find out whether given input is a noun, pronoun, verb, adverb, adjective or preposition
iii) Write a program to count number of lines, characters, words and vowels from given input
iv) Write a program to read input from a file and find & replace a given string
v) Write a program to change case of given input (Upper, Lower, Sentence, Toggle)

- Implement a lexical analyzer for a Sample Language using LEX Implementation should support Error handling.

YACC

- Assignment to understand basic syntax of YACC, generate a calculator using YACC.
- Implement Thermostat temperature control using YACC
- Implement Scientific Calculator using YACC.

Intermediate Code Generation for an Arithmetic Expression –Three Address Code- Quadruples, Triples.
Intermediate Code Generation for Subset of C (for loop)
Assignment to optimize the generated equivalent three-address code.
Code Generation using LEX and YACC.

- **STUDY ASSIGNMENT**

Write an ambiguous CFG to recognize an infix expression and implement a parser that recognizes the infix expression using YACC. Provide the details of all conflicting entries in the parser table generated by LEX and YACC and how they have been resolved.
Students can do a mini project in C to implement various phases of a Compiler considering a simple set of

Instructions and other assumptions.

17BTIS821: PROJECT PHASE II **002010**

CA : 100 Marks FE : 200 No. of Total Hours: 150 Hours

The project involves the following

Preparing a project – brief proposal including

1. Problem Identification
2. A statement of system / process specifications proposed to be developed (block Diagram / Concept tree)
3. Cost benefit analysis
4. Time Line of activities

A report highlighting the design finalization [based on functional requirements & standards (if any)]

A presentation including the following

1. Implementation Phase (Hardware / Software / both)
2. Testing & Validation of the developed system
3. Learning in the project

Consolidated report preparation

1. Project workstation selection, installations and setup along with report to the guide. (recommended submission date:- 3 weeks after commencement of second term)

2. Programming of the project, GUI (if any) as per 1st Term termwork submission. (recommended sub mission date:- Progress report every week during laboratory)

3. Test tool selection for various testing recommended by preferably external guide and generate various testing result charts, graphs etc. including reliability testing. (7 weeks before Term II Conclusion)

4. Review of design and necessary corrective actions taking into consideration feedback report of Term I assessment, and other competitions/conferences participated like IIT,Central Universities, University Conferences or equivalent centers of excellence etc.

5. Students must submit and preferably publish at least one technical paper in the conferences held by IITs, Central Universities Conference or International Conferences in Europe or US.

6. Final term work submissions in the prescribed format given by the guides consisting of a project report consisting of a preliminary report prepared in term-I, detailed design (all necessary UML diagrams) document, User Interface design, Laboratory assignments on test cases and test results generated by selected project testing tool, conclusions, appendix (if necessary), glossary, tools used and references at the end of Term-II after checking, removing/ avoiding the plagiarism. Give an additional assignment per reporting plagiarism to be submitted in the report under the Annex heading extra-work. If the project is the replica of any other previous project or work from other unrelated persons than the students team, such project should be rejected for the term work.

7. The Term II examination is conducted by panel of examiners (preferably guide and expert from Industry having at least 5 years subject experience (or senior teacher in the subject in case of non- availability of industry expert). The project assessment shall be done using Live Project Demonstration [in existing functional condition], using necessary simulators (if required) and presentation by the students. The remarks of Term I assessment and related corrective actions must be assessed during examining the term-work.

Term-II Project Laboratory Assignments

1. Review of design and necessary corrective actions taking into consideration the feedback report of Term I assessment, and other competitions/conferences participated like IIT, Central Universities, University Conferences or equivalent centers of excellence etc.

2. Project workstation selection, installations along with setup and installation report preparations.
3. Programming of the project functions, interfaces and GUI (if any) as per 1 st Term term-work submission using corrective actions recommended in Term-I assessment of Term-work.
4. Test tool selection and testing of various test cases for the project performed and generate various testing result charts, graphs etc. including reliability testing.
5. Additional assignments for the Entrepreneurship Project:
6. Installations and Reliability Testing Reports at the client end.
7. To study Clients Feedback reports and related x generations.
8. To create Documents Pro t and Loss accounts and balance-sheet of the company.

Note: If the student fails to complete the Entrepreneurship assignment successfully then the project shall be treated as Internal Project for the purpose of assessment.

REFERENCES

1. Term-I Project Report with Corrections, plagiarism reports, project replica reports

2. Journals references necessary for the Project