Curriculum Structure & Syllabi
of
B.Tech
In
Computer Scienceand Engineering

(w.e.f. 2014-15)

Vision
Mission
Program Educational Objectives
Program Outcomes
Program Specific Outcomes
Overall Credit Structure
Curriculum
Syllabus

Offered By

DEPARTMENT OF COMPUTER SCIENCE
M. M. M. UNIVERSITY OF TECHNOLOGY,
GORAKHPUR-273010, UP

August 2021

CURRICULA & SYLLABI
B. Tech. Computer Sc.& Engineering

Vision: To become a leader of education, research and innovation in the area of Computer Science and Engineering and to produce under graduates who are globally recognized as innovative and well prepared computing professionals.

Mission:

1. To create, share and disseminate knowledge through research and education in the theory and application ofcomputing.
2. To train the students in different aspects of computing discipline for enhancing, augmenting and updating their technicalskills
3. To inculcate the spirit of analysis, team work, innovation and professionalism among the students

Programme Educational Objectives (PEO)

PEO-1 To inculcate the knowledge of the fundamentals of the mathematics, science& engineeringdisciplinesfordevelopingtheabilitytoformulate,solveandanalyze the problems of Computer Science & Engineering field and to provide them the skills for the pursuit of under-graduate studies, research and development and higher education.

PEO-2 To provide the understanding of the prerequisite of the software, technical aspects and design for coming up with the novel engineering solutions and efficient product developments.

PEO-3 To assist the students in the pursuit of the successful career by adopting the ethical practices and social responsibility.

PEO-4 To provide students the technical as well as soft skills required by the national as well as international organizations.

PEO-5 To elevate cognizance in the students toward the unending learning and to inculcate the ethical and moralways.

PEO-6 To give students the knowledge of the contemporary technologies, practical experiences and possibilities in the field of Computer Science & Engineering and to provide the multidisciplinary knowledge to develop the team spiritand leadership qualities by working on multidisciplinary projects.

Programme Outcome (POs)

PO-1 The students will develop the ability towards the application of fundamental knowledge of computing, mathematics, algorithms and computer science & engineering precepts and rationales for developing the solutions of the critical engineering problems. (Rudimentary engineering analytical skills).

PO-2 The under-graduating students will be able to model and carry out the experiments by using the fundamental knowledge of computer science & engineering discipline and derive the conclusions by analyzing and interpreting the data.

PO-3 The students will be able to analyze, design, implement and assess a computer-based information system, procedure, module or program to fulfil the requirements along with the consideration of economic, social, privacy and reliability constraints. (innovative skills)

PO-4 The students will be able to perform efficaciously in multi-disciplinary teams. (Team spirit)

PO-5 The students will develop the analytical skills to critically analyze, recognize, formulate, and devise solutions to the engineering problems by using the adequate computing and engineering skills and knowledge. (Engineering problem solving skills)

PO-6 The students will have the awareness towards the professional, ethical practices, legal, security & social consequences, and obligation. (Professionalintegrity).

PO-7 The students will have the efficient speaking skill and written/interpersonal communication skills. (Oral & written communication skill)

PO-8 To impart the exhaustive education in the students required to understand and analyze the local and global consequences of computer science & engineering solutions ranging from individuals and organizations to society. (Engineering consequences assessment skills)

PO-9 The students will develop the realization of the requirement of and the ability to indulge in maintaining professional growth and unending learning. (Continuing education cognizance).

PO-10 The students will have the cognition towards the current issues and problems. (Societal awareness)

PO-11 The students will possess the ability to utilize the knowledge of innovative computing equipment's required for engineering tasks. (Pragmaticskills)

PO-12 The students will be able to apply the design and evolution precepts in the development of software and hardware computer systems of variable complications. (Software hardware interface).

Programme Specific Outcome (PSOs):

PSO1. Ability to be lifelong learner to adapt innovation.

PSO2. Ability to learn the best practices regarding ideating, innovating and to be able to attain successful career with globally employable capabilities.

PSO3. Ability to be open to international cultures and demands.

Syllabus and Credit Structure:

Credit Structure for B. Tech. (Computer Science & Engineering)

(Session 2014-2015 onwards)

Category / Semesters	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences &Maths (BSM)	9	14	9	4	-	-	-	-	**36**
Engineering Fundamentals (EF)	12	7	6	2	-	-	-	-	**27**
Department Core (DC)	-	-	10	14	20	25	10	5	**84**
Management (M)	-	-	-	3	3	-	-	-	**6**
Humanities & Social Science Core (HSSC)	4	-	-	-	-	-	-	-	**4**
Project (P)	-	-	-	-	-	-	5	5	**10**
Programme Electives (PE)	-	-	-	-	-	-	8	8	**16**
Open Electives (OE)	-	-	-	-	-	-	-	4	**4**
Humanities & Social Science Electives (HSSE)	-	3	-	-	-	-	-	-	**3**
Total	**25**	**24**	**25**	**23**	**23**	**25**	**23**	**22**	**190**

Curriculum for B.Tech. (Computer Science &Engineering)

Freshman Year, Semester-I

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	BSM	BMS - 01/BAS-01	Engineering Mathematics-I	3	1	0	4
2.	BSM	BPM-01/BAS-02	Engineering Physics-I	3	1	2	5
3.	EF	BCS-02	Introduction to C & Functional Programming	3	1	2	5
4.	EF	BEE-01	Principles of Electrical Engineering	3	1	2	5
5.	HSSC	BHM-01/BAS-03	Professional Communication	3	1	0	4
6.	EF	BCS-03	Software Lab-I	0	0	4	2
7.	AC	BCY-04/BAS-05	Environment & Ecology	2	1	0	-
			Total	**15**	**5**	**10**	**25**

Freshman Year, Semester-II

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	BSM	BMS-02/BAS-07	Engineering Mathematics-II	3	1	0	4
2.	BSM	BAS-08	Engineering Physics-II	3	1	2	5
3.	BSM	BMS-03/BAS-14	Graph Theory	3	1	2	5
4.	EF	BCS-04	Object Oriented Modeling & C++	3	1	2	5
5.	HSSE	BMS-**/BAS-**	Humanities & Social Science Electives	2	1	0	3
6.	EF	BCS-05	Software Lab-II	0	0	4	2
7.	AC	BEC-01	Fundamentals of Electronics Engineering	3	1	2	-
			Total	**14**	**5**	**10**	**24**

Sophomore Year,Semester-III

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	BSM	BMS-06/BAS-24	Applied Computational Methods	3	1	2	5
2.	BSM	BMS-05/BAS-27	Discrete Mathematics	3	1	0	4
3.	EF	BCS-11	Digital Circuits and Logic Design	3	1	0	4
4.	DC	BCS-12	Principles of Data Structures through C/C++	3	1	2	5
5.	DC	BCS-13	Internet & JAVA Programming	3	1	2	5
6.	EF	BCS-14	Software Lab-III	0	0	4	2
7.	AC	MAS 109/110/111	One of the Foreign Languages (French, German, Spanish etc.)	3	1	0	-
			Total	**15**	**5**	**10**	**25**

Sophomore Year,Semester-IV

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	BSM	BMS-09/BAS-26/	Optimization Techniques	3	1	0	4
2.	M	MBA-113	Management Information System	2	1	0	3
3.	DC	BCS-15	Database Management Systems	3	1	2	5
4.	DC	BCS-16	Theory of Computation	3	1	0	4
5.	DC	BCS-17	Computer Organization & Design	3	1	2	5
6.	EF	BCS-18	Software Lab-IV	0	0	4	2
7.	AC	BEC-32	Microprocessors & Application	3	1	2	-
			Total	**14**	**5**	**8**	**23**

Junior Year, Semester-V

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	M	MBA-02	Engineering and Managerial Economics	2	1	0	3
2.	DC	BCS-26	Principles of Operating Systems	3	1	2	5
3.	DC	BCS-27	Computer Graphics	3	1	2	5
4.	DC	BCS-28	Design & Analysis of Algorithms	3	1	2	5
5.	DC	BCS-29	Advanced Computer Architecture	3	1	2	5
6.	AC	BEC-42	Digital Signal Processing	3	1	0	-
			Total	**14**	**5**	**8**	**23**

Junior Year, Semester-VI

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	AC	BCS-30	Seminar	0	0	6	-
2.	DC	BCS-31	Principle of Compiler Design	3	1	2	5
3.	DC	BCS-32	Artificial Intelligence	3	1	2	5
4.	DC	BCS-33	Web Technologies	3	1	2	5
5.	DC	BCS-34	Computer Networks	3	1	2	5
	DC	BCS-35	Software Engineering	3	1	2	5
			Total	**15**	**5**	**10**	**25**

Senior Year, Semester-VII

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	P	BCS-40	Project Part-I	0	0	10	5
2.	DC	BCS-41	Introduction to Machine Learning	3	1	2	5
3.	DC	BCS-42	Parallel & Distributed Computing	3	1	2	5
4.	PE1	BCS-**	Programme Elective-1	3	1	0	4
5.	PE2	BCS-**	Programme Elective-2	3	1	0	4
6.	AC	BCS-45	Industrial/Practical Training	0	0	2	-
			Total	**12**	**4**	**14**	**23**

Senior Year, Semester-VIII

S.N.	Category	Paper Code	Subject	L	T	P	Credits
1.	DC	BCS-43	Mobile Computing	3	1	2	5
2.	PE3	BCS-**	Programme Elective-3	3	1	0	4
3.	PE4	BCS-**	Programme Elective-4	3	1	0	4
4.	OE	BOE-**	Open Elective offered by other Department	3	1	0	4
5.	P	BCS-50	Project Part-II	0	0	10	5
			Total	**12**	**4**	**12**	**22**

Engineering Fundamentals & Department Core (Computer Science & Engineering)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits

		I Year					
1.	BCS-02	Introduction to C & Functional Programming	-	3	1	2	5
2.	BCS-03	Software Lab-I	-	0	0	4	2
3.	BCS-04	Object Oriented Modeling & C++	-	3	1	2	5
4.	BCS-05	Software Lab-II	-	0	0	4	2
		II Year					
5.	BCS-11	Digital Circuits and Logic Design	-	3	1	0	4
6.	BCS-12	Principles of Data Structures through C/C++	-	3	1	2	5
7.	BCS-13	Internet & JAVA Programming	-	3	1	2	5
8.	BCS-14	Software Lab-III	-	0	0	4	2
9.	BCS-15	Database Management Systems	-	3	1	2	5
10.	BCS-16	Theory of Computation	-	3	1	0	4
11.	BCS-17	Computer Organization & Design	-	3	1	2	5
12.	BCS-18	Software Lab-IV	-	0	0	4	2
		III Year					
13.	BCS-26	Principles of Operating Systems	-	3	1	2	5
14.	BCS-27	Computer Graphics	-	3	1	2	5
15.	BCS-28	Design & Analysis of Algorithms	-	3	1	2	5
16.	BCS-29	Advanced Computer Architecture	-	3	1	2	5
17.	BCS-30	Seminar	-	0	0	6	-
18.	BCS-31	Principle of Compiler Design	-	3	1	2	5
19.	BCS-32	Artificial Intelligence	-	3	1	2	5
20.	BCS-33	Web Technologies	-	3	1	2	5
21.	BCS-34	Computer Networks	-	3	1	2	5
22.	BCS-35	Software Engineering	-	3	1	2	5
		IV Year					
23.	BCS-40	Project Part-I	-	0	0	10	5
24.	BCS-41	Introduction to Machine Learning	-	3	1	2	5
25.	BCS-42	Parallel & Distributed Computing	-	3	1	2	5
26.	BCS-43	Mobile Computing	-	3	1	2	5
27.	BCS-45	Industrial/Practical Training	-	0	0	2	-
28.	BCS-50	Project Part-II	BCS-40	0	0	10	5

Programme Electives (Computer Science & Engineering)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
		PE1 & PE2 (VII Semester)					
1.	BCS-51	Advanced JAVA	BCS-13	3	1	0	4
2.	BCS-52	.Net Technology	-	3	1	0	4
3.	BCS-53	LAMP Technology	-	3	1	0	4
4.	BCS-54	Network Programming	BCS-34	3	1	0	4
5.	BCS-55	Mobile Application Programming	BCS-34	3	1	0	4
6.	BCS-56	Linux Administration & System Call Programming	BCS-26	3	1	0	4

7.	BCS-57	Database Administration with ORACLE	BCS-15	3	1	0	4
8.	BCS-58	Data warehousing & Data Mining	BCS-15	3	1	0	4
9.	BCS-59	Analytics and Systems of Big Data	BCS-15	3	1	0	4
10.	BCS-60	Game Theory	-	3	1	0	4
		PE3 & PE4 (VIII Semester)					
11.	BCS-66	Advanced Programming Techniques	-	3	1	0	4
12.	BCS-67	Computer Vision: Foundations and Applications	-	3	1	0	4
13.	BCS-68	Software Reuse	BCS-35	3	1	0	4
14.	BCS-69	Software Verification & Validation	BCS-35	3	1	0	4
15.	BCS-70	Software Design & Construction	BCS-35	3	1	0	4
16.	BCS-71	Software Quality Management	BCS-35	3	1	0	4
17.	BCS-72	Aspect Oriented Programming	-	3	1	0	4
18.	BCS-73	Neural Networks & Fuzzy Systems	-	3	1	0	4
19.	BCS-74	Fundamentals of Cloud Computing	BCS-26 BCS-34	3	1	0	4
20.	BCS-75	Advanced Multi-core Systems	BCS-28	3	1	0	4
21.	BCS-76	Cryptography & Information Security	-	3	1	0	4
22.	BCS-77	Digital Image Processing	BEC-42	3	1	0	4
23.	BCS-78	High Performance Computing	-	3	1	0	4
24.	BCS-79	Introduction to Real Time Systems	-	3	1	0	4
25.	BCS-80	Programming in C	-	3	1	1	5
26.	BCS-81	Data Mining	-	3	1	0	4
27.	BCS-82	Software Testing	-	3	1	0	4
28.	BCS-83	Introduction for information of things	-	3	1	0	4

Subjects for other Departments

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	BCS-01	Introduction to Computer Programming	-	3	1	2	5
2.	BCS-19	Web Designing	-	0	0	4	2
3.	BCS-36	Database Management System, Data Mining & Warehousing	-	3	1	0	4
4.	BCS-37	Network Security & Cryptography	-	3	1	2	5
5.	BCS-44	Object Oriented Techniques & JAVA Programming	-	3	1	0	4
6.	BOE-07	Introduction to Data & File Structures	-	2	1	2	4
7.	BOE-08	Introduction to Web Technology	-	2	1	2	4
8.	BOE-09	Linux & Shell Programming	-	2	1	2	4

Humanities & Social Science Electives

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	BHM-04/BAS-11	Human Values & Professional Ethics	-	2	1	0	3
2.	BHM-05/BAS-12	Industrial Psychology	-	2	1	0	3
3.	BHM-06/BAS-13	Industrial Sociology	-	2	1	0	3

Subjects Offered by the Department

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	BCS-01	Introduction to Computer Programming	-	3	1	2	5
2.	BCS-02	Introduction to C & Functional Programming	-	3	1	2	5
3.	BCS-03	Software Lab-I	-	0	0	4	2
4.	BCS-04	Object Oriented Modeling & C++	-	3	1	2	5
5.	BCS-05	Software Lab-II	-	0	0	4	2
6.	BCS-11	Digital Circuits and Logic Design	-	3	1	0	4
7.	BCS-12	Principles of Data Structures through C/C++	-	3	1	2	5
8.	BCS-13	Internet & JAVA Programming	-	3	1	2	5
9.	BCS-14	Software Lab-III	-	0	0	4	2
10.	BCS-15	Database Management Systems	-	3	1	2	5
11.	BCS-16	Theory of Computation	-	3	1	0	4
12.	BCS-17	Computer Organization & Design	-	3	1	2	5
13.	BCS-18	Software Lab-IV	-	0	0	4	2
14.	BCS-19	Web Designing	-	0	0	4	2
15.	BCS-26	Principles of Operating Systems	-	3	1	2	5
16.	BCS-27	Computer Graphics	-	3	1	2	5
17.	BCS-28	Design & Analysis of Algorithms	-	3	1	2	5
18.	BCS-29	Advanced Computer Architecture	-	3	1	2	5
19.	BCS-30	Seminar	-	0	0	6	-
20.	BCS-31	Principle of Compiler Design	-	3	1	2	5
21.	BCS-32	Artificial Intelligence	-	3	1	2	5
22.	BCS-33	Web Technologies	-	3	1	2	5
23.	BCS-34	Computer Networks	-	3	1	2	5
24.	BCS-35	Software Engineering	-	3	1	2	5
25.	BCS-36	Database Management System, Data Mining & Warehousing	-	3	1	0	4
26.	BCS-37	Network Security & Cryptography	-	3	1	2	5
27.	BCS-40	Project Part-I	-	0	0	10	5
28.	BCS-41	Introduction to Machine Learning	-	3	1	2	5
29.	BCS-42	Parallel & Distributed Computing	-	3	1	2	5
30.	BCS-43	Mobile Computing	-	3	1	2	5
31.	BCS-44	Object Oriented Techniques & JAVA Programming	-	3	1	0	4
32.	BCS-45	Industrial/Practical Training	-	0	0	2	-
33.	BCS-50	Project Part-II	BCS-40	0	0	10	5
33.	BCS-51	Advanced JAVA	BCS-13	3	1	0	4
34.	BCS-52	.Net Technology	-	3	1	0	4
35.	BCS-53	LAMP Technology	-	3	1	0	4
36.	BCS-54	Network Programming	BCS-34	3	1	0	4
37.	BCS-55	Mobile Application Programming	BCS-34	3	1	0	4

38.	BCS-56	Linux Administration & System Call Programming	BCS-26	3	1	0	4
39.	BCS-57	Database Administration with ORACLE	BCS-15	3	1	0	4
40.	BCS-58	Data Warehousing & Data Mining	BCS-15	3	1	0	4
41.	BCS-59	Analytics and Systems of Big Data	BCS-15	3	1	0	4
42.	BCS-60	Game Theory	-	3	1	0	4
43.	BCS-66	Advanced Programming Techniques	-	3	1	0	4
44.	BCS-67	Computer Vision: Foundations and Applications	-	3	1	0	4
45.	BCS-68	Software Reuse	BCS-35	3	1	0	4
46.	BCS-69	Software Verification & Validation	BCS-35	3	1	0	4
47.	BCS-70	Software Design & Construction	BCS-35	3	1	0	4
48.	BCS-71	Software Quality Management	BCS-35	3	1	0	4
49.	BCS-72	Aspect Oriented Programming	-	3	1	0	4
50.	BCS-73	Neural Networks & Fuzzy Systems	-	3	1	0	4
51.	BCS-74	Fundamentals of Cloud Computing	BCS-26 BCS-34	3	1	0	4
52.	BCS-75	Advanced Multi-core Systems	BCS-28	3	1	0	4
53.	BCS-76	Cryptography & Information Security	-	3	1	0	4
54.	BCS-77	Digital Image Processing	BEC-42	3	1	0	4
55.	BCS-78	High Performance Computing	-	3	1	0	4
56.	BCS-79	Introduction to Real Time Systems	-	3	1	0	4

SYLLABI

BMS-01/BAS-01 ENGINEERING MATHEMATICS-I

Course category : Basic Sciences &Maths (BSM)

Pre-requisite Subject : NIL

Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 0

Number of Credits : 4

Course Assessment methods: Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of basic differential operators in various engineering problems.
2. Solve linear system of equations using matrix algebra.
3. Use vectors to solve problems involving force, velocity, work and real-life problems and able to analyze vectors in space
4. Evaluate and use double integral to find area of a plane region and us of triple integral to find the volume of region in 3rd dimension

Topics Covered

UNIT-I **9L**

Differential Calculus: Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable. Taylor's and Maclaurin's theorem. Expansion of function of two variables, Jacobian, Extrema of function of several variables.

UNIT-II **9L**

Linear Algebra: Rank of Matrix, Inverse of a Matrix, Elementary transformation, Consistency of linear system of equations and their solution. Characteristic equation, Eigen-values, Eigen-vectors, Cayley-Hamilton theorem.

UNIT-III **9L**

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables. Application of multiple integral to surface area and volume. Beta and Gamma functions, Dirichlet integral.

UNIT-IV **9L**

Vector Calculus: Gradient, Divergence and Curl. Directional derivatives, line, surface and volume integrals. Applications of Green's, Stoke's and Gauss divergence theorems (without Proofs).

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications.

BPM-01 (BAS-02) ENGINEERING PHYSICS-I

Course category :	Basic Sciences &Maths (BSM)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3 , Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of relativity and its application in Engineering.
2. Quantum Mechanics and its application to understand material properties.
3. Statistical mechanics and its application in study of Macro and Micro scale properties of Matter.
4. Use of the principle of optics in the measurement.
5. Applications of Laser and holography in Engineering.
6. Basic Principles of optical Fibre and its application in Engineering.

Topics Covered

UNIT-I **9L**

Relativistic Mechanics: Inertial and Non-inertial Frames of reference, Galilean transformation, Michelson-Morley Experiment, Postulates of special theory of relativity, Lorentz Transformation, Length contraction, Evidences of length

contraction, Time dilation, Evidences for time dilation, Relativistic velocity transformation, Relativistic variation of mass with velocity, Evidence of mass variation with velocity, Relativistic kinetic energy, Mass energy equivalence, Examples from nuclear physics, Relativistic energy-momentum relation.

UNIT-II **9L**

Quantum Mechanics: De Broglie waves and Group velocity concept, Uncertainty principle and its application, Davisson-Germer experiment, Derivation of Schrodinger equation for time independent and time dependent cases. Postulates of quantum mechanics, Significance of wave function, Application of Schrodinger wave equation for a free particle (one dimensional and three dimensional case), Particle in a box (one dimensional), Simple harmonic oscillator (one dimensional).

UNIT-III **9L**

Physical Optics:

Interference: Interference of light, Interference in thin films (parallel and wedge shaped film), Newton's rings. Refractive index and wavelength determination.

Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate, Polarimeter

UNIT-IV **9L**

Modern Optics

Laser: Spontaneous and stimulated emission of radiation, population inversion, concept of 3 and 4 level Laser, construction and working of Ruby, He-Ne lasers and laser applications.

Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Propagation Mechanism and communication in fiber Single and Multi Mode Fibers, step index and graded index fiber..

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

EXPERIMENTS

1. To determine the wavelength of monochromatic light by Newton's Ring
2. To determine the specific rotation of cane sugar solution using polarimeter
3. To determine the wavelength of spectral lines using plane transmission grating.
4. To verify Brewster's law using rotating Nicol prism
5. To verify Stefan's law by electrical method
6. To Study resonance in LCR circuit with a c source.
7. To determine the height of a tower with a Sextant.
8. To determine the refractive index of a liquid by Newton's ring.

Books & References

1. Introduction to Special theory Relativity-Robert Resnick, Wiley Eastern Ltd.
2. Statistical Mechanics and Properties of Matter- E S R Gopal, John Wiley and Sons
3. Quantum Mechanics: Theory and Applications- AjoyGhatak, Tata McGraw-Hill
4. Optics- AjoyGhatak, Tata McGraw-Hill
5. Optics- N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, S. Chand
6. Fiber optics and laser Principles and Applications-Anuradha De, New Age International

7. Concepts of Modern Physics-Arthur Beiser, Tata McGraw-Hill

BHM-01/BAS-03 PROFESSIONAL COMMUNICATION

Course category :	Humanities & Social Science Core (HSSC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3 , Tutorial : 1 , Practical: 0
Number of Credits :	4
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, and three minor tests and One Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of communication skills, such as, Reading, Writing, Listening and speaking skills.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the communication and soft skills by practice.

Topics Covered

UNIT-I **9L**

Communication

Principles of Communication – Communication as coding and decoding – signs and symbols – verbal and non –verbal symbols – Language AND communication; language VS communication, language as a tool of communication – media/channels for communication : Types of Communication- functional, situational, verbal and non-verbal, interpersonal, group, interactive, public, mass line, dyadic – with illustrations LSRW in Communication – Listening – active vs passive (Talk less, listen more); Speaking - Speech vs. enunciation (mind your tone); Reading – Focus on the structure not on the theme alone, Technical Communication, General Communication,

Barriers of Communication, Levels of Communication

UNIT-II **9L**

Language Acquisition through Grammar, Usage and Mechanics of Writing

Vocabulary, Phrase, Clause, Parts of Speech: Types ,Examples with Use Gender, Singular, Plural, Article, Sequence of Tenses, Use of Modifiers, Sentence-Loose Sentence, Periodical Sentence, Topic Sentence, Paragraph-Different Orders and Methods of Paragraph Writing, Inductive Method, Deductive Method, Spatial Method, Question and Answer Method, Chronological Method, Expository Method, Common Errors, Antonyms, Synonyms, One-word Substitutes, Homophone, Homonym, Comprehension and Précis, Words Frequently Misspelt, Punctuation and Capitalization,

Abbreviations and Numerals ,Proofreading, Using the Library

UNIT-III **9L**

Technical Writing

Report Writing: Meaning, Types, Structure, Methods and Models of Report Writing, Technical Proposal; Concept, Kinds, Layout, and Examples of Technical Proposal, Definitions, Characteristics, Structure, Letter Writing: Importance, Types, Layout, and examples of letters, Scientific and Technical Writing: Features, Methods, Examples,

Project, Thesis and Dissertation
Writing

UNIT-IV **9L**

Spoken and Presentation Skills

Impromptu speech – tackling hesitation, shyness and nervousness in speaking – Public speaking, academic and professional presentations – Group discussions – facilitators and impediments Planning, preparing and delivering a presentation, essentials of presentation - etiquette; clarity; lively delivery – Speech generation; speech rhythm; speech initiators body language – voice, posture and gesture; eye contact; dress codes; verbal crutches; stresses, pronunciation – contextualization – creating and understanding contexts, Speech Drill.

Books & References

1. Complete Course in English - Dixon Robert J., Prentice Hall of India, New Delhi
2. A Practical English Grammar - Thomson and Martinet, ELBS
3. English Pronouncing Dictionary - Jones Daniel, Paperback
4. Spoken English - Bansal ,R.K. &Harrison J.B., Orient Longman, India
5. Handbook of Pronunciation of English Words - Sethi J. & Jindal D.V.A, Prentice Hall of India, New Delhi
6. Word Power Made Easy - Lewis, Norman, Pocket Books
7. Business Correspondence and Report Writing - Sharma R.C. & Mohan Krishna, Tata McGraw Hill
8. Business Communication - Chhabra T.N., Sun India Publication, New Delhi

BEE-01 PRINCIPLES OF ELECTRICAL ENGINEERING

Course category : Department Core (DC)
Pre-requisite Subject : Physics and Math (10+2)
Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, One Minor test, and One Major Theory & Practical Examination.
Course Outcomes
: The student are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Able to understand the basic concepts of network and circuit.
2. To solve the basic electrical circuits.
3. Familiarity with the basic concepts of AC circuits.
4. Introductory concept of measurement, instrumentation, working & performances of different kind of measuring instruments (PMMC, MI).
5. Able solve magnetic circuits.
6. Able to analyze three phase circuits.
7. Introduction and application to different electrical machines.

Topic Covered

UNIT I **9L**

D C Circuit Analysis and Network Theorems:
Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current

sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation Kirchhoff's laws; Loop and nodal methods of analysis; Star-delta transformation Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem.

UNIT II **9L**

Steady- State Analysis of Single-Phase AC Circuits:

AC fundamentals: Sinusoidal, square, and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasor, phasor representation of sinusoidally varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits, Resonance in series and Parallel circuit

Three Phase AC Circuits: Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power, and its measurement

UNIT III **9L**

Measuring Instruments, Magnetic Circuit & 1 phase Transformers

Types of instruments, Construction and working principles of PMMC and Moving Iron type voltmeters & ammeters, Use of shunts and multipliers.

Magnetic circuit, concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis and eddy current losses.

Single Phase Transformer: Principle of operation, Construction, EMF equation, Power losses, Efficiency, Introduction to auto transformer.

UNIT IV **9 L**

Electrical Machines:

Concept of electromechanical energy conversion DC machines: Types, EMF equation of generators and torque equation of motor, Characteristics, and applications of DC Generators & motors

Three Phase Induction Motor: Types, Principle of operation, Torque-slip characteristics, Applications

Single Phase Induction motor: Principle of operation and introduction to methods of starting,

applications.

Three Phase Synchronous Machines: Principle of operation of alternator, emf equation, Principle of operation and starting of synchronous motor, their applications.

EXPERIMENTS

1. Verification of Kirchhoff's law
2. Verification of Norton's theorem
3. Verification of Thevenin's theorem
4. Verification of Series R-L-C circuit
5. Verification of Parallel R-L-C circuit
6. Measurement of Power and Power factor of three phase inductive load by two wattmeter methods
7. To draw the magnetization characteristics of separately excited dc motor.
8. To perform the external load characteristics of dc shunt motor.
9. To perform O.C. and S.C. test of a single-phase transformer

Text Books:

1. "Principles of Electrical Engineering", V. Del Toro; Prentice Hall International
2. "Basic Electrical Engineering", D P Kothari, I.J. Nagarath; Tata McGraw Hill
3. "Basic Electrical Engineering", S N Singh; Prentice Hall International
4. "Fundamentals of Electrical Engineering" B Dwivedi, A Tripathi; Wiley India
5. "Electrical and Electronics Technology", Edward Hughes; Pearson

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BCY-04/BAS-05 ENVIRONMENT & ECOLOGY

Course category : Basic Sciences & Maths (BSM)
Pre-requisites : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Students will acquire basic knowledge in Environment and Ecology, which allows students to gain qualitative and quantitative skills.
2. Students will aware of environmental pollution and control methods along with quality standards of air, water etc along with waste management.
3. Students will able to give systematic account of natural resources their use of exploitation and environmental
4. How to achieve sustainable development through strategies and its threats

Topics Covered

UNIT-I 6

The Multidisciplinary nature of environmental studies, Definition, scope and importance, Need for public awareness. Natural Resources, Renewable and non-renewable resources, Natural resources and associated problems

(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources,

(d) Food resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

(e) Energy resources: Growing energy needs, renewable and non renewable energy sources,
use of alternate energy sources.

UNIT-II 6

Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following

ecosystem: (a) Forest ecosystem (b) Grassland Ecosystem (c) Aquatic ecosystems (ponds, rivers, oceans)
Biodiversity
Introduction- Definition : genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, Endangered and endemic species of India,
Conservation of biodiversity:
UNIT-III 6
Environmental Pollution Causes, effects and control measures of-
(a) Air Pollution. (b) Water Pollution. (c) Soil Pollution (d) Marine Pollution. (e) Noise Pollution. (f) Thermal Pollution.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution
Global warming and green house effect, Acid Rain, Ozone Layer depletion
UNIT-IV 6
Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental Organizations (NGO), Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.
Human Population and the Environment
Population growth, Population explosion- Family Welfare Programme, Environment and human health, Environmental Education, Women Education., Women and Child Welfare
Books & References
1. Environmental Studies - J Krishnawamy , R J Ranjit Daniels, Wiley India
2. Environmental Science - Bernard J. Nebel, Richard T. Right, 9780132854467, Prentice Hall
3. Environment and Ecology - R K Khandal, 978-81-265-4277-2, Wiley India
4. Environmental Science – 8th edition ISV, Botkin and Keller, 9788126534142, Wiley India
5. Environmental Studies - Soli. J Arceivala, Shyam, R Asolekar, McGrawHill India, 2012
6. Environmental Studies - D.L. Manjunath, 9788131709122 Pearson Education India, 2007

BMS-02/BAS-07 ENGINEERING MATHEMATICS – II

Course category : Basic Sciences &Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits : 4
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes

: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

Use of various mathematical techniques such as differential operators, matrix algebra and vector differentiation and integration.

To identify, formulate and solve the real life problems.

To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I 9

Differential Equations: Linear differential equations with constant coefficients (n^th order), complementary function and particular integral. Simultaneous linear differential equations, solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications of differential equations to engineering problems

UNIT-II 9

Special functions: Series solution of second order differential equations with variable coefficient (Frobeneous method). Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials

UNIT-III 9

Laplace Transform: Laplace Transform, Laplace transform of derivatives and integrals. Unit step function, Laplace transform of Periodic function. Inverse Laplace transform, Convolution theorem, Applications to solve simple linear and simultaneous differential equations.

UNIT-IV 9

Fourier Series and Partial Differential Equations: Periodic Functions, Fourier Series of period 2π, Change of interval, Even and Odd functions, Half range Sine and Cosine Series. Harmonic analysis, Partial Differential Equations with constant coefficients

Books & References

Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers

Engineering Mathematics - H.K. Dass and Rama Verma, S. Chand Publications

Engineering Mathematics - N.P. Bali and Manish Goel, Laxmi Publications

Higher Engineering Mathematics - B.V. Ramana, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

BPM-02/BAS-08 ENGINEERING PHYSICS-II

Course category : Basic Sciences &Maths (BSM)

Pre-requisite Subject : NIL

Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 2

Number of Credits : 5

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination

Course Outcomes

: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of crystallography application in Engineering

2. Use of the principles of sound wave and acoustics in civil engineering with the consideration of NDT.
3. Basic principles of electricity and magnetism applied in Engineering.
4. Maxwell's equation of electromagnetic theory and its application in engineering.
5. Basic principles of semiconducting materials and its application.
6. Basic Principles of Superconductivity and its application in Engineering.

Topics Covered

UNIT-I 9

Crystal Structures and X-ray Diffraction: Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Crystal-System Structure, Packing factor (cubic, body and face), Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer.

UNIT-II 9

Sound Waves and Acoustics: Sound waves, intensity, loudness, reflection of sound, echo; Reverberation, reverberation time, Sabine's formula, remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies; Ultrasonics –Production of ultrasonics by Piezo-electric and magnetostriction; Detection of ultrasonics; Engineering applications of Ultrasonics (Non-destructive testing).

UNIT-III 9

Electrodynamics –I: Basic concepts of Gauss's law, Ampere's law and faradays law of electromagnetic induction. Correction of Ampere's law by Maxwell (concept of displacement current), Maxwell's equation, transformation from integral form to differential form, physical significance of each equation

Electrodynamics –II: Maxwell's equation in free space, velocity of electromagnetic wave, transverse character of the wave and orthogonality of E, H and k vectors, Maxwell's equations in dielectric medium and velocity of e. m. wave, comparison with free space, Maxwell's equations in conducting media, solution of differential equation in this case and derivation of penetration depth

UNIT-IV 9

Physics of Advanced Materials

Semiconducting Materials: Concept of energy bands in solids, Carrier concentration and conductivity in intrinsic semiconductors and their temperature dependence, carrier concentration and conductivity in extrinsic semiconductors and their temperature dependence. Hall effect in semiconductors, Compound semiconductors, Optoelectronic Materials.

Superconducting Materials: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type- I and Type-II superconductors, Electrodynamics of superconductors, BCS theory (Qualitative), High temperature superconductors and Applications of Superconductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.

EXPERIMENTS

1. To determine the specific resistance of a given wire using Carrey Foster's Bridge.
2. To study the variation of magnetic field along the axis of current carrying circular coil.
3. To study the Hall's effect and to determine Hall coefficient in n type Germanium.
4. To study the energy band gap of n- type Germanium using four probe method
5. To determine e/m of electron using Magnetron valve
6. To draw hysteresis curve of a given sample of ferromagnetic material
7. To determine the velocity of Ultrasonic waves
8. To determine the Elastic constants (Y, η, σ) by Searl's method

Books & References

1. Introduction to Solid State Physics- Kittel , 7th edition, Wiley Eastern Ltd.
2. Solid State Physics - S. O. Pillai, 5th edition, New Age International.
3. Introduction to Electrodynamics- David J. Griffiths Pearson, New International Edition
4. Semiconductor Devices and Application - S.M. Sze, Wiley
5. Introduction to Nano Technology - Poole Owens, Wiley India
6. Master Hand book of Acoustics - F. Alton Everest and Ken Pohlmann, 5th edition, McGraw Hill

BMS-03/BAS-14 GRAPH THEORY

Course category : Basic Sciences &Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination
Course Outcomes
: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Write precise and accurate mathematical definitions of objects in graph theory.
2. Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
3. Use mathematical definitions to identify and construct examples.
4. Validate and critically assess a mathematical proof.

Topics Covered
UNIT-I 9
Preliminaries: Sets, relations, functions & multi-sets, Inductive definition and proof by induction, Cardinality of sets Basic concepts of Graph Theory: Digraphs, graphs and other similar objects, Representations of diagraphs and graphs, Operations on graphs, degree sequence and isomorphism Connectedness and distance: Walks, trails, circuits, cycles, and paths, Connected digraphs and graphs, Weighted graphs and digraphs and distance
UNIT-II 9
Trees and their applications: Basic properties of trees and forests, Minimum-weight

spanning trees, Enumeration of labeled trees, Rooted trees and uniquely decipherable coding, Tree traversals and parentheses-free notations Networks and flows: Legal flows and capacities of cuts, The Ford-Fulkerson Algorithms and Maxflow-Mincut theorem

UNIT-III 9

Edge and Vertex traversal problems: Euler circuits and Euler trails, Fleury's algorithm and the Chinese Postman problem, Hamilton cycles and the Travelling Salesman problem Planar embeddings of graphs: Basic properties of planar graphs, Kuratowski's theorem and non-planar graphs, The DMP planarity algorithm, Polyhedral graphs and geometric dual

UNIT-IV 9

Colorings and Matchings in graphs: Legal colorings and k-colorable graphs, Chromatic Polynomial and Fourcolor theorem, Matchings in graphs and Stable marriage algorithm Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, branching, Infinite graphs and digraphs

EXPERIMENTS

1. Write a recursive program that computes the value of ln(N!).
2. Write a C program to Implement Euler Circuit which starts and ends on the same vertex.
3. Write a C Program to Implement Hamiltonian Cycle Algorithm.
4. Write a C Program to assign a colour to each of the states so that no two adjacent states share the same colour. The program should output each state and its colour. Example: Alabama touches Florida, Mississippi, Tennessee, and Georgia. Arkansas touches Louisiana, Texas, etc.
5. Graph implementation of BFS and DFS using C.
6. Write a C Program to Implement Euler Circuit problem. In graph theory, this starts and ends on the same vertex.
7. Write a C Program for the 'marriage problem', for N boys and N girls and an NxN binary matrix telling us which pairings are suitable, and want to pair each girl to a boy. Implement perfect matching in a bipartite graph.
8. Write a C program to implement ford-fulkerson algorithm
9. Write A C program for the implementation of the Branch and Bound Algorithm: The Asymmetric Travelling Salesman Problem
10. Write a C program for Dijkstra's Algorithm for Finding Shortest Paths in Non-Negative Weight Graphs.
11. Write a C program to check whether the given graph is tree.
12. Write a C program to extract spanning tree (without using Kruskal and prim's Algorithm).
13. Write a C program to perform following operations on a given 2 connected graph i. Union ii. Intersection iii. deletion of a vertex iv. deletion of any edge v. fusion of 2 vertex
14. Write a C program to input an image (Graph) and find out its adjacency and incidence matrix.
15. Write a C program to extract walk, path from any vertex to any vertex in a given graph.
16. Write a C program for the i. test for emptyness ii. return the number of vertices iii. return the number of edges iv. test if a given vertex exists v. test if a given edge exists vi. add a vertex (this operation does not add any edge) vii. add an edge (this operation

may result in adding new vertices) viii. delete a vertex (this operation may result in deleting edges) ix. delete an edge (this operation may result in deleting vertices)

Textbooks & Reference books

1. Graphs and Hypergraphs -Berge, C., New York: Elsevier, 1973.
2. Theory of Graphs and Its Applications - Berge, C., New York: Wiley, 1962.
3. Modern Graph Theory- Bollobás, B., New York: Springer-Verlag, 1998.

BEC-01 FUNDAMENTAL OF ELECTRONICS ENGINEERING

Course category : Engineering Fundamentals (EF)
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home
assignments, quizzes, practical work, record, viva voce and minor and major theory & practical Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing
this course

1. Able to identify schematic symbols and understand the working principles of electronic devices, e.g., Diode, Zener Diode, LED, BJT, JFET and MOSFETetc.
2. Able to understand the working principles of electronic circuits e.g. Rectifiers, Clipper, Clamper, Filters, Amplifiers and Operational Amplifiers etc. also understand methods to analyse and characterize thesecircuits
3. Able to understand the functioning and purposes of Power Supplies, Test and Measuring equipments such as multimeters, CROs and function generatorsetc.
4. Able to rig up and test small electronicscircuits.

Topics Covered

UNIT-I

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities, Junction diode, p-n junction, depletion layer, v-i characteristics, diode resistance, capacitance, diode ratings (average current, repetitive peak current, non-repetitive current, peak inverse voltage). Diode Applications in rectifier, filters, voltage multipliers, load regulators, clipper and clamper circuits, Breakdown mechanism (Zener and avalanche), breakdown characteristics, Zener resistance, Zener diode ratings, Zener diode application as shunt regulator 9

UNIT-II

Bipolar Junction Transistor (BJT): Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits. Transistor Amplifier: Graphical analysis of CE amplifier, concept of voltage gain, current gain, h- parameter model (low frequency), computation
of Ai, Av, Ri, Ro of single transistor CE and CC amplifier configurations. 9

UNIT-III

FieldEffectTransistors(JFETandMOSFET):Basicconstruction,transistoraction,conceptof pinch off, maximum drain saturation current, input and transfer characteristics,

characteristic 9

equation CG, CS and CD configurations, fixed & self-biasing. MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics. Computation of Av, Ri, Ro, of single FET amplifiers using all the three configurations.
Operational Amplifiers: Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators
UNIT-IV
Switching theory and logic design: Number systems, conversion of bases, Boolean algebra, logic gates, concept of universal gate, canonical forms, Minimization using K-map Operational Amplifiers
Electronics Instruments: Working principle of digital voltmeter, digital multimeter (block diagram approach), CRO (its working with block diagram), measurement of voltage, current, phase and frequency using CRO 9
EXPERIMENTS
A. Compulsory Experiments
1. To identify the components which are used in electroniccircuits.
2. To get familiarization and to study the operation of a function generator instrumentand visualize the types of waveforms produced by a functiongenerator.
3. To study the CRO and to find the Amplitude and Frequency of a sinusoidal waveformusing CRO.
4. To plot and analyze the forward and Reverse Characteristics of Si based P-N junctiondiode.
5. To implement a circuit to study the various applications of OperationalAmplifier.
6. Study of half waverectifier.
7. Operation of diode based clipper and clampercircuits.

B. Optional Experiments
1. Implement a circuit to draw the characteristics of JFET in common sourceconfiguration.
2. Implement a circuit of half wave and full wave rectifiers withfilters.
3. Implement a circuit to draw the characteristics of common emitter BJTamplifier.

Books & References
1. Electronic Devices and Circuits-Boylestad and Nashelsky, 6e, PHI,2001.
2. Electronic Devices and Circuits, A Mottershead, PHI, 2000,6e.
3. Digital Computer Design, Morris Mano, PHI, 2003.
4. Electronic Instrumentation-H.S. Kalsi, 2e, TMH,2007.

BMS- 05/BAS-27 DISCRETE MATHEMATICS

Course category : Basic Sciences &Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits : 4
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes
: The students are expected to be able to demonstrate the following

knowledge, skills and attitudes after completing this course

1. Use logical notation to define different function such as set, function and relation.
2. Use of basic properties of group theory in computer science.
3. Use of graph theory models to solve problems of connectivity and constraint satisfaction, for example, scheduling.
4. Use of induction hypotheses to prove formulae.

Topics Covered

UNIT-I 9

Set Theory, Relation and Function: Definition of sets, Countable and uncountable sets, Venn Diagrams, Proofs of some general identities on sets. Definition and types of relation, composition of relation, equivalence relation, partial order relation. Function: Definition, types of function, one to one, into and onto function, inverse function, composition of functions.

UNIT-II 9

Algebraic Structures: Definition, properties and types of algebraic structures, Semi groups, Monoid, Groups, Abelian group, properties of groups, Subgroups, Cyclic groups, Cosets, Factor group, Permutations groups, Normal subgroups, examples and standard results. Rings and fields: Definition and Standard results.

UNIT-III 9

Graphs: Simple graph, multigraph, graph terminology, representation of graphs, Bipartite, regular, planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, graph colouring, chromatic number, chromatic polynomials. Tree: types and definition, rooted tree, properties of trees.

UNIT-IV 9

Combinatorics: Basic counting Technique, Pigeon-hole principle, Discrete Numeric function, Recurrence relations and their solution, Generating function, Solution of recurrence relations by method of generating function.

Books & References

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with applications to computer science, Tata McGraw-Hill.
2. D. Narsingh, Graph Theory with application to engineering and computer science - Prentice Hall
3. V. Krishnamurthy, Combinatorics: Theory and applications -, East East-West Press PVT. LTD, 1985

BMS-06/BAS-24 APPLIED COMPUTATIONAL METHODS

Course category : Basic Sciences &Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory & Practical Examination
Course Outcomes
: The students are expected to be able to demonstrate the following

knowledge, skills and attitudes after completing this course

1. To find the root of a curve using Bisection, Regula falsi Newton's Method.
2. Use of moments and kurtosis to find the type of curve.
3. To interpolate a curve using Gauss, Newton's interpolation formula.
4. To find the derivative of a curve.
5. To find the area of a curve.

Topics Covered

UNIT-I 9

Numerical Methods: Solution of algebraic and Transcendental equations, Bisection method, Method of False position (Regula-Falsi method) and Newton-Raphson method, Solution of linear simultaneous equations; Guass-Siedel method, Crout's method.

UNIT-II 9

Interpolation and Numerical Integration: Interpolation: Finite Differences, Difference operators, Newton's forward and backward interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula for unequal intervals. Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eight rules.

UNIT-III 9

Numerical Solution of Ordinary Differential Equations and Difference Equations: Picard's method, Taylor's Series method, Euler's method, Modified Euler's method, Runge-Kutta method of order four. Difference equations and their solutions. Rules for finding the particular integral.

UNIT-IV 9

Statistical Methods and Probability Distributions: Frequency Distributions, mean, mode, median, standard deviation, Moments, Skewness, Kurtosis, Types and measurement of Skewness and Kurtosis. Correlation; Regression and regression lines. Binomial Distribution, Poisson's Distribution, Normal Distribution.

Experiments

1. To implement Regula-Falsi method to find root of algebraic equation.
2. To implement Newton-Raphson method to find root of algebraic equation.
3. To implement Newton's Divided Difference formula to find value of a function at a point.
4. To implement Numerical Integration by using Simpson's one-third rule.
5. To implement numerical solution by using Runge-Kutta method of order four to find solution of differential equation.
6. To implement numerical solution of differential equation by Picard's method.
7. To implement numerical solution of differential equation by using Euler's method.
8. To estimate regression equation from sampled data and evaluate values of standard deviation, regression coefficient.

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications.

BMS-09/BAS-26 OPTIMIZATION TECHNIQUES

Course category : Basic Sciences &Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits : 4
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes
: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To find the root of a curve using iterative methods.
2. To interpolate a curve using Gauss, Newton's interpolation formula.
3. Use the theory of optimization methods and algorithms developed for various types of optimization problems.
4. To apply the mathematical results and numerical techniques of optimization theory to Engineering problems.

Topics Covered
UNIT-I 9
Classical Optimization Techniques: Single variable optimization, Multi-variable with no constraints. Non-linear programming: One Dimensional Minimization methods. Elimination methods: Fibonacci method, Golden Section method.
UNIT-II 9
Linear Programming: Constrained Optimization Techniques: Simplex method, Solution of System of Linear Simultaneous equations, Revised Simplex method, Transportation problems, Karmarkar's method, Duality Theorems, Dual Simplex method, Decomposition principle.
UNIT-III 9
Non-Linear Programming: Unconstrained Optimization Techniques: Direct search methods: Random jumping method, Univariate method, Rosenbrock's method. Indirect search methods: Steepest Descent method, Cauchy-Newton Methods, Newton's method.
UNIT-IV 9
Geometric Programming: Polynomial, Unconstrained minimization problem, Degree of difficulty. Solution of an unconstrained Geometric Programming problem. Constrained minimization complementary Geometric Programming, Application of Geometric Programming.

Books & References
1. S.S. Rao; Engineering Optimization, New Age International
2. E.J. Haug and J.S. Arora; Applied Optimal Design, Wiley New York
3. Kalyanmoy Deb; Optimization for Engineering Design, Prentice Hall of India

MBA-113 MANAGEMENT INFORMATION SYSTEM

Course category : Departmental Core
Pre- requisites : -
Contact hours/week : Lecture: 2, Tutorial: 1, Practical:0

Number of Credits : 3
Course Assessment: Continuous assessment through tutorials, assignments, Methods Quizzes and Minor test and Major Theory Examination
Course Outcome:
1. Understands the concept, its development and management support for the Management Information System
2. Ability to define needs and dimensions of MIS, steps for short- and long-range plans and budget for MIS.
3. Analyses the elements and data sources, constraints and develops formats and documents of MIS.
4. Develops methods, planning for implementation and process of evaluation of MIS

UNIT I6
Meaning and role of Management Information System, Development of Management Information system, Organisation for Management Information System, Systems and user training; Top Management Support for Management. Information System
UNIT II 6
Meaning, needs and dimension of Management information system Plan, Strategic Planning for Management Information System, Step in Planning; Information System; Steps in Planning Information needs for short and long- range plans budgeting for management information system.
UNIT III 6
Information elements and data sources; constraints in Management Information System design, Information flow charts; Documentation and Formats in Management Information System, Alternative Approaches to Design.
UNIT IV 6
Methods and tasks in implementation, Planning for implementation, Behavioural implications in Management Information System, Approaches and process of evaluation of Management Information System. Case Study

Books & References:

1. Brein James, Computer in Business Management An Introduction
2. Murdick, Robert G,.Information System for Modern Management
3. ContarJesome, Management Information System
4. Bentley Trevoi, Management Information System and Data Process
5. Davis Gozdam B. &Doson, Modern Information System
6. Jawedekar W.S., Management Information System
7. Schulthesis, Management Information System.

BEC-32 MICROPROCESSORS & APPLICATIONS
Course category : Department Core (DC)
Pre-requisite Subject : Digital Electronics and Circuits(BEC-12)
Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One MajorTheory& Practical
Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Acquired knowledge about 8085 Microprocessor and supporting devices.
2. Foster ability to write the assembly language programming using 8085 microprocessor.
3. Foster ability to understand 8086 microprocessor and also develop programming skill.
4. Foster ability to develop microprocessor-based system using different peripheral devices.

Topics Covered

UNIT-I 9

Introduction to Microprocessors: Evolution of Microprocessors, Microprocessor Architecture and its operations, Memory devices, I/O Devices, 8-bit Microprocessor (8085): Introduction, Signal Description,RegisterOrganization,Architecture,BasicInterfacingConceptsforMemoryand I/O Devices

UNIT-II 9

8085 Assembly Language Programming: Instruction Classification, Instruction Format, Addressing Modes, 8085 Instructions: Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Flow Chart, Writing assembly language programs, Programming techniques: looping, counting and indexing.

UNIT-III 9

16-bit Microprocessors (8086/8088): Architecture, Physical address segmentation, memory organization, Bus cycle, Addressing modes, difference between 8086 and 8088, Introduction to 80186 and 80286, Assembly Language Programming of 8086/8088.

UNIT-IV 9

Data Transfer Schemes: Introduction, Types of transmission, 8257 (DMA), 8255 (PPI), Serial Data transfer (USART 8251), Keyboard-display controller (8279), Programmable Interrupt Controller (8259), Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, Interfacing of 8253, applications, ADC and DAC

EXPERIMENTS

1. Write a program using 8085 Microprocessor for Decimal addition and subtraction of two numbers.
2. Write a program using 8085 Microprocessor for Hexadecimal addition and subtraction of two numbers.
3. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
4. To perform multiplication and division of two 8 bit numbers using8085.
5. To find the largest and smallest number in an array of data using 8085 instructionset.
6. To write a program to arrange an array of data in ascendingorder.
7. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instructionset.

8. To write a program to initiate 8251 and to check the transmission and reception ofcharacter.
9. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six differentmodes.
10. To interface 8255 with 8085 and verify the operation of 8255 in differentmodes.
11. To interface 8259 with 8085 and verify the operation of8259.
12. Serial communication between two 8085 microprocessors through RS-232 C port.

Books & References

1. R. Singh and B. P. Singh: Microprocessor Interfacing and Application, New Age International Publishers, 2nd Edition.
2. D. V. Hall: Microprocessors Interfacing, TMH (2ndEdition).
3. R. S. Gaunkar: Microprocessor Architecture, Programming and Applications with 8085/8080, PenramPublication
4. Y.C. Liu and G.A. Gibson: Microcomputer Systems: The 8086/8088 FamilyArchitecture
Programming and Design, PHI 2nd Edition,

MBA-02 ENGINEERING AND MANAGERIAL ECONOMICS 3 Credits (2-1-0)

Course category : Program Elective
Pre- requisites : General Management
Contact hours/week : Lecture: 2, Tutorial: 1, Practical:0
Number of Credits : 3
Course Assessment: Continuous assessment through tutorials, assignments, Methods Quizzes and Minor test and Major Theory Examination

Course Outcome :

1. Students will acquire basic knowledge in Engineering & managerial economics, which
allows students to gain theoretical and empirical skill of economics.
2. To make Engineering students prepared for economic empowerment so that they could manage their wealth, help them in starting their own business or during managerial period.
3. Students will develop Interdisciplinary skills which can help them to thrive in the lifelong changing environment in various fields of Industry of Economics.
4. Students will acquire practical knowledge of economics, the kind of markets, cost
theory, various issues of demand and other major economic concepts.
5. Able to explain succinctly the meaning and definition of managerial economics; elucidate on the characteristics and scope of managerial economics.
6. Able to describe the techniques of managerial economics.
7. Able to explain the applications of managerial economics in various aspects.
8. To learn about the management and economics of the industrial environment

UNIT I6

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

Basic Concepts: Demand Analysis, Law of Demand, Determinates of Demand,

Elasticity of Demand Price, Income and cross Elasticity. Uses of concept of elasticity of demand in managerial decision

UNIT II 6

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

UNIT III 6

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

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

UNIT IV 6

Concept of Goals, Resources, Efficiency & Effectiveness; Introduction to Management discipline and activity, Managerial Roles and Skills; Management Thought and Thinkers-Details: Scientific Management; Classical

Organization Theory; Neo-Classical Theory; Systems Approach; Contingency Approach. Managerial Functions and Decision Making

Books & References:

1. KoutsoyiannisA : Modern Microeconomics, ELBS.
2. Managerial Economics for Engineering : Prof. D.N. Kakkar
3. Managerial Economics : D.N. Dwivedi
4. Managerial Economics : Maheshwari.
5. Principles & Practices of Management : L.M. Prasad
6. Industrial Economics and Principles of Management: T.N. Chabra

BEC-42 DIGITAL SIGNAL PROCESSING

Course category : Department Core (DC)
Pre-requisite Subject : Signals and Systems (BEC-13)
Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits : 4
Course Assessment methods : Continuous assessment through tutorials, attendance, home
assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Able to analyze signals using the Discrete Fourier Transform and Fast Fourier Transform.
2. Able to understand the characteristics of infinite impulse response (IIR) filters and learn designing IIR filters for filtering undesired signals.
3. Able to understand the characteristics of finite impulse response (FIR) filters and learn designing FIR filters for filtering undesired signals.
4. Able to implement digital filters in a variety of forms:-Direct form I & II, Parallel, Cascade and lattice structure.

Topics Covered

UNIT-I 9

Discrete Fourier Transforms: Definitions, Properties of the DFT, Circular Convolution, Linear Convolution
Fast Fourier Transform Algorithms: Introduction, Decimation in Time (DIT) Algorithm, Computational Efficiency, Decimation in Frequency (DIF) Algorithm.
UNIT-II 9
IIR Filter Design: Structures of IIR – Analog filter design – Discrete time IIR filter from analog
filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.
UNIT-III 9
FIR Filter Design: Filter design using windowing (Rectangular Window, Hamming window,
Hanning window, Blackman window, Kaiser window), Frequency sampling technique.

UNIT-IV 9
Realization of Discrete Time Systems: FIR systems – Direct form, cascaded, parallel and lattice structures, IIR systems – Direct form, cascaded, parallel, lattice and lattice ladder structures
Finite Word length Effects: Quantization effect in filter coefficients, round-off effect in digital
filters
Books & References
1. John G Prokias, Dimitris G Manolakis, "Digital Signal Processing", PearsonEducation.
2. Oppenheim & Schafer, "Digital Signal Processing"PHI
3. Johnny R. Johnson, "Digital Signal Processing", PHI Learning Pvt Ltd.,2009.
4. S. Salivahanan, ""Digital Signal Processing" Mc Graw HillEducation

BHM-04/ BAS-11 HUMAN VALUES & PROFESSIONAL ETHICS
Course category : Humanities & Social Science Electives (HSSE)
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, attendance, home
assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
1. To create conducive environment for professionals to grow as good and responsible human beings imbibing values and ethics.
2. Understanding the significance of environment.
3. Developing humanitarian outlook.
Topics Covered
UNIT-I 6
Origin, Meaning, and Definition of Value, Types of Values, Individual Value, Family Value,
Societal Value, Human Value, Value in Education System, Understanding Happiness

and Prosperity, Self Exploration and Natural Acceptance.

UNIT-II 6

Harmony in family, Harmony in Society, Values Leading to Harmony, Creating a world family, Harmony in Nature, Environment and Sustainable Developmental, Legal aspects of Environment,

Holistic Perspectives of Values, Existence and Co-existence.

UNIT-III 6

Origin, Meaning and Definition of Ethics, Ethics: The science of the Morality of The Art of

Correct Living ,Ethics in Human Acts, Ethics and Religion, Ethical Norms and Laws ,Ethics in Literature, Ethics in Science and Technology.

UNIT-IV 6

Ethical Approaches:- Theistic Approach, Atheistic Approach, General and Special Ethics, Professional Ethics: Ethics at work place, Ethics as Skill, Values and Ethics, Ethics with Value Education, Managerial and Business & Corporate Ethics, Corporate Social Responsibilities.

Books & References

1. Bangaria ,G.P et.al A foundation course in Human Values and Professional Ethics, Excel books.
2. Govindrajan, M Professional Ethics and Human Values, Eastern Economy Edition
3. Naagrazan, R.S. Textbook on Professional Ethics and Human Values, New age International.
4. Misra, Anuranjan and Shukla, Dr. R.K. Human values and Professional Ethics, Amazon(Paper Back).
5. Fernando, A.C Business Ethics: An Indian Perspective, Pearson,India.

BHM-05/BAS-12 INDUSTRIAL PSYCHOLOGY

Course category : Humanities & Social Science Electives (HSSE)

Pre-requisite Subject : NIL

Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0

Number of Credits : 3

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of psychology, it problems and understanding.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the industrial problems from psychological eyes.

Topics Covered

UNIT-I 6

Introduction to Industrial Psychology and its basic concepts

Nature, Importance and scope of Industrial Psychology, Scientific management, Time and motion study and human relations school

UNIT-II 6

Individual in workplace

Motivation and job satisfaction, Stress management, Organisational culture, Leadership and group- dynamic.

UNIT-III 6

Work environment, Recruitment and selection

Engineering Psychology, Fatigue and boredom, Work environment, Accident and safety, Job- analysis, Recruitment and selection, Psychological tests.

UNIT-IV 6

Performance management and training

Performance appraisal, Importance and Methods of Performance appraisal, Training and development- Concepts and Benefits to the organization.

Books & References

1. Miner, J. B. (1992). Industrial/Organizational Psychology. N Y: McGraw Hill
2. Blum & Naylor (1962). Industrial Psychology. Its Theoretical & Social Foundations CBS Publication
3. Aamodt, M. G. (2007). Industrial/Organization Psychology: A Applied Approach (5e) Wadsworth /Thompson: Belmont, C. A.
4. Aswathappa K. (2008). Human Resource Management (Fifth edition) New Delhi: Tata McGraw Hill
5. Archana Despandey (2010). Industrial Psychology, Sun India Publications, New Delhi.

BHM-06/BAS-13 INDUSTRIAL SOCIOLOGY

Course category : Humanities & Social Science Electives (HSSE)

Pre-requisite Subject : -

Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0

Number of Credits : 3

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of sociology, it problems and understanding.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the industrial problems from sociological perspectives.

Topics Covered

UNIT-I 6

Introduction to Industrial Sociology

Nature, Scope and importance of Industrial Sociology, Development of Industrial Sociology and other social sciences. Understanding social structure and social processes: Perspectives of Marx,
Weber & Durkheim

UNIT-II 6

Rise and development of industry

Early industrialisation- Types of productive systems- Evolution of Productive system and Development of Industry, Primitive Stage, Agrarian economy Stage, Handicrafts Stage, Guild System, Feudal or Manorial System, Putting out System, Industrial Revolution, Industrialisation-
Causes and Consequences.

UNIT-III 6

Contemporary issues in Industrial Sociology Industrial Policy Resolutions

Social change in contemporary India: Modernization and globalization, Secularism and

communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization ,Industrial Grievances, Industrial conflicts, Industrial disputes in
India, Strike and Lock-out, Promote industrial Peace. Industrial Policy Resolutions.
UNIT-IV 6
Industrial relations machinery in India
Tripartite and Bipartite Machinery, Code of discipline and standing orders and Trade unionism, The National Commission on Labour, Industrial Relations and Technology, Sociological Approach to Industrial relations
Books & References
1. Durae, Pravin. (2013). Dorling. Kindersley (India) P. Ltd. Pearson education in South Asia.
2. Archana Despandey (2010). Industrial Sociology., Sun India Publications, New Delhi.
3. Ramaswamy, E.A. and Ramaswamy, U. (1981), Industry and Labour, OU Press
4. Dhanagare, D.N. , Themes and Perspectives in Indian Sociology, Rawat
5. Chandoke, Neera& Praveen Priyadarshi (2009), Contemporary India: Economy, Society and Politics, Pearson

MHM-104/MAS-109 FOREIGN LANGUAGE-FRENCH

Course category : Audit Course
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
1. Use of various facets of French language, it problems and understanding.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the French knowledge
Topics Covered
UNIT-I 6
Alphabets and numbers
Simple Grammar: Basics of French conversation (To greet a person, Introducing oneself, Asking basic information)
UNIT-II 6
Simple Grammar: Name and locate objects, colours and simple description of people.
Simple Grammar: Asking for directions, Giving suggestions.
UNIT-III 6
Simple Grammar: Indicate date and time. Asking and giving information on one's profession and
activities.
UNIT-IV 6
Simple Grammar: Use of past tense. Narrating past events. Giving one's opinion.
Books & References
1. ―Taxi‖ – Guy Cappelle and Robert Menand.

2. NSF I (Nouveau sans frontières) - Philippe Dominique & Jacky Girardet.
3. NouvelEspace I - Guy Cappelle
4. Cadences I – D. Berger & L. Mérieux

MHM-105/MAS-110 FOREIGN LANGUAGE-GERMAN

Course category : Audit Course
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, attendance, home
assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of German Language, it problems and understanding
2. to identify, formulate and solve the real life problems with positive attitude
3. to inculcate the habit of learning and developing the German knowledge

Topics Covered

UNIT-I 6

- Alphabets and numbers (1 - 20)
- Simple Grammar: Articles (Definite, Indefinite, Negative), Nouns, Gender; Singular and plural. Conjugation of the auxiliary verb ―To be‖ ―Sein‖
- Contextual Vocabulary and Dialogue: Greeting, Self Introduction, Simple questions.
- Hard Facts of Germany: (i) Fall of Berlin Wall (ii) Unification of Germany

UNIT-II 6

- Numbers (20 – 100)
- Simple Grammar: Conjugation of verbs, pronouns (personal and interrogative), Present tense, Imperative tense, auxiliary verb ―To have‖, ―Haben‖, Nominative and accusative cases.
- Contextual Vocabulary and Dialogue: At the Railway Station, Airport.
- Hard Facts of Germany: Education System.

UNIT-III 6

- Simple Grammar: Modal verbs, Past and perfect tenses, Dative case.
- Contextual Vocabulary and Dialogue: Idiomatic expressions, One's family and background, Reading the time, days, months and year
- Hard Facts of Germany: Germany and the European Union.

UNIT-IV 6

- Simple Grammar: Irregular verbs, Separable and inseparable verbs,Reflexive pronouns, Possessive pronouns Revision of Grammar learn so far
- Contextual Vocabulary and Dialogue: Daily life, Meals, How to place an order in a restaurant.
- Hard Facts of Germany: Presentation of topics on German Civilization discussed earlier.

Books & References

1. ―KommMit‖ – Level I – Holt, Rinehart & Winston
2. ―Moment Mal!‖ - Level I
3. ―Themen‖ - Level I
4. ―Facts about Germany‖

5. ―Deutsch FÜr Ausländer‖ – Schulz-Griesbach

MHM-106/MAS-111 FOREIGN LANGUAGE-SPANISH

Course category : Audit Course
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of Spanish Language, it problems and understanding.
2. to identify, formulate and solve the real life problems with positive attitude
3. to inculcate the habit of learning and developing the Spanish knowledge

Topics Covered

UNIT-I 6

- Alphabet
- Introducing oneself
- Pronunciation
- Nouns, gender of the nouns
- Singular and plural of the nouns Articles: definite and indefinite
- Subject pronouns
- Number (1~100)

- Name of months and days

UNIT-II 6

- Present indicative of the two auxiliaries: Ser/Estar – Tener
- Hay / Están / Dóndeestá /están
- Adjectives
- The interrogative adjectives and pronouns (cuanto? cual?)
- Nationalities
- Idiomatic expressions with ―Tener‖ (Tener hambre/ sed/...)
- Culture and civilization

UNIT-III 6

- Present indicative of the three conjugations (AR-ER-IR)
- Negation
- Interrogative sentences
- Present indicative of a few common irregular verbs
- Present indicative of ―ir‖ and ―venir‖
- Possession (de/ de quién)
- Culture and civilization

UNIT-IV 6

- Prepositions and their combination with the articles
- Possessive adjectives and pronouns
- Use of prepositions with ‖ir‖ and ―venir‖
- Present indicative of the verbs. Querer- Poder- Deber/Tener que
- Asking and expressing time
- Family vocabulary (family relations)
- Culture and Civilization

Books & References

1. Virgilio Borobio, Nuevo ELE 1, Curso de Español para extranjeros,2002, SM, Madrid.
2. Luis Aragonés y Ramón Palencia: Gramática de uso del Español, teoría y práctica, Ed. SM, Madrid.
3. Lisa Prange y Francisca Pichardo Castro: Por Turnos, Actividades para aprenderespañoljugando, Ed. Difusión, Madrid.
4. Chamorro, M. D.: Abanico, libro del alumno, Ed. Difusión, Madrid.
5. Deutsch FÜr Ausländer – Schulz-Griesbach

BCS-01 INTRODUCTION TO C PROGRAMMING

Course Category	:	Engineering Fundamental (EF) for other Departments
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Read and understand Cprograms.
2. Discuss basic theory and practice ofprogramming.
3. Design and implement practical programs using Clanguage.
4. Use compiler and feel comfortable with Windowsenvironment
5. Identify and fix common Cerrors

Topics Covered

UNIT-I

Basics of Computer: Introduction to Digital Computer, Basic Operations of Computer, Functional Components of Computer, Classification of Computers. Introduction to Operating System: DOS, Windows, Linux, Function, Services and Types. Basics of Programming: Approaches to Problem Solving, Concept of Algorithm and Flow Charts, Types of Computer Languages:- Machine Language, Assembly Language and High Level Language, Concept of Assembler, Compiler, Loader and Linker. 9

UNIT-II

Standard I/O in "C", Fundamental Data Types and Storage Classes: Character Types, Integer, Short, Long, Unsigned, Single and Double-Precision Floating Point, Storage Classes, Automatic, Register, Static and External, Operators and Expressions: Using Numeric and Relational Operators, Mixed Operands and Type Conversion, Logical Operators, BitOperations, Operator Precedence and Associativity, C Conditional Program Execution: Applying if and Switch Statements, Nesting if and else, Restrictions on switch Values, Use of Break, Program Loops and Iteration: Uses of while, do and for Loops, Multiple Loop Variables, Assignment Operators, Using Break and Continue 9

UNIT-III

Arrays: One Dimensional, Multidimensional Array and their Applications, Declaration and Manipulation of Arrays Structures: Purpose and Usage of Structures, Declaring Structures, Assigning of Structures, Strings: String Variable, String Handling Functions, Array of Strings, Functions: Designing Structured Programs, Functions in C, User Defined and Standard Functions, Formal vs. Actual Arguments, Function Category, Function Prototype, Parameter Passing, Recursive Functions. Storage Classes: Auto, Extern, Register and Static Variables 9

UNIT-IV

Pointers: Pointer Variable and its Importance, Pointer Arithmetic and Scale Factor, Compatibility, Dereferencing, L value and R-Value, Pointers and Arrays, Pointer and Character Strings, Pointers and Functions, Array of Pointers, Pointers to Pointers Dynamic Memory Allocation Structure and Union: Declaration and Initialization of Structures, Structure as Function Parameters, Structure Pointers, Unions. File Management: Defining and Opening A File, Closing A File, Input/Output Operations in Files, Pre-Processor Directives, Command Line Arguments. 9

EXPERIMENTS

1. Write a program that finds whether a given number is even orodd.
2. Write a program that tells whether a given year is a leap year ornot.
3. Write a program that accepts marks of five subjects and finds percentage and prints grades according to the followingcriteria:
   a. Between90-100%--Print„A"
   b. 80-90%--Print„B"
   c. 60-80%---Print„C"
   d.---------- Below60% Print„D"
4. Write a program that takes two operands and one operator from the user and perform the operation and prints the result by using Switchstatement.
5. Write a program to print sum of even and odd numbers from 1 to Nnumbers.

6. Write a program to print the Fibonacciseries.
7. Write a program to check whether the entered number is prime ornot.
8. Write a program to find the reverse of anumber.
9. Write a program to print Armstrong Numbers from 1 to100.
10. Write a program to convert binary number into decimal number and viceversa.
11. Write a program that simply takes elements of the array from the user and finds the sum oftheseelements.
12. Write a program that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and printsthem.
13. Write a program to find the minimum and maximum element of thearray.
14. Write a program to search an element in array using LinearSearch.
15. Write a program to sort the elements of the array in ascending order using Bubble Sort technique.
16. Write a program to add and multiply two matrices of orderNxN.
17. Write a program that finds the sum of diagonal elements of a MxNmatrix.
18. Define a structure data type TRAIN_INFO. The typecontain
    a. Train No.: integertype
    b. Train name:string
    c. Departure Time: aggregate typeTIME
    d. Arrival Time : aggregate typeTIME
    e. Start station:string
    f. End station :string

    The structure type Time contains two integer members: hour and minute. Maintain a train Time table and
19. implement the following operations:
    i. List all the trains (sorted according to train number) that depart from a particular section.
    ii. List all the trains that depart from a particular station at a particulartime.
    iii. List all he trains that depart from a particular station within the next one hour of a giventime.
    iv. List all the trains between a pair of start station and endstation.
20. Write a program to swap two elements using the concept ofpointers.
21. Write a program to compare the contents of two files and determine whether they are same ornot.

Textbooks

1. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 7th edition, Pearson
2. Childt ,HerbertComplete reference with C Tata McGraw Hill

Reference books

1. Kerninghan and Ritchie, The C programming language, Prentice Hall
2. Samuel P. Harbison, and Guy L. Steele Jr., C-A Reference Manual, Fifth Edition, Prentice Hall, 2002

BCS-02 INTRODUCTION TO C & FUNCTIONAL PROGRAMMING

Course Category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1, Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the

Following knowledge, skills and attitudes after completing this course.

1. Basic Terminology used in ComputerProgramming.
2. Programs Development in C Language by Writing, Compiling andDebugging.
3. Design of Programs involving Simple Statements, Conditional Statements, Iterative Statements, Array, Strings, Functions, Recursion, Structure andUnion.
4. Difference between Call by Value and Call byReference.
5. Dynamic Memory Allocations and Use ofPointers.
6. Basic Operations on aFile.
7. Basics of FunctionalProgramming.

Topics Covered

UNIT-I

Basics of Programming: Approaches to Problem Solving, Concept of Algorithm and Flow Charts, Types of Computer Languages-Machine Language, Assembly Language and High Level Language, Concept of Assembler, Compiler, Loader and Linker. 9

Data types, Operators, Expressions, Operator Precedence and Associativity

Fundamentals of C Programming: Structure of C Program, Writing and Executing the First C Program, Components of C Language. Standard I/O in C

Conditional program execution: Applying if and switch Statements, Nesting if and else

Program Loops and Iterations: use of while, do while and for Loops, Multiple Loop Variables, Use of break and continue Statements.

UNIT-II

Arrays: One Dimensional, Multidimensional Array and Their Applications, Declaration and Manipulation of Arrays 9

Strings: String Variable, String Handling Functions, Array of Strings

Functions: Designing Structured Programs, Functions in C, User Defined and Standard Functions, Formal vs. Actual Arguments, Function Category, Function Prototype, Parameter Passing, Recursive Functions.

Storage classes: Auto, Extern, Register and Static Variables

UNIT-III

Pointers: Pointer Variable and its Importance, Pointer Arithmetic Pointers and Arrays, Pointer and Character Strings, Pointers and Functions, Array of Pointers, Pointers to Pointers, Dynamic Memory Allocation 9

Structure and Union: Declaration and Initialization of Structures, Structure as Function Parameters, Structure Pointers, Unions.

File Management: Defining and Opening a File, Closing a File, Input/ Output Operations in Files, Random Access to Files, Error Handling

The Pre-processor Directives, Command Line Arguments, Macros

UNIT-IV

Principles of Functional Programming: Expressions, Evaluations, Functions and Types 9

Type Definitions and Built-in Types: Numbers, Characters, Strings and Lists. Basic Operations on Lists, Including Map, Fold And Filter, together with Their Algebraic Properties. Recursive Definitions and Structural Induction, Simple Program Calculation, Infinite Lists and Their Uses

EXPERIMENTS

1. Write a program to find the nature of the roots as well as value of the roots. However, in case of imaginary roots, find the real part and imaginary partseparately.
2. Fibonaccisequenceisdefinedasfollows:thefirstandsecondtermsinthesequenceare0and
   1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first n terms of the sequence. For example, for n = 8, the outputshould be 0 1 1 2 3 5 8 13
3. Write a program to print all the prime numbers between m and n, where the value of m and n is supplied by theuser.
4. The number such as 1991 is a palindrome because it is same number when read forward or backward. Write a program to check whether the given number is palindrome ornot.
5. A positive integer number IJK is said to be well-ordered if I < J < K. For example, number138 is called well-ordered because the digits in the number (1, 3, 8) increase from left to right, i.e., 1 < 3 < 8. Number 365 is not well-ordered because 6 is larger than 5. Write a program that will find and display all possible three digit well-ordered numbers. The program should also display the total number of three digit well-ordered numbersfound.
6. Write a function to computer the highest common factor of integer numbers m and n. Use this function to find the highest common factor of integer numbers

a andb.

7. Write a program to multiply matrix A (m×n) by B (p×q), given that n =p.
8. Write a program to sort a list of n integer numbers in descending order using bubble sort method.

Textbooks

1. Jeri R. Hanly and Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition,
   Pearson
2. Schildt ,Herbert, Complete Reference with C, Tata McGraw Hill
3. Kerninghan and Ritchie,The C programming Language, 2nd Edition, Prentice Hall
4. Richard Bird, Introduction to Functional Programming using Haskell, 2nd Edition, Prentice-Hall
   International, 1998

Reference books

1. Greg Michaelson, An Introduction to Functional Programming Through Lambda Calculus,
   Dover Edition, Addition Wesley Publication
2. Samuel P. Harbison, and Guy L. Steele Jr., C-A Reference Manual, Fifth Edition, Prentice Hall, 2002

BCS-03 SOFTWARE LAB-I

Course Category	:	Engineering Fundamental (EF)
Pre-requisite	:	NIL
Subject Contact Hours/Week	:	Lecture : 0, Tutorial : 0, Practical: 4
Number of Credits	:	2
Course Assessment Methods	:	Continuous assessment through three Viva voce, Practical work/record, attendance and Major Practical Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. BasicTerminologyusedinC, UseofStandardCLibraryandEvaluationofExpressions.
2. Programming in C Language by Writing, Compiling andDebugging.
3. Designing of Programs involving Simple Statements, Conditional Statements, Iterative Statements, Array, Strings, Functions, Recursion, Structure andUnion.
4. Basic PointerProgramming.
5. Programming for Searching andSorting.
6. Basic Operations on aFile.
7. Basic Knowledge of FunctionalProgramming.

EXPERIMENTS

The students should write programs in C to get the familiarization with following topics.

1. Get Familiar with CCompiler
2. Implement and Test Small Routine inC
3. Evaluation ofExpression
4. Iteration, Function and RecursiveFunction
5. Arrays
6. Structures andUnion
7. Searching andSelection
8. Sorting,
9. StringsHandling
10. Basic PointerProgramming
11. Files
12. Use of Standard CLibrary
13. Basics of FunctionalProgramming.

BCS-04 OBJECT ORIENTED MODELING & C++

Course Category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understand the Concept of Object Oriented Programming and Master OOP using C++.
2. Implementing the Real Life Problems using Object OrientedTechniques.
3. Improvement in Problem SolvingSkills.

Topics Covered

UNIT-I

Object Oriented Programming Concepts – Objects, Classes, Methods and Messages- 9
Abstraction and Encapsulation, Inheritance- Abstract Classes, Polymorphism. Introduction to C++- Objects-Classes- Constructors and Destructors.

UNIT-II

Operator Overloading - Friend Functions- Type Conversions- Templates - Inheritance – 9
Virtual Functions- Runtime Polymorphism. Exception Handling - Streams and Formatted I/O

UNIT-III

Object Modeling: Objects and Classes, Links and Associations, Generalization and Inheritance, 9
Aggregation, Abstracts Class, Multiple Inheritance, Meta Data, Candidate Keys, Constraints. Dynamics Modeling: Events and States, Operations, Nested State Diagrams and Concurrency.

UNIT-IV

Functional Modeling: Data Flow Diagram, Specifying Operations, Constraints, 9
A Sample Functional Model. OMT (Object Modeling Techniques)
Methodologies, Examples and Case
Studies to Demonstrate Methodologies, Comparisons of Methodologies, SA/SD, JSD.

EXPERIMENTS

Write C++ Programs to illustrate the concept of the following:

1. Arrays
2. Structures
3. Pointers
4. Objects andClasses
5. Console I/OOperations
6. Scope Resolution and Memory ManagementOperators
7. Inheritance
8. Polymorphism
9. VirtualFunctions
10. Friend Functions
11. OperatorOverloading
12. FunctionOverloading
13. Constructors andDestructors
14. thisPointer
15. File I/OOperations

Analyze, Design and Develop Code for the Following System (one for a batch of three students) using Object Oriented Methodology

1. ATM (Automated Teller Machine)System
2. Online ReservationSystem
3. Online QuizSystem
4. Stock MaintenanceSystem
5. Course RegistrationSystem
6. PayrollSystem
7. ExpertSystem
8. Library ManagementSystem
9. Real TimeScheduler
10. Online PurchaseSystem

Textbooks

1. B. Trivedi Programming with ANSI C++, Oxford University Press, 2007.
2. Ira Pohl , Object Oriented Programming using C++, Pearson Education, Second Edition
3. B. Stroustrup, The C++ Programming Language, 3rdedition, Pearson Education, 2004
4. James Rumbaugh, et. al Object Oriented Modeling and Design-, PHI
5. Robert Lafore, Object Oriented Programming in Turbo C++, Galgotia Publication, 1994
6. E. Balaguruswamy, Object Oriented Programming with C++, TMH Publication
7. Grady Booch, James Rumbaugh and Ivar Jacobson The Unified Modeling Language User Guide,
   Pearson Education
8. Booch, Maksimchuk, Engle, Young, Conallen and Houstan, Object Oriented Analysis and
   Design with Applications, Pearson Education
9. S. B. Lippman, Josee Lajoie, Barbara E. Moo,C++ Primer,4th edition, Pearson Education, 2005

Reference books

1. Coleman, D. et.al. Object-Oriented Development, The Fusion Method. Prentice Hall
2. Booch, G. Object-Oriented Design with Applications. Redwood City, Bengamin/Cummings
3. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, McGraw Hill, Second Edition, 2005.

BCS-05 SOFTWARE LAB-II

Course Category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 0, Tutorial : 0 , Practical: 4
Number of Credits	:	2
Course Assessment Methods	:	Continuous assessment through three Viva voce, Practical work/record, attendance and Major Practical Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Differentiate between structures oriented programming and object oriented programming.
2. Use object oriented programming language like C++ and associated libraries to develop object oriented programs
3. Understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language.
4. Apply concepts of operator-overloading, constructors anddestructors
5. Reuse the code and write the classes which work like built-intypes.
6. Apply object -oriented concepts in real worldapplications.

EXPERIMENTS

To write following programs in C++

1. Using basic statements like control statements, looping statements, various I/O statements and various datastructures.
2. Creating classes in C++ for understanding of basic OOPSfeatures.
3. Representing concepts of data hiding, function overloading and operatoroverloading.
4. Using memory management features and various constructors anddestructors.
5. Representing Inheritance, virtual classes andpolymorphism.
6. Writing genericfunctions.
7. File handlingprograms.
8. Design and Implementation of some real life problems using Object Oriented Techniques (Object Model/Dynamic Model/FunctionalModel).

BCS-11 DIGITAL CIRCUITS AND LOGICDESIGN

Course Category : Engineering Fundamental(EF)
Pre-requisiteSubject : NIL
ContactHours/Week : Lecture : 3, Tutorial : 1 , Practical:0
NumberofCredits : 4
Course Assessment Methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

CourseOutcomes : Thestudentsareexpectedtobeabletodemonstratethe following knowledge, skills and attitudes after completing this course

1. Design a finite state machine and sequential logicdesign.
2. Synthesize a logic design from a natural language description of aproblem.
3. Realize a complete arithmetic and logicunit.
4. Generate a realization of combinational logic in a programmable gatearray.
5. Simulate a complete design to evaluate functional correctness andtiming.

Topics Covered

UNIT-I

Binary Codes - Weighted and Non-Weighted - Binary Arithmetic Conversion Algorithms-Error 9
Detecting and Error Correcting Codes - Canonical and Standard Boolean Expressions - Truth Tables.

UNIT-II

K-Map Reduction - Don't Care Conditions - Adders / Subtractors- Carry Look-Ahead Adder - 9 Code Conversion Algorithms - Design of Code Converters - EquivalenceFunctions.

Binary/Decimal Parallel Adder/Subtractor for Signed Numbers - Magnitude Comparator - Decoders / Encoders - Multiplexers / Demultiplexers- Boolean Function Implementation using Multiplexers.

UNIT-III

Sequential Logic - Basic Latch - Flip-Flops (SR, D, JK, T and Master-Slave)-Triggeringof 9
Flip-Flops - Counters - Design Procedure - Ripple Counters - BCD and Binary - Synchronous Counters.

UNIT-IV

Registers-ShiftRegisters-RegisterswithParallelLoad-MemoryUnit-ExamplesofRAM,

9

ROM, PROM, EPROM - Reduction of State and Flow Tables - Race-Free State Assignment - Hazards.

Textbooks

1. Morris Mano, Digital Design, Prentice Hall of India, 2001
2. Raj Kamal, Digital Systems Principles and Design, Pearson Education, First Edition,2007
3. Charles H. Roth, Jr. and Larry L. Kinney, Fundamentals of Logic Design, CL Engineering,
   Seventh Edition, 2013.

Reference books

1. W. H. Gothmann, Digital Electronics -An Introduction to Theory and Practice, Prentice Hall of
India, 2000
2. Donald D. Givone, Digital Principles and Design, Tata McGraw –Hill, Thirteenth Impression, 2003.

BCS-12 PRINCIPLES OF DATA STRUCTURES THROUGH C/C++

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Describe how arrays, records, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their commonapplications.
2. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs.
3. Compare and contrast the benefits of dynamic and static data structures implementations.
4. Identity the alternative implementations of data structures with respect to its performance to solve a real worldproblem.
5. Demonstrate organization of information using Trees and Graphs and also to perform different operations on these datastructures.
6. Design and implement an appropriate organization of data on primary and secondary memories for efficient its efficient retrieval..
7. Discuss the computational efficiency of the principal algorithms for sorting, searching andhashing.
8. Describe the concept of recursion, its application, its implementation and removal of recursion.

Topics Covered
UNIT-I

Introduction: Basic Terminology, Elementary Data Organization, Structure Operations, Complexity and Time-Space Tradeoff 9

Arrays: Definition, Representation and Analysis, Single and Multi Dimension Array, Address Calculation, Application of Arrays, Character, String in C, Character String Operation, Arrays Parameters, Ordered List, Sparse Matrices and Vectors

Stacks: Array Representation and Implementation of Stack, Operations on Stacks: Push &Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of Stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation
of Postfix Expressions using Stack, Application of Recursion in Problem like Tower of Hanoi

UNIT-II

Queues: Array and Linked Representation and Implementation of Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular Queues, D-Queues and Priority Queues. 9

Linked List: Representation and Implementation of Singly Linked Lists, Two-Way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to / from Linked Lists, Insertion and Deletion Algorithms, Doubly Linked List, Linked List in Array, Polynomial Representation and Addition, Generalized Linked List, Garbage Collection and Compaction.

UNIT-III

Trees: Basic Terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary Trees, Traversing Binary Trees, Threaded Binary Trees, Traversing Threaded Binary Trees, Huffman Algorithm. 9

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of
Search Algorithm, Path Length, AVL Trees, B-Trees.

UNIT-IV

Searching and Hashing: Sequential Search, Binary Search, Comparison and Analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. 9

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical Consideration for InternalSorting.

Graphs: Terminology &Representations, Graphs &Multi-Graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

EXPERIMENTS

Write C/C++ Programs to illustrate the concept of the following:

1. Sorting Algorithms-Non-Recursive
2. Sorting Algorithms-Recursive
3. Searching Algorithm
4. Stack
5. Queue
6. LinkedList
7. Graph

Textbooks

1. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publication, New Delhi.
2. R. Kruseetal, Data Structure and Pragram Design in C, Pearson Education Asia Delhi
3. A. M.Tenenbaum, Data Structures using C & C++, PHI, India
4. K Loudon, Mastering Algorithms with C, Shroff Publication and Distributor Pvt. Ltd.
5. Bruno R Preiss, Data Structure and Algorithms with Object Oriented Design Pattern in C++,
   John Wiley & Sons
6. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd. Singapore

Reference books

1. Lewis, H.R., Denenberg, L., Data Structures and their Algorithms. Published by Addison-
   Wesley, UK, 1991
2. Oluwadare, S.A., Agbonifo, O.C., Fundamentals of Data structures and Algorithms. Lecture Notes, 2013

BCS-13 INTERNET & JAVA PROGRAMMING

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To identify different components of client server architecture on Internetcomputing.
2. Knowledge of how to develop and deploy applications and applets inJAVA.
3. Knowledge of how to develop and deploy GUI using JAVA Swing andAWT.
4. Design, develop and implement interactive webapplications.
5. Be able to implement, compile, test and run JAVA programs comprising more than one class and to address a particular softwareproblem.
6. To understand the basic concepts of Internet services and relatedtechnologies.
7. Develop programs using the JAVA Collection API as well as the JAVA standard classlibrary.

Topics Covered

UNIT-I

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite Connection, Choosing an ISP, Introduction to Internet Services, E-Mail Concepts, Sending and Receiving Secure E-Mail, Voice and Video Conferencing. 9

UNIT-II

Core JAVA: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread Programming, I/O, JAVA Applet, String Handling, Networking, Event Handling, Introductionto AWT, AWT Controls, Layout Managers. 9

UNIT-III

JAVA Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text Fields, Buttons, Tabbed Panes. 9

JDBC: Connectivity Model, JDBC/ODBC Bridge, JAVA. SQL Package, Connectivity to Remote Database.

UNIT-IV

JAVA Beans: Application Builder Tools, The Bean Developer Kit(BDK), JAR files, Introspection, Developing a Simple Bean, using Bound Properties, The JAVA Beans API, Session Beans, Entity Beans, Introduction to JAVA Servlet: Servlet Basics, Servlet API Basic, Life Cycle of a Servlet, Running Servlet. 9

EXPERIMENTS

1. Basic programs of simple statements, conditional statements, iterative statements andarrays
2. Programs having object oriented concepts like Inheritance andInterface
3. Programs for Exception Handling and EventHandling
4. Programs of Threads andMultithreading
5. Programs related to Applets andSwings
6. Programs including JAVA Beans andServlets

Textbooks

1. Naughton, Schildt, The Complete Reference JAVA2, TMH.
2. Balaguruswamy E, Programming in JAVA, TMH

Reference books

1. Margaret Levine Young, The Complete Reference Internet, TMH.
2. Dustin R. Callway, Inside Servlets, Addison Wesley.
3. Mark Wutica, JAVA Enterprise Edition, QUE.
4. Steven Holzner, JAVA2 Black book, Dreamtech.

BCS-14 SOFTWARE LAB-III

Course Category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 0, Tutorial : 0 , Practical: 4
Number of Credits	:	2
Course Assessment Methods	:	Continuous assessment through three Viva voce, Practical work/record, attendance and Major Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Analyze and represent problems in the object-oriented programmingparadigm.
2. Design and implement object-oriented softwaresystems.
3. Demonstrate the efficient implementation of various Data Structures in memory and theiroperation.
4. Build programs on fundamental algorithmic problems including Searching, Sorting, Tree Traversals, Graph traversals, and shortestpaths.
5. Explain the main principles for client-serverprogramming
6. Design and implement Client-side systems, server-side system and event-driven graphical userinterface.
7. Integrate their knowledge and skills to produce a real lifeapplication.

EXPERIMENTS

C++:

1. Program using functions with default arguments implementation of call by value, address, reference
2. Simple classes for understanding objects, member functions &constructors classes with primitive data members, classes with arrays as data members classes with pointers as data members classes with constant data members classes with static memberfunctions
3. Compile time polymorphism- operator overloading, functionoverloading
4. Run time polymorphism -inheritance ,virtual functions, virtual baseclasses
5. File handling -sequential access, randomaccess

JAVA:

1. Simple JAVA applications for understanding references to an instant of a class, handling strings in JAVA, simple package creation, developing user defined packages inJAVA
2. Interfaces
3. Threading- creation of threading in JAVA applications,multi-threading

4. Exception handling mechanism in JAVA- handling predefined exceptions, handling user defined exceptions

Internet Programming:

1. Web page creation usingHTML
   i) To embed an image map in a webpage
   ii) To fix the hotspots
   iii) Show all the related information when the hot spots areclicked.
2. Web page creation with all types of Cascading stylesheets
3. Client side scripts for validating web form controls usingDHTML
4. JAVA programs to createapplets
5. i) Create a color palette with matrix ofbuttons
   i) ii) Set background and foreground of the control text area by selecting a color from colorpalette.
   ii) In order to select foreground or background use check box control as radio but- tons.
   iii) To set backgroundimages.
6. Programs in JAVA usingservlets
7. Programs in JAVA to create three-tier applications using JSP andDatabases
   i. for conducting onlineexamination
   ii. for displaying students mark list.
8. Programs using XML-schema-XSLT/XSL
9. Programs usingAJAX
10. Implementation of web services anddatabases.

BCS-15 DATABASE MANAGEMENT SYSTEMS

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2

Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. List and define the fundamental concepts of database managementsystem.
2. Manually execute a given (simple) database design a transaction overit.
3. Manually infer the type of a given (simple) databasetransaction.
4. Implement (simple) algorithms and data structures as databasetransaction.
5. Design (large) databases that are modular and have reusablecomponents.
6. Explain on a simple problem how to apply concurrency control over concurrent databasetransactions.

Topics Covered

UNIT-I

Introduction: An Overview of Database Management System, Database System vs File System, 9

Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure.

Data Modeling using Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of An ER Diagrams to Tables, Extended ER Model,

Relationship of Higher Degree.

UNIT-II

Relational Data Model and Language: Relational Data Model Concepts, 9
Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple And Domain Calculus.

Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins,

Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

UNIT-III

Database Design &Normalization: Functional Dependencies, Normal Forms, 9
First, Second, Third Normal Forms, BCNF, Inclusion Dependence, Loss Less Join Decompositions,

Normalization using FD, MVD, and JDS, Alternative Approaches to Database Design.

UNIT-IV

Transaction Processing Concept: Transaction System, Testing of 9 Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, DeadlockHandling.

Distributed Database: Distributed Data Storage, Concurrency Control, Directory System. **Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle.

EXPERIMENTS

1. Exercises to be based on Sybase / Oracle / Postgres / VB / Power Builder / DB2 /MS-Access.
2. Applications involving vendor development systems, stores management system, finance managementetc.
3. Creation and querying of database tables for following cases..
   i. Write SQL queries using logical operations(=,<,>,etc)
   ii. Write SQL queries using SQLoperators
   iii. Write SQL query using character, number, date and groupfunctions
   iv. Write SQL queries for relationalalgebra
   v. Write SQL queries for extracting data from more than onetable
   vi. Write SQL queries for sub queries, nested queries
   vii. Write program by the use ofPL/SQL
   viii. Concepts for ROLL BACK, COMMIT & CHECKPOINTS
   ix. Create VIEWS, CURSORS and TRGGERS & writeASSERTIONS.
   x. Create FORMS and REPORTS
4. Design of tables by normalization and dependencyanalysis.
5. Writing application software with host language interface

Textbooks

1. Date C J, An Introduction to Database Systems, Addison Wesley
2. Korth, Silbertz, Sudarshan, Database Concepts, McGraw Hill
3. Elmasri, Navathe, Fundamentals of Database Systems, Addison Wesley
4. O"Neil, Databases, Elsevier Pub.
5. Leon& Leon, Database Management Systems, Vikas Publishing House
6. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications
7. Majumdar & Bhattacharya, Database Management System, TMH
8. Ramkrishnan, Gehrke, Database Management System, McGraw Hill
9. Kroenke, Database Processing Fundamentals, Design and Implementation, Pearson Education.
10. J. D. Ulman, Principles of Database and Knowledge base System, Computer Science Press.
11. Maheshwari Jain. DBMS: Complete Practical Approach, Firewall Media, New Delhi

Reference books

1. Ramona.Mato-Toledo,PaulineK.Cushman,DatabaseManagementSystems,Schaums" Outline series, TMH, New Delhi Special Indian Edition 2007

2. Ivan Bayross, Mastering Database Technologies, BPB Publications, New Delhi - First Indian Edition 2006, Reprinted 2011

BCS-16 THEORY OF COMPUTATION

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous Assessment through Tutorials, Assignments, Quizzes and Three Minor Tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Analyse and design finite automata, pushdown automata, Turing machines, formal languages, andgrammars.
2. Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problemsolving.
3. Prove the basic results of the Theory ofComputation.
4. State and explain the relevance of the Church-Turingthesis.

Topics Covered

UNIT-I

Alphabets, Strings and Languages, Automata and Grammars, Deterministic Finite Automata (DFA)-Formal Definition, Simplified Notation: State Transition Graph, Transition Table, Language of DFA, Nondeterministic Finite Automata (NFA), NFA with Epsilon Transition, Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem 9

UNIT-II

Regular Expression (RE), Definition, Operators of Regular Expression and their Precedence, AlgebraicLawsforRegularExpressions,Kleen"sTheorem,RegularExpressiontoFA, DFAto Regular Expression, Arden Theorem, Non Regular Languages, Pumping Lemma for Regular Languages. Application of Pumping Lemma, Closure Properties of Regular Languages,Decision PropertiesofRegularLanguages,FAwithOutput:MooreandMealyMachine,Equivalenceof Moore and Mealy Machine, Applications and Limitation of FA. 9

UNIT-III

Context Free Grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation, Derivation Trees, Ambiguity in Grammer, Inherent Ambiguity, Ambiguous to Unambiguous CFG, Useless Symbols, Simplification of CFGs, Normal Forms for CFGs: CNF and GNF, Closure Proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping Lemma for CFLs. 9

Push Down Automata (PDA): Description and Definition, Instantaneous Description, Language of PDA, Acceptance by Final State, Acceptance by Empty Stack, Deterministic PDA,

Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two Stack PDA

UNIT-IV

Turing Machines (TM): Basic Model, Definition and Representation, Instantaneous Description, Language Acceptance by TM, Variants of Turing Machine, TM as Computer of Integer Functions,UniversalTM,Church'sThesis,RecursiveandRecursivelyEnumerableLanguages, Halting Problem, Introduction to Undecidability, Undecidable Problems about TMs. Post Correspondence Problem (PCP), Modified PCP, Introduction to Recursive Function Theory. 9

Textbooks

1. MichealSipser, "Introduction to the Theory of Computation", Thomson Learning

Reference books

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
2. Peter Linz, "An Introduction to Formal Language and Automata", Narosa Publishing house
3. H R. Lewis and Christos H. Papadimitriou, "Elements of the theory of Computation", PHI Ltd

BCS-17 COMPUTER ORGANIZATION & DESIGN

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. To understand the basic structure and operation of digitalcomputer.
2. To study the design of arithmetic and logic unit and implementation of fixed point and floating-point arithmeticoperations
3. To study the two types of control unit techniques and the concept ofPipelining
4. To study the hierarchical memory system including cache memories and virtual memory
5. To study the different ways of communicating with I/O devices and standard I/O interfaces

Topics Covered

UNIT-I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, 9

Arithmetic Logic, Shift Micro-Operation, Arithmetic Logic Shift Unit, Design of Fast Address, IEEE Standard for Floating Point Numbers.

UNIT-II

Control Design: Hardwired &Micro Programmed Control Unit, .Processor Design: Processor Organization: General Register Organization, Stack Organization, Addressing Mode, Instruction Format, Data Transfer & Manipulations, Program Control, Reduced Instruction Set Computer, Pipelining 9

UNIT-III

Arithmetic - Addition & Subtraction of Signed Numbers - Multiplication - Integer Division - 9

Floating Point Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-IV

Input-Output Organization: I/O Interface, Modes of Transfer, Interrupts &Interrupt Handling, Direct Memory Access, Input-Output Processor, Serial Communication. 9

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), Auxiliary Memory, Cache Memory, Virtual Memory

EXPERIMENTS

1. Implementing HALF ADDER, FULL ADDER using basic logicgates
2. Implementing Binary -to -Gray, Gray -to -Binary codeconversions.
3. Implementing 3-8 lineDECODER.
4. Implementing 4x1 and 8x1MULTIPLEXERS.
5. Verify the excitation tables of variousFLIP-FLOPS.
6. Design of an 8-bit Input/ Output system with four 8-bit InternalRegisters.
7. Design of an 8-bit ARITHMETIC LOGICUNIT.
8. Design the data path of a computer from its register transfer languagedescription.
9. Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.
10. Implement a simple instruction set computer with a control unit and a datapath.

Textbooks

1. Computer System Architecture - M. Mano

2. Carl Hamacher, ZvonkoVranesic, SafwatZaky Computer Organization, McGraw-Hill, Fifth
Edition, Reprint 2012
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition,
1998.

Reference books

1. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson
Education, Seventh edition, 2006.
2. BehroozParahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.
3. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012.

BCS-18 SOFTWARE LAB-IV

Course category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 4
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through three Viva voce, Practical work/record, attendance and Major Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Tools and techniques for optimizations in designprocesses.
2. Design and develop the software packages/ systems to support the management of an organization inquestion.
3. Design and develop aDBMS.

EXPERIMENTS

1. Write user-friendly computer programs to implement algorithms in your course of OptimizationTechniques.
2. Design and develop a software packages/ systems for your University ManagementSystem.
3. Design and develop your ownDBMS.
4. Design and develop a simulator for (i) Logic Circuit Design, (ii) Electronic CircuitDesign.

BCS-19 WEB DESIGNING

Course Category	:	For other Department
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 0, Tutorial : 0 , Practical: 4

Number of Credits	:	2
Course Assessment Methods	:	Continuous Assessment through Practical Work/ Attendance/ Record/ Viva Voce, Three Viva Voce Examinations and One Major Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Identify common design mistakes when creating a web basedapplication.
2. Discuss the process of editing a web page using text editors and web pageeditors.
3. Cover commonly used HTML tags and discuss how this knowledge is important to a webdesigner
4. Demonstrate an understanding of basic CSS,XML

EXPERIMENTS

1. Create a HTML static web page which shows the use of different tags inthat.
2. Insert an image and create a link such that clicking on image takes user to otherpage.
3. Prepare a sample code to illustrate three types of lists inHTML.
4. Use tables to provide layout to your HTML page describing your universityinfrastructure.
5. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to showremarks.
6. Create a simple form that will show all the INPUT METHODS available inHTML.
7. Create a sample code to illustrate the Embedded, External and Inline style sheets for your web page.
8. Write an XML example of given tree that demonstrates the creation of user-designed tags and display it in a browser. fname, lname, joindate, bdate, college, employee, age, salary (with at least 3 elements).
9. Write a program in XML for creation of DTD which specifies a particular set ofrules.
10. Create an e-book having left side of the page name of the chapters and right side of the page the contents of the chapters clicked on leftside.

Textbooks

1. Uttam K. Roy,**Web Technologies, 1/e ,** Oxford University Press, USA
2. Murray, Tom/Lynchburg, Creating a Web Page and Web Site ,College,2002
3. Abeginner'sguidetoHTMLNCSA,14thMay,2003
4. Kogent Learning Solutions Inc. HTML 5 in simple steps Dreamtech Press

Reference books

1. Steven M. Schafer HTML, XHTML, and CSS Bible, 5ed ,Wiley India
2. Kogent Learning Web Technologies: HTML, JAVA script , Wiley

BCS-26 PRINCIPLES OF OPERATING SYSTEMS

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL

Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the structure and functions ofOS.
2. Learn about Processes, Threads and Schedulingalgorithms.
3. Understand the principles of concurrency andDeadlocks.
4. Learn various memory managementscheme.
5. Study I/O management and Filesystems.

Topics Covered

UNIT-I

Operating Systems Overview-Components, Goals of Designer, System Structures, User Services, Interrupt Systems and Device Programming-Interrupt Sources and Priorities, Interrupt Service Routines, Hardware Support - Machine States, Context Switching, Privileged Instructions and Registers 9

UNIT-II

Memory Management-Major Issues: Fetch, Placement, Contiguity, Relocation Adjustment, Paging and Virtual Memory, Translate-Look-Aside Buffer (Associative Memory), Single and Multi-Level Page Tables, Paging with Segmentation, Problems of Large Address Spaces and How They Are Addressed

Virtual Storage Management- Storage Hierarchy, Cache Usage, Partial Residency, Page Replacement Strategies, Working Sets 9

UNIT-III

Concurrency Problems and Solutions- Critical Section Problem, Process Synchronization and Coordination, Semaphores, Special Instructions, Monitors, Inter-process Communication, Remote Procedure Calls, Special Problems of Transaction-Based Systems

Deadlock and Resource Conflict- Prevention, Avoidance, Detection, Recovery, 9

Process and Thread Management-Process/Thread Creation and Termination, Process/Thread States and Their Transitions

CPU Scheduling Algorithms, Non-Preemptive Approaches, Preemptive Approach, Multi-Processor Considerations

UNIT-IV

Physical Storage Management- Disk Scheduling Algorithms, Disk Performance Features, Disk ReliabilityConcerns 9

File System Organization - The Boot Record - Where Things Start, Directory Organization, File Descriptors, Access ControlBackup

System Security-Principle of Least Privilege, Threats and Vulnerabilities, Protection
Mechanisms - Access and Capability Control, User (Subject) Authentication, Levels of Security in "Trusted" Systems, Confinement Problem

EXPERIMENTS

1. Study of hardware and software requirementsof different operating systems (UNIX,LINUX,WINDOWS XP,WINDOWS7/8
2. Execute various UNIX system calls for
   a. Processmanagement
   b. Filemanagement
   c. Input/output Systemscalls
3. Implement CPU SchedulingPolicies:
   a. SJF
   b. Priority
   c. FCFS
   d. Multi-levelQueue
4. Implement file storage allocationtechnique:
   a. Contiguous(usingarray)
   b. Linked –list(using linked-list)
   c. Indirect allocation(indexing)
5. Implementation of contiguous allocationtechniques:
   a. Worst-Fit
   b. Best-Fit
   c. First-Fit
6. Calculation of external and internalfragmentation
   a. Free space list of blocks fromsystem
   b. List process file from thesystem
7. Implementation of compaction for the continually changing memory layout and calculate total movement ofdata
8. Implementation of resource allocation graphRAG)
9. ImplementationofBanker"salgorithm
10. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.
11. Implement the solution for Bounded Buffer (producer-consumer)problem using inter process communicationtechniques-Semaphores
12. Implement the solutions for Readers-Writers problem using inter process communication technique-Semaphore

Textbooks

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John
   Wiley & Sons (ASIA) Pvt. Ltd, Seventh Edition, 2005

2. Pramod Chandra and P. Bhatt, “An Introduction to Operating Systems Concepts and Practice”,
Prentice Hall India,3rd Edition,2010

Reference books

1. Milenekovie, Operating System Concept, McGraw Hill.
2. Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, Operating Systems, Prentice Hall,
Third edition, 2003
3. Petersons, "Operating Systems", Addison Wesley
4. Andrew S. Tannenbaum & Albert S. Woodhull, “Operating System Design and Implementation”, Prentice Hall , 3rd Edition, 2006
5. William Stallings, Operating Systems – internals and design principles, Prentice Hall, 7thEdition,
2011
6. Gary J. Nutt, “Operating Systems”, Pearson/Addison Wesley, 3rd Edition 2004.
7. Andrew S. Tannenbaum, “Modern Operating Systems”, Prentice Hall,3rd Edition,2007.

BCS-27 COMPUTER GRAPHICS

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Have a basic understanding of the core concepts of computergraphics.
2. Be capable of using OpenGL to create interactive computergraphics.
3. Understand a typical graphicspipeline.
4. Have made pictures with theircomputer.

Topics Covered

UNIT-I

BASICS OF COMPUTER GRAPHICS- Introduction, Area of Computer Graphics, Design and Drawing, Animation Multimedia Applications, Simulation, How are Pictures Actually Stored and Displayed, Difficulties for DisplayingPictures. 9

GRAPHIC DEVICES- Cathode Ray Tube, Quality of Phosphors, CRTs for Color Display, Beam Penetration CRT, Shadow - Mask CRT, Direct View Storage Tube, Tablets, Light Pen, Three Dimensional Devices. C Graphics Basics Graphics Programming, Initializing Graphics, C Graphical Functions, Simple Programs.

SIMPLE LINE DRAWING METHODS- Point Plotting Techniques, Qualities of Good Line
DrawingAlgorithms,DigitalDifferentialAnalyzer(DDA),Bresenham"sAlgorithm,Generation of Circles

UNIT-II

TWO DIMENSIONAL TRANSFORMATIONS and CLIPPING AND WINDOWING- 9

What is Transformation?, Matrix Representation of Points, Basic Transformation, Need for Clipping and Windowing, Line Clipping Algorithms, Midpoint Subdivision Method, Other Clipping Methods, Sutherland - Hodgeman Algorithm, Viewing Transformations. **GRAPHICAL INPUT TECHNIQUES-** Graphical Input Techniques, Positioning Techniques, Positional Constraints, Rubber Band Techniques.

EVENT HANDLING AND INPUT FUNCTIONS- Introduction, Polling, Event Queue, Functions for Handling Events, Polling Task Design, Input Functions, Dragging and Fixing, Hit
Detection, OCR.

UNIT-III

THREEDIMENSIONALGRAPHICS-Needfor3-DimensionalImaging,Techniquesfor3-Dimesional Displaying, Parallel Projections, Perspective Projection, Intensity Cues,Stereoscope
Effect, Kinetic Depth Effect, Shading. 9

CURVES AND SURFACES- Shape Description Requirements, Parametric Functions, Bezier Methods, Bezier Curves, Bezier Surfaces, B-Spline Methods

UNIT-IV

SOLID AREA SCAN CONVERSION-Three Dimensional Transformations Solid Area Scan Conversion, Scan Conversion of Polygons, Algorithm Singularity, Three Dimensional Transformation, Translations, Scaling, Rotation, Viewing Transformation, Perspective, Algorithms, Three Dimensional Clipping, Perspective View of Cube. 9

HIDDEN SURFACE REMOVAL-Need For Hidden Surface Removal, Depth - Buffer Algorithm, Properties that Help in Reducing Efforts, Scan Line Coherence Algorithm, Span - CoherenceAlgorithm,Area-CoherenceAlgorithms,Warnock"sAlgorithm,PriorityAlgorithms

EXPERIMENTS

Develop program to

1. Understand the basic concepts of computergraphics.
2. Design scan conversion problems using C/C++programming.
3. Apply clipping and filling techniques for modifying anobject.
4. Understand the concepts of different type of geometric transformation of objects in 2D and3D.
5. Understand the practical implementation of modeling, rendering, viewing ofobjects.

Textbooks

1. Z.Xiang,R.Plastock,Schaum'soutlinesComputerGraphics,2nd Ed.,TMH
2. B M Havaldar, C Graphics & Projects, Anmol Publications Pvt. Limited, 01-Jan-2005
3. Hearn and Baker Computer Graphics with OpenGL, 3e, Prentice Hall, 2004.
4. Asthana and Sinha, Computer Graphics for Scientists and Engineers, New Age International, 01-Jan-2007

Reference books

1. Foley, Vandam, Feiner, Hughes, Computer Graphics principles, 2nd Ed.,Pearson Education
2. W. M. Newman, R. F. Sproull, Principles of Interactive computer Graphics, TMH.

BCS-28 DESIGN & ANALYSIS OF ALGORITHMS

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Define the basic concepts of algorithms and analyze the performance ofalgorithms.
2. Discuss various algorithm design techniques for developingalgorithms.
3. Discuss various searching, sorting and graph traversalalgorithms.
4. Understand NP completeness and identify different NP completeproblems.
5. Discuss various advanced topics onalgorithm

Topics Covered

UNIT-I

Introduction: Algorithms, Analyzing Algorithms, Complexity of Algorithms, Growth of Functions, Performance Measurements, Sorting and Order Statistics - Shell Sort, Quick Sort, Merge Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time. Divide And Conquer with Examples such as Sorting, Matrix Multiplication, Convex Hull and Searching. 9

UNIT-II

Greedy Methods with Examples such as Optimal Reliability Allocation, Knapsack, Minimum SpanningTrees–Prim"sandKruskal"sAlgorithms,SingleSourceShortestPaths-Dijkstra"sand Bellman Ford Algorithms. 9

Dynamic Programming with Examples such as Multistage Graphs, Knapsack, All Pair Shortest Paths-Warshal"sandFloyd"sAlgorithms,ResourceAllocationProblem.

UNIT-III

Backtracking, Branch and Bound with Examples such as Travelling Salesman Problem, Graph Coloring, N-Queen Problem, Hamiltonian Cycles and Sum Of Subsets 9

Advanced Data Structures**:** Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps.

UNIT-IV

Selected Topics: String Matching, Text Processing- Justification of Text, Theory of NP-Completeness, Approximation Algorithms And Randomized Algorithms, Algebraic Computation, Fast FourierTransform. 9

EXPERIMENTS

1. To analyze time complexity of Insertionsort.
2. To analyze time complexity of Quicksort.
3. To analyze time complexity of Mergesort.
4. To Implement Largest CommonSubsequence.
5. To Implement Matrix ChainMultiplication.
6. ToImplementStrassen"smatrixmultiplicationAlgorithm,MergesortandQuicksort.
7. To implement KnapsackProblem.
8. To implement Activity SelectionProblem.
9. ToimplementDijkstra"sAlgorithm.
10. ToimplementWarshall"sAlgorithm.
11. ToimplementBellmanFord"sAlgorithm.
12. To implement Naïve String MatchingAlgorithm.
13. To implement Rabin Karp String MatchingAlgorithm
14. ToimplementPrim"sAlgorithm.
15. To implement Kruskal""sAlgorithm.

Textbooks

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, Introduction to Algorithms,
   PHI.

2. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of
Algorithms", McGraw Hill, 2005.
3. Ellis Horowitz and Sartaj Sahni, *Fundamentals of Computer Algorithms*, Computer Science
Press, Maryland, 1978
4. Berman, Paul," Algorithms", Cengage Learning.
5. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education,
2008.

Reference books

1. Berlion, P. Izard, P., Algorithms-The Construction, Proof and Analysis of Programs, 1986. Johan
Wiley & Sons.
2. Bentley, J.L., Writing Efficient Programs, PHI
3. Ellis Horowitz, Sartaj Sahni, and SanguthevarRajasekaran, *Computer Algorithms*, W. H.
Freeman, NY, 1998
4. Goodman, S.E. &Hedetnien, introduction to Design and Analysis of Algorithm1997, MGH.
5. Knuth, D.E , Fundamentals of Algorithms: The Art of Computer Programming Vol,1985

BCS-29 ADVANCED COMPUTER ARCHITECTURE

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voceand One Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the advanced concepts of computerarchitecture.
2. Exposing the major differentials of RISC and CISC architecturalcharacteristics.
3. Investigating modern design structures of Pipelined and Multiprocessorssystems.
4. Become acquainted with recent computer architectures and I/O devices, as well as the low-level language required to drive/manage these types of advancedhardware.
5. Preparing selected reports that imply some emergent topics supporting materialessence.

Topics Covered

UNIT-I

RISC Processors, Characteristics of RISC Processors, RISC vs CISC, Classification of Instruction Set Architectures, Review of Performance Measurements, Basic Parallel Processing Techniques: Instruction Level, Thread Level and Process Level, Classification of Parallel Architectures. 9

UNIT-II

Basic Concepts of Pipelining, Arithmetic Pipelines, Instruction Pipelines, Hazards in A Pipeline: Structural, Data, and Control Hazards, Overview of Hazard Resolution Techniques, Dynamic Instruction Scheduling, Branch Prediction Techniques, Instruction-Level Parallelism using Software Approaches, Superscalar Techniques, Speculative Execution. 9

UNIT-III

Basic Concept of Hierarchical Memory Organization, Main Memories, Cache Design and Optimization, Virtual Memory Design and Implementation, Memory Protection, Evaluating Memory Hierarchy Performance, RAID, Centralized vs. Distributed Shared Memory. 9

UNIT-IV

Interconnection Topologies, Synchronization, Memory Consistency, Review of Modern Multiprocessors, Distributed Computers, Clusters, Grid, Mainframe Computers, Bus Structures and Standards, Types and Uses of Storage Devices, Interfacing I/O to The Rest of the System, Reliability and Availability, I/O System Design 9

EXPERIMENTS

1. Write an algorithm and program to perform matrix multiplication of two n * n matrices on the 2-D mesh SIMDmodel.
2. Write an algorithm and program to perform matrix multiplication of two n * n matrices on Hypercube SIMDModel
3. Write an algorithm and program for Block oriented Matrix Multiplication on multiprocessor system
4. StudyofScalabilityforSingleboardMulti-board,multi-core,multiprocessorusingSimulator
5. Study of various computer Architecture (MIPS, Power etc.) usingsimulator.
6. StudyofMemoryandsystemcontrollers,InterruptandDMAcontrollersusingsimulator.

Textbooks

1. Hennessey and Patterson, Computer Architecture: A quantitative Approach, Morgan Kaufman.
2. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.
3. SIMA, Advanced Computer Architectures, Addison-Wesley.

Reference books

1. H.S. Stone, High-performance Computer Architecture, 3rd edition, Addison-

Wesley, 1993.
2. Patterson, D. A. and Hennessy, J. L., Computer Organization and Design: The Hardware/ Software Interface, Morgan Kaufmann, 1998.

BCS-30 SEMINAR

Course category	:	Audit Course (AC)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 6
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through quality of material, presentation, quality &extent of external response of question asked and participation in other seminars (attendance)
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrativefunctions.
2. Students will demonstrate the ability to distinguish opinions and beliefs from researched claims and evidence and recognize that kinds of evidence will vary from subject tosubject.
3. Students will demonstrate the ability to evaluate, credit, and synthesizesources.

BCS-31 PRINCIPLE OF COMPILER DESIGN

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Definethephases ofatypicalcompiler,includingthefront-•-and back-•-end.
2. Identify tokens of a typical high-•-level programming language; define regular expressionsfor tokens and design; implement a lexical analyzer using a typical scanner generator.
3. Explain the role of a parser in a compiler and relate the yield of a parse tree to a grammar derivation; design and implement a parser using a typical parsergenerator.
4. Apply an algorithm for a top-•-down or a bottom-•-up parser construction; construct a parser for a small context-•-freegrammar.
5. Explain the role of a semantic analyzer and type checking; create a syntax-•-directed definition and an annotated parse tree; describe the purpose of asyntax tree.
6. Explain the role of different types of runtime environments and memory organization for implementation of typical programminglanguages.
7. Describe the purpose of translating to intermediate code in the compilationprocess.
8. Design and implement an intermediate code generator based on given codepatterns

Topics Covered

UNIT-I

CompilerStructure:Analysis-SynthesisModelofCompilation,Various Phases of A Compiler, Tool Based Approach to Compiler Construction Lexical Analysis: Interface with Input, Parser and Symbol Table, Token, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting, and Implementation. Regular Definition, Transition Diagrams, LEX. 9

UNIT-II

Syntax Analysis: Context Free Grammars, Ambiguity, Associativity, Precedence, Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing, Bottom Up Parsing, Operator Precedence Grammars, LR Parsers (SLR, LALR, LR), YACC. 9

UNIT-III

Syntax Directed Definitions: Inherited and Synthesized Attributes, Dependency Graph, Evaluation Order, Bottom Up and Top Down Evaluation Of Attributes, L- and S-Attributed Definitions. 9

Type Checking: Type System, Type Expressions, Structural and Name Equivalence of Types, Type Conversion, Overloaded Functions and Operators, Polymorphic Functions.

Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments Intermediate Code Generation For Control Flow, Boolean Expressions and Procedure Calls, Implementation Issues.

UNIT-IV

Symbol Table Management, Runtime Environments, Source Language Issues, Storage Organization, Storage Allocation Strategies, Access to Non-Local Names, Parameter Passing. 9

Code Optimization, Peephole Optimization, Source of Optimizations, Optimization of Basic Blocks, Loops, Global Dataflow Analysis, Introduction to Code Generation.

EXPERIMENTS

1. Write a program using Lex to calculate the number of characters, number of words and the number of lines present in the given text file asinput.
2. Write a program using Lex to implement the set of regular expression and indicates the acceptance of a given string for a particular regularexpression.
3. Write a C program to implement the conversion of regular expression to non-deterministic finite automation
4. WriteaprogramusingYacctocheck whetherastringbelongtothegivengrammarornot.
5. WriteaCprogramtocomputeFIRSTandFOLLOW ofthenon-terminalsofgivengrammar.
6. WriteaCprogramtocheckthegivengrammarisLeftrecursiveandremoveLeftrecursion.
7. Write Syntax Directed Translation actions using Yacc to generate Parse Tree for the grammar for arithmeticexpressions.
8. Write Syntax Directed Translation actions using Yacc to translate arithmetic expressions into Post- fixform.
9. Write Syntax Directed Translation actions using Yacc to translate arithmetic expressions into three addresscode.

Textbooks

1. A.V. Aho, M.S. Lam, R. Sethi, and J.D. Ullman, Compilers: Principles, Techniques, and Tools,
   Pearson Education, 2007 (second ed.).
2. K.D. Cooper, and L. Torczon, Engineering a Compiler, Elsevier, 2004.

Reference books

1. AW Appel, J Palsberg, Modern Compiler Implementation in JAVA, Cambridge University
   Press, 2002
2. AW Appel, M Ginsburg, Modern Compiler Implementation in C, Cambridge UniversityPress.

BCS-32 ARTIFICIALINTELLIGENCE

Course Category	:	Department Core(DC)
Pre-requisiteSubject	:	NIL
ContactHours/Week	:	Lecture : 3, Tutorial : 1 , Practical:2
NumberofCredits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination

CourseOutcomes : Thestudentsareexpectedtobeabletodemonstratethe following knowledge, skills and attitudes after completing this course.

1. The intelligent agents--software or hardware entities that perform useful tasks with some degree ofautonomy.
2. An understanding of the basic areas of artificial intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action, and learning -- and their applications (e.g., data mining, information retrieval)
3. Design and implement key components of intelligent agents of moderate complexity in JAVA and /or Lisp or Prolog and evaluate theirperformance.
4. Develop familiarity with current research problems, research methods, and theresearch literature inAI

Topics Covered

UNIT-I

Artificial Intelligence Introduction, Intelligent Agents, Solving Problems bySearchingBeyond 9 Classical Search Adversarial Search Constraint SatisfactionProblems

UNIT-II

KnowledgeandReasoning LogicalAgentsFirst-OrderLogic InferenceinFirst-OrderLogic 9Classical Planning and Acting in the Real WorldKnowledge Representation Uncertain Knowledge and Reasoning Quantifying Uncertainty Probabilistic Reasoning Probabilistic Reasoning over Time 16 Making Simple Decisions Making ComplexDecisions

UNIT-III

Planning and Acting in the Real World Definition of Classical Planning Algorithmsfor Planning 9 as State-Space Search Planning Graphs Classical planning as Boolean Satisfiability Representing temporal and resource constraints Planning and Acting in Nondeterministic Domains. Knowledge Representation Acting under Uncertainty Probabilistic Reasoning Time and Uncertainty Learning from Examples Knowledge in Learning Probabilistic Models ReinforcementLearning

UNIT-IV

Forms of Learning Supervised Learning, Decision Trees Evaluating and Choosing the Best Hypothesis A Logical Formulation of Learning Statistical Learning with Complete Data Natural Language Processing Communicating, Perceiving, and Acting Natural Language Processing Natural Language for Communication Perception Robotics.

EXPERIMENTS

1. Write the program to solve the water jug problem using production ruleset.
2. Write the program to solve the water jug problem using A*ALGORITHM.
3. Write the program to solve the 8 puzzle problem using A*ALGORITHM.
4. Write the program to solve the salesman problem using A*ALGORITHM.
5. Write the program to solve the farmer transfer three belonging form one side of the river to other side using AO* ALGORITHM.
6. Write the program to solve the DISEASE problem using Bayesianreasoning.
7. Write the program to solve the Object finding problem using Bayesianreasoning.
8. Write the program to solve the Object finding problem using D Stheory
9. Write the program to solve the Decision TreesEvaluating.
10. Write the program for walk, drive, take the bus, take a cab, and fly problem using mean end analysis.

Textbooks

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2012

Reference books

2. David Poole, Alan Mackworth, Randy Goebel, Computational Intelligence: a logical approach, Oxford University Press, 2012.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2012
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998

BCS-33 WEB TECHNOLOGIES

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Identify common design mistakes when creating a web basedapplication.
2. Discuss the process of editing a web page using text editors and web pageeditors
3. Cover commonly used HTML tags and discuss how this knowledge is important to a webdesigner
4. Demonstrate an understanding of basic CSS, XML, JAVA Script, JSP, ASP.NET and PHP

Topics Covered

UNIT-I

Introduction to WWW- World Wide Web, WWW Architecture, Web Search Engines, Web Crawling, Web Indexing, Web Searching, Search Engines Optimization and Limitations, Web Mining: Web Content Mining, Web Structure Mining, Web Usage Mining 9

UNIT-II

Markup Language Basics: SGML, HTML, CSS And XML 9

SGML: Standard Generalized Markup Language (SGML) -Structures, Elements, Content Models, DTD, Attributes Entities.

HTML: Designing Web Pages With HTML-Use Of Tags, Hyperlinks, URLs, Tables, Text Formatting, Graphics & Multimedia, Imagemap, Frames and Forms in Web Pages.

CSS: Use of Cascading Style Sheet in Web Pages.

XML: Extensible Markup Language (XML): Introduction using User-Defined Tags in Web Pages, Displaying XML Contents, XML Dtds, Use of XSL

UNIT-III

Client-Side Scripting using JAVA Script 9

JAVA script Overview; Constants, Variables, Operators, Expressions & Statements; User- Defined & Built-in Functions; Client-Side Form Validation; Using Properties and Methods of Built-in Objects

UNIT-IV

Server-Side Scripting Using JSP, **ASP.NET And PHP** 9

JSP : Introduction to JSP, JSP Architecture, JSP Directives, JSP Scripting Elements, Default Objects in JSP, JSP Actions, JSP with Beans and JSP with Database, Error Handling in JSP, Session Tracking Techniques in JSP, Introduction to Custom Tags.

ASP.NET :ASP.Net Coding Modules, ASP.NET Page Directives, Page Events and Page Life Cycle , Postback and Crosspage Posting ASP.NET Server Controls , HTML Controls, Validation Controls, Building Databases.

PHP(Hypertext Preprocessor)-Introduction, Syntax, Variables, Strings, Operators, If- Else, Loop, Switch, Array, Function, Form ,Mail, File Upload, Session, Error, Exception, Filter, PHP- ODBC

EXPERIMENTS

1. Create a HTML static web page which shows the use of different tags inthat.
2. Insert an image and create a link such that clicking on image takes user to otherpage.
3. Prepare a sample code to illustrate three types of lists inHTML.
4. Use tables to provide layout to your HTML page describing your universityinfrastructure
5. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to showremarks.
6. Create a simple form that will show all the INPUT METHODS available inHTML.
7. Create a sample code to illustrate the Embedded, External and Inline style sheets for your web page.
8. Write down simple JAVA Script using timeout such that image will be changed after every 1 ms at a specifiedposition.
9. Design a registration form and validate its field by using JAVAscript.
10. Write an XML example of given tree that demonstrates the creation of user-designed tags and display it in abrowser.
11. college, employee, fname, lname, joindate, bdate, age, salary (with atleast 3elements)
12. Write a program in XML for creation of DTD which specifies a particular set ofrules.
13. Create a bean student with attributes (first name, last name, age, class). In another JSP page display the bean values using<jsp:usebean>.
14. Write a program to use JDBC connectivity program for maintaining database by sending queries through JSPPage.
15. Use ad-rotator to change advertisements on client siderequest.(ASP.NET)
16. Implement Session tracking using user authentication inASP.NET.
17. Write a PHP script to create a database StudentDB.
18. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on webpage.

Textbooks

1. Uttam K. Roy, **Web Technologies, 1/e,** Oxford University Press, USA
2. M. Srinivasan, Web Technology: Theory and Practice, Pearson Education India
3. Deitel, Deitel and Nieto, Internet and Worldwide Web - How to Program, 5th Edition, PHI,
   2011.
4. Ralph Moseley & M. T. Savaliya , Developing Web Application- Second Edition, Wiley
5. Miller/Kirst, Web Programming Step by Step, Stepp, 2nd edition, 2009
6. Ullman , PHP for the Web: Visual Quick Start Guide, Pearson Education, 4th edition, 201
7. www.w3c.org

8. www.w3schools.com

Readings:

Various journal and conference articles, research reports, and book excerpts as appropriate

Reference books

1. Ivan Bayross , Web Enabled Commercial Application Development Using HTML, DHTML,
   JAVA Script, Perl & CGI, BPB Publication, 2005
2. Hans Bergsten, JAVA Server Pages, O"Reilly.

BCS-34 COMPUTER NETWORKS

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse

1. Understand the concepts of communication architecture andprotocols
2. Identify different types of communication mediums andtechniques
3. Define and identify different types of multiplexing, data encoding, modulation, and switchingtechniques
4. Illustrate different standards of Local Area Network in terms of technologies and hardware used
5. Illustrate network addressing and analysistechniques
6. Understand the Wide Area Networktechnologies
7. Understand the network routingconcepts
8. Understand the internetworking concepts andarchitectures
9. Understand the TCP/IP protocols and designarchitectures

Topics Covered

UNIT-I

Introductory Concepts: Goals and Applications of Networks, Network Structure and Architecture, OSI Reference Model, Services, Networks Topology, Physical Layer- Transmission, Switching Methods, LAN Inter Connection Devices, Integrated Services Digital Networks. 9

UNIT-II

Medium Access Sub Layer: Channel Allocations, LAN Protocols, ALOHA Protocols- Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision Free Protocols, IEEE Standards, Ethernet, FDDI, Data Link Layer- Basic Design Issues, Error Correction & Detection Algorithms, Elementary Data Link Layer Protocols, Sliding Window Protocols, Error Handling, High Level Data Link Control 9

UNIT-III

Network Layer: Packet Switched Networks – IP – ARP – RARP –DHCP – ICMP – Queuing Discipline – Routing Algorithms, Congestion Control Algorithms, Internetworking, TCP/IP Protocol, IP Addresses, Ipv4 and Ipv6. 9

UNIT-IV

Transport Layer: Design Issues, Connection Management, Internet Transport Protocol(UDP), Transmission Control Protocol. (TCP) -**Adaptive Retransmission Congestion Control Congestion Avoidance – QOS.** 9

Application Layer: Domain Name System, Electronic Mail **(Email),** File Transfer Protocol, Hyper Text Transfer Protocol, Introduction To Cryptography and Network Security.

EXPERIMENTS

1. To create scenario and study the performance of CSMA/CD protocol throughsimulation.
2. To create scenario and study the performance of token bus and token ring protocols through simulation.
3. Implementation of Error detection and correctionalgorithms.
4. Implementation and study of 1-bit sliding window viz., stop and waitprotocol.
5. Implementation and study of Go back-Nprotocol.
6. Implementation and study of selective repeatprotocol.
7. To get the MAC or Physical address of the system using Address ResolutionProtocol.
8. Implementation of distance vector routingalgorithm.
9. Implementation of link state routingalgorithm.
10. To write a client-server application for chat using TCP.
11. To write a C program to develop a DNS client server to resolve the givenhostname.

Textbooks

1. Forouzan, Data Communication and Networking, TMH
tn
2. A. S Tanenbaum, Computer Networks, 4 , Edition", Pearson education

Reference books

1. W. Stallings , Data and Computer Communication , Macmillan Press
2. Comer , Computer Networks & Internet with Internet Applications, Pearson Education
3. Comer, Internetworking with TCP/IP, 6th Edition, PHI
4. W Stallings, Computer Networks with Internet Protocols, Pearson Education
5. W Stallings, Local and Metropolitan Area Networks, 6th edition, Pearson Education

BCS-35 SOFTWARE ENGINEERING

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Enhance the Software Project Managementskills.
2. Develop functioning software which benchmarks to the internationalstandards.

Topics Covered

UNIT-I

Software Process– Introduction, S/W Engineering Paradigm , Life Cycle Models (Waterfall, Incremental, Spiral, Evolutionary, Prototyping), Software Requirements –Functional And Non- Functional–Software Document– Requirement Engineering Process–Feasibility Studies – Software Prototyping– Prototyping in Software, Process–Data–Functional and Behavioral Models– Structured Analysis And Data Dictionary. 9

UNIT-II

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.SoftwareMeasurementandMetrics:VariousSizeOrientedMeasures:Halstead'sSoftware Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graph. 9

UNIT-III

Software Testing – Taxonomy of S/W Testing Levels - Black Box Testing – Testing Boundary Conditions – Structural Testing — Regression Testing– S/W Testing Strategies, Unit Testing, Integration Testing, Validation Testing, System Testing and Debugging. 9

UNIT-IV

MeasuresandMeasurements–Zipf'sLaw,SoftwareCostEstimation– FunctionPointModels, COCOMO Model. Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – Case Tools 9

EXPERIMENTS

1. Identifying the Requirements from ProblemStatements
2. Estimation of ProjectMetrics
3. Modeling UML Use Case Diagrams and Capturing Use CaseScenarios
4. E-R Modeling from the ProblemStatements
5. Identifying Domain Classes from the ProblemStatements
6. State chart and ActivityModeling
7. Modeling UML Class Diagrams and Sequencediagrams
8. Modeling Data FlowDiagrams
9. Estimation of Test Coverage Metrics and StructuralComplexity
10. Designing TestSuites

Textbooks

1. R. S. Pressman, "Software Engineering - A practitioners approach", 3rd Edition, McGraw Hill
   International editions, 1992.

Reference books

1. IAN Sommerville, Software Engineering, Pearson Education Asia, VI Edition, 2000.
2. Pankaj Jalote, "An Integrated Approach to software Engineering", Springer Verlag, 1997

BCS-36 DATABASE MANAGEMENT SYSTEM, DATA MINING & WAREHOUSING

Course Category	:	For Other Department
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To educate students with fundamental concepts of Database Management System, Data Models, Different Data BaseLanguages.
2. To analyze Database designmethodology.
3. To understand the basic principles, concepts and applications of data warehousing and data mining
4. To introduce the task of data mining as an important phase of knowledge recovery process
5. Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAPdeployment
6. Have a good knowledge of the fundamental concepts that provide the foundation of data mining

Topics Covered

UNIT-I

Introduction: An Overview of Database Management System, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. 9

Data Modeling using Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model,
Relationship of Higher Degree.

UNIT-II

Relational Data Model and Language: Relational Data Model Concepts, Integrity Constraints, 9

Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus.

Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins,
Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

UNIT-III

Transaction Processing Concept: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. 9

Distributed Database: Distributed Data Storage, Concurrency Control, Directory System. **Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of
Oracle.

UNIT-IV

Data Mining & Warehousing: Introduction to Data Warehouse, Building A Data Warehouse, Data Warehouse Architecture, OLAP Technology, Introduction to Data Mining, Data Pre- Processing, Mining Association Rules, Classification and Prediction, Cluster Analysis, Advanced Techniques of Data Mining and its Applications. 9

Textbooks

1. Korth, Silbertz, Sudarshan, Database Concepts, McGraw Hill
2. Jiawei Han, Micheline Kamber, Data Mining Concepts & Techniques, Elsevier
3. Elmasri, Navathe, Fundamentals of Database Systems, Addison Wesley

Reference books

1. Date C J, An Introduction to Database Systems, Addison Wesley
2. J. D. Ulman, Principles of Database and Knowledge base System, Computer Science Press.
3. M. H. Dunham, Data Mining: Introductory and Advanced Topics. Pearson Education
4. Mallach, Data Warehousing System, McGraw –Hill

BCS-37 NETWORK SECURITY & CRYPTOGRAPHY

Course Category	:	For Other Department
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The studentsare expected to be able to demonstrate the following knowledge, skills and attitudes after completingthis course

1. Understand the basic concept of Cryptography and Network Security, their mathematical models
2. Various types ciphers, DES, AES, message Authentication, digital Signature,System
3. Network security, Viruses, worms andfirewall
4. Understand mathematical foundation required for various cryptographicAlgorithms.
5. DES, AES, IDEA and RC5 cryptographictechnique
6. Public and Private Keycryptography.
7. Various Message Digest Algorithm,
8. Comprehend and apply email security services andmechanisms
9. Comprehend and apply IP securitymechanisms
10. Comprehend and apply authentication services andmechanisms
11. Comprehend and apply WEB securitymechanisms

12. Design of Firewall, Intrusion andFiltering

Topics Covered

UNIT-I

Introduction to Cryptography 9

Need, Attacks, Security Principles, Security Services, Conventional & Classical Encryption Techniques, Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation

UNIT-II

Conventional Encryption Algorithm and Public Key Encryption 9

Triple DES, IDEA, RC5, AES, Key Distribution, Public Key Cryptography: Principles of Public KeyCryptosystem,RSAAlgorithm,KeyManagement,Fermat′sandEuler′sTheorem,Chinese Remainder Theorem

UNIT-III

Hash Functions 9

Message Authentication and Hash Function: Authentication Requirements, Authentication Functions, Message Authentication Codes, Birthday Attacks, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signature, Authentication Protocol, Digital Signature Standard (DSS)

UNIT-IV

Network and System Security: 9

Authentication Applications: Kerberos, Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME,IP Security: Authentication Header, Encapsulation Security Payload, Combining Security Association, Key Management, Web Security:Secure Socket Layer and Transport Layer security, Secure Electronic Transaction (SET), System security: Intruders, Viruses, Worms, Firewall design principles

EXPERIMENTS

1. Implementation of DESAlgorithm.
2. Implementation of Random numbergeneration.
3. Implementation of AES Cryptographic technique.
4. Implementation of IDEA Cryptographictechnique.
5. Implementation of RSAAlgorithm.
6. Generate the Digitalsignature.
7. Implementation of MD5Algorithm.
8. Implementation of SHAAlgorithm.
9. Implementation of MD5Algorithm.
10. Demonstrate and implement the PGP Algorithm.
11. Demonstrate and simulate the working ofFirewall.

Textbooks

1. William Stallings, Cryptography and Network Security Principles and Practices, Sixth Edition, PHI Publication
2. Atul Kahate, Cryptography and Network Security, Second Edition, TMH Publication
3. Shyamla, Harini and Padmnabhan, Cryptography and Security, Wiley Publication
4. Deven Shah, Information Security Principles and Practice, Wiley-India
5. Forouzan, Mukhopadhyay, Cryptography & Network Security, McGraw Hill

Reference books

1. Bruce Schneier, Applied Cryptography: Protocols, Algorithms, and Source Code in C, John Wiley and Sons
2. Godbole, Information Systems Security, Wiley-India
3. ArtoSalomaa, Public-Key Cryptography by, second edition, Springer, 1996
4. Goodrich and Tamassia, Introduction to Computer Security , Addison-Wesley Publication
5. Rubin, Geer and Ranum, Web Security Sourcebook: A Complete Guide to Web SecurityThreats and Solutions , Wiley Publication
6. Henk C.A. van Tilborg, An Introduction to Cryptology, Kluwer Academic Publishers
7. N. Doraswamy and Dan Harkins, IPSec- The New Security Standard for the Internet, Intranets, and Virtual Private Networks, Prentice Hall, USA

BCS-40 PROJECT PART- I

Course category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 10
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through three viva voce/presentation, preliminary project report, effort and regularity and end semester presentation
Course Outcomes	:	The students are expected to be able to demonstrate the

following knowledge, skills and attitudes after completing this course

1. Learning of latest trends and technology in selected field ofinterest.
2. Apply the acquired knowledge to practicalsituations.
3. Develop self-interest to explore the selected technical field of interest infuture.
4. Acquire presentationskills.
5. Develop better interpersonal communication skills and increase selfconfidence

BCS-41 INTRODUCTION TO MACHINELEARNING

Course Category	:	Department Core(DC)
Pre-requisiteSubject	:	NIL
ContactHours/Week	:	Lecture : 3, Tutorial : 1 , Practical:2
NumberofCredits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination

CourseOutcomes : Thestudentsareexpectedtobeabletodemonstratethe following knowledge, skills and attitudes after completing this course.

1. To explain theory underlying machinelearning
2. To construct algorithms to learn linear and non-linearmodels
3. To implement data clusteringalgorithms
4. To construct algorithms to learn tree and rule-basedmodels
5. To apply reinforcement learningtechniques

Topics Covered

UNIT-I

FOUNDATIONS OF LEARNING- Components of Learning – Learning Models–Geometric Models – Probabilistic Models – Logic Models – Grouping and Grading – Learning Versus Design – Types of Learning – Supervised – Unsupervised – Reinforcement – Theory ofLearning – Feasibility of Learning – Error and Noise – Training versus Testing – Theory ofGeneralization – Generalization Bound – Approximation- Generalization Tradeoff – Bias and Variance – Learning Curve 9

UNIT-II

LINEAR MODELS-Linear Classification–Univariate Linear Regression– Multivariate Linear Regression–Regularized Regression– Logistic Regression– Perceptron–Multilayer Neural Networks –Learning Neural Networks Structures – Support Vector Machines–Soft Margin SVM– Going Beyond Linearity – Generalization and Over Fitting – Regularization– Validation 9

UNIT-III

DISTANCE-BASED MODELS-Nearest Neighbour Models–K-Means– Clustering around Medoids–Silhouettes–Hierarchical Clustering–K-D Trees– Locality Sensitive Hashing–Non- Parametric Regression–Ensemble Learning– Bagging And Random Forests–Boosting–Meta Learning 9

UNIT-IV

TREE AND RULE MODELS- Decision Trees – Learning Decision Trees – Ranking and Probability Estimation Trees – Regression Trees – Clustering Trees – Learning Ordered Rule Lists – Learning Unordered Rule Lists – Descriptive Rule Learning – Association Rule Mining – First-Order Rule Learning 9

UNIT-V

REINFORCEMENT LEARNING-Passive Reinforcement Learning – Direct Utility Estimation – Adaptive Dynamic Programming – Temporal-Difference Learning – Active Reinforcement Learning – Exploration – Learning an Action-Utility Function –

Generalization in Reinforcement Learning – Policy Search – Applications in Game Playing – Applications in Robot Control

EXPERIMENTS

1. A simple *linear regression* attempts to draw a straight line that will best minimize the residual sum of squares between the observations and the predictions in python programlanguage
2. Linear Regression Logistic Regression in python programlanguage
3. Decision Tree in python programlanguage
4. SVMin python programlanguage
5. Naive Bayesin python programlanguage
6. KNNin python programlanguage
7. K-Meansin python programlanguage
8. Random Forestin python programlanguage
9. Dimensionality Reduction Algorithms in python programlanguage
10. Gradient Boost &Adaboost in python programlanguage

Textbooks

1 EthemAlpaydın -Introduction to Machine Learning Third Edition, MIT Press, 2004

Reference books

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, Learning from Data, AML Book
Publishers, 2012.
2. P. Flach, Machine Learning: The art and science of algorithms that make sense of data,
Cambridge University Press, 2012.
3. K. P. Murphy, Machine Learning: A probabilistic perspective, MIT Press, 2012.
4. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2007.
5. D. Barber, Bayesian Reasoning and Machine Learning, Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, Foundations of Machine Learning, MIT Press,
2012.
7. T. M. Mitchell, Machine Learning, McGraw Hill, 1997.
8. S. Russel and P. Norvig, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2009.

BCS-42 PARALLEL & DISTRIBUTED COMPUTING

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5

Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. understand and account for models, limitations, and fundamental concepts in the area of message passing and shared memory concurrency, and apply this understanding to example systems andalgorithms
2. adapt, and design algorithms for execution in parallel and distributed settings, and analyze the algorithms for correctness, reliability, security, andperformance

Topics Covered

UNIT-I

Parallel Computing, Parallel Computer Model, Parallel Architectural Classification Schemes, Multiprocessor System and Interconnection Networks. Theoretical Foundation For Distributed System: Limitation of Distributed System, Absence of Global Clock, Shared Memory, Logical Clocks, Lamport‟s& Vectors Logical Clocks, Causal Ordering of Messages, Global State, Termination Detection. 9

UNIT-II

Distributed Mutual Exclusion: Classification of Distributed Mutual Exclusion, Requirement of Mutual Exclusion Theorem, Token Based and Non Token Based Algorithms, Performance Metric for Distributed Mutual Exclusion Algorithms. 9

UNIT-III

Distributed Deadlock Detection: System Model, Resource vs Communication Deadlocks, Deadlock Prevention, Avoidance, Detection & Resolution, Centralized Dead Lock Detection, Distributed Dead Lock Detection, Path Pushing Algorithms, Edge Chasing Algorithms. Agreement Protocols: Introduction, System Models, Classification of Agreement Problem, Byzantine Agreement Problem, Consensus Problem, Interactive Consistency Problem, Solution to Byzantine Agreement Problem, Application of Agreement Problem. 9

UNIT-IV

Distributed File Systems: File Service Architecture, Sun Network File System, The Andrew File System, Recent Advances. 9

Distributed Algorithms: Introduction to Communication Protocols, Balanced Sliding Window Protocol, Routing Algorithms, Destination Based Routing, APP Problem, Deadlock Free Packet Switching, Introduction to Wave & Traversal Algorithms, Election Algorithm, CORBA Case Study: CORBA RMI, CORBA Services.

EXPERIMENTS

1. Writeaprogram to simulatethefunctioning of Lamport‟s logicalclock in 'C‟.
2. Writeaprogram to simulatetheDistributed MutualExclusion in „C‟.
3. Writeaprogram to implement aDistributed chat server using TCP sockets in „C‟.
4. Implement RPC mechanism forafiletransfer across anetwork in „C‟.
5. Write a JAVA code to implement „JAVA RMI‟ mechanism for accessing methods of remote systems.
6. Writeacodein „C‟ to implement sliding window protocol.
7. Implement corba mechanism by using c++ program at one end and JAVA program at theother.
8. Writeacodein „C‟ to Increment acounter in shared memory.

Textbooks

1. Singhal Mukesh & Shivaratri N. G., Advanced Concepts in Operating Systems, TMH

Reference books

2. D. Culler, J. P. Singh, A. Gupta, Parallel Computer Architecture, Elsevier
3. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems Principles and Paradigms, PHI
4. Tanenbaum, A. S. Distributed Operating Systems, Prentice Hall 199
5. Tanenbaum, A. S. Modern Operating Systems, 2nd Edition, Prentice Hall 2001.
6. Bacon, J., Concurrent Systems, 2nd Edition, Addison Wesley 1998.
7. Silberschatz, A., Galvin, P. and Gagne, G., Applied Operating Systems Concepts, 1st Edition, Wiley 2000.
8. Coulouris, G. et al, Distributed Systems: Concepts and Design, 3rd Edition, Addison Wesley 2001.
9. Galli, D.L., Distributed Operating Systems: Concepts and Practice, Prentice-Hall 2000.

BCS-43 MOBILE COMPUTING

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance,home assignments, quizzes, practical work, record, viva voce and Three Minortests and One Major Theory &Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse.

1. Demonstrate the actual meaning of power and energy management in wireless mobile networks.
2. Outline knowledge on MobileIP.
3. Be familiar with the network protocolstack
4. Learn the basics of mobile telecommunicationsystem
5. Be exposed to Ad-Hocnetworks
6. Gain knowledge about different mobile platforms and applicationdevelopment

Topics Covered

UNIT-I

Introduction, Issues in Mobile Computing, Overview of Wireless Telephony: Cellular Concept, GSM: Air-Interface, Channel Structure, Location Management: HLR, VLR, Hierarchical, Handoffs, Channel Allocation In Cellular Systems, CDMA, GPRS. 9

UNIT-II

Wireless Networking, Wireless LAN Overview: MAC Issues, IEEE 802.11, Blue Tooth, Wireless Multiple Access Protocols, TCP Over Wireless, Wireless Applications, Mobile IP, WAP: Architecture, Protocol Stack, Application Environment, Applications, Wireless mark Up Language (WML). 9

UNIT-III

Data Management Issues, Data Replication for Mobile Computers, Adaptive Clustering for Mobile Wireless Networks, File System, Disconnected Operations, Mobile Agents Computing, Security and Fault Tolerance. 9

UNIT-IV

Adhoc Networks, Localization, MAC Issues, Routing Protocols, Global State Routing (GSR), Destination Sequenced Distance Vector Routing (DSDV), Dynamic Source Routing (DSR), Ad Hoc On Demand Distance Vector Routing (AODV), Temporary Ordered Routing Algorithm (TORA), QOS in Ad Hoc Network. 9

EXPERIMENTS

1. Develop an application that uses GUI components, Font andColours
2. Develop an application that uses Layout Managers and eventlisteners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on thescreen.
5. Implement an application that implements Multithreading
6. Develop a native application that uses GPS locationinformation.
7. Implement an application that writes data to the SDcard.
8. Implement an application that creates an alert upon receiving amessage.
9. Write a mobile application that creates alarmclock

Textbooks

1. Asoke K Taukder, Roopa R Yavagal, Mobile Computing, Tata McGraw Hill Pub. Co., New

Delhi, 2005.

2. J. Schiller, Mobile Communication, Addison Wesley, 2000.

Reference books

1. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computing, John Wiley & sons
   Inc, Canada, 2002.
2. William Stallings, "Wireless Communication and Networks", Pearson Education, 2003.
3. Yi-Bing Lin &ImrichChlamtac, Wireless and Mobile Networks Architectures, John Wiley &
   Sons, 2001.
4. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of
   India, 2001.
5. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech, 2004.
6. Ray Rischpater, "Wireless Web Development", Springer Publishing, 2000.
7. P. Stavronlakis, "Third Generation Mobile Telecommunication systems", Springer Publishers,
   2001.
8. Burkhardt , Pervasive Computing, Pearson
9. P. Stavronlakis, Third Generation Mobile Telecommunication systems, Springer Publishers.

BCS-44 OBJECT ORIENTED TECHNIQUES & JAVA PROGRAMMING

Course Category	:	Program Elective (EC) Electrical Engineering
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse

1. Knowledge of how to develop and deploy applications and applets inJAVA.
2. Knowledge of how to develop and deploy GUI using JAVA Swing andAWT.
3. Design, develop and implement interactive webapplications.
4. Be able to implement, compile, test and run JAVA programs comprising more than one class and to address a particular softwareproblem.
5. Develop programs using the JAVA Collection API as well as the JAVA standardclass library.

Topics Covered

UNIT-I

Introduction: Introduction to Programming Languages, The Evolution of JAVA, Object- Oriented Programming Concepts and JAVA, Differences between C++ and JAVA, Primary Characteristics of JAVA, The Architecture, Programming with JAVA, Operator, Data type, Variable, Arrays, Control Statements, Methods. 9

UNIT-II

Core JAVA: Classes, Inheritance, Package and Interface, Exception Handling, Multithread Programming, I/O, JAVA Applet, String Handling, Networking, Event Handling, Introduction to AWT, AWT Controls, Layout Managers. 9

UNIT-III

JAVA Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and Feel, Labels, Text Fields, Buttons, Tabbed Panes. 9

UNIT-IV

JDBC: Connectivity Model, JDBC/ODBC Bridge, JAVA.SQL Package, Connectivity to Remote Database, **JAVA Beans**: Application Builder Tools, The Bean Developer Kit(BDK), JAR files, Introspection, Developing a Simple Bean, **Servlet:** Introduction to JAVA Servlet: Servlet Basics, Servlet API Basic, Life Cycle of a Servlet, Running Servlet. 9

Textbooks

1. Naughton, Schildt, The Complete Reference JAVA2, TMH Publication
2. Balaguruswamy E, Programming in JAVA, TMH Publication

Reference books

1. Margaret Levine Young, The Complete Reference Internet, TMH Publication
2. Dustin R. Callway, Inside Servlets, Addison Wesley.
3. Mark Wutica, JAVA Enterprise Edition, QUE.
4. Steven Holzner, JAVA2 Black book, Dreamtech.

BCS-45 INDUSTRIAL / PRACTICAL TRAINING

Course category	:	Audit Course (AC)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 2
Number of Credits	:	1
Course Assessment methods	:	Continuous assessment through technical quality of the work, attendance, discipline, involvement and interest, project work, viva voce, project report and presentation
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. The main objective of the Industrial Training is to experience and understand real life situations in industrial organizations and their related environments and accelerating thelearningprocessof howstudent'sknowledge couldbe used ina realistic way.
2. In addition to that, industrial training also makes one understand the formal and informal relationships in an industrial organization so as to promote favourable human relations and teamwork. Besides, it provides the exposure to practice and apply the acquired knowledge "hands - on" in the workingenvironment.
3. Industrial training also provides a systematic introduction to the ways of industry and developing talent and attitudes, so that one can understand how Human Resource Development works. Moreover, students can gain hands-on experience that is related to the student understanding so that the student can relate to and widen the skills that have been learnt while being in university. Industrial training also exposes the students to the real career world and accustoms them to an organizational structure, business operation and administrativefunctions.
4. Furthermore, students implement what they have learned and learn more throughout this training. Besides, students can also gain experience to select the optimal solution in handling a situation. During industrial training students can learn the accepted safety practices in theindustry.
5. Students can also develop a sense of responsibility towardssociety

BCS-50 PROJECT PART-II

Course category	:	Department Core (DC)
Pre-requisite Subject	:	Project Part-I (BCS-40)
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 10
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through three viva voce/presentation, final project report, contribution made to literary world and Major examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. B. Tech. project is designed to allow students to work with faculty members on *one long project* that may require effort over two semesters. The final year project gives studentsanexcellentopportunitytodevelopanddemonstratetheirinnovationskills, design skills and research interests. These projects quite often lead to publications of their original work.
2. Develops ability of reportwriting.
3. Develops ability to be aware of current trends in specific area ofinterest

BCS-51 ADVANCE JAVA

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Be proficient in using JAVA Servlets and related Web developmenttools
2. Identify different components of client/server Architecture on Internetcomputing
3. Design, develop and implement interactive Webapplications
4. Know how to develop and deploy applications and applets inJAVA
5. Know how to design and develop GUI using JAVA Swing andAWT

Topics Covered

UNIT-I

Collections: Collection Interfaces, Concrete Collections, Collections Framework. **Multithreading :**Creating Thread and Running it, Multiple Thread Acting on Single Object, Synchronization, Thread Communication, Thread Group, Thread Priorities,Daemon Thread, Life Cycle of Thread. 9

UNIT-II

Networking: Internet Addressing, Internet address, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets,Datagrams 9

Enterprise JAVA Bean: Preparing a Class to be a JAVA bean, Creating a JAVA bean, JAVA bean Properties, Types of Beans, Stateful Session Bean, Stateless Session Bean, Entity Bean

UNIT-III

JAVA Database Connectivity (JDBC): 9

Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C

Servlets: Servlet Overview and Architecture, Interface Servlet and Servlet Life Cycle, HandlingHTTPGetRequests,HandlingHTTPPostRequests,RedirectingRequeststo Other Resources, Session Tracking, Cookies, Session Tracking with Http session.

UNIT-IV

JAVA Server Pages (JSP): Introduction, JAVA server Pages Overview, A First JAVA server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries 9

Remote Method Invocation: Defining Remote Interface, Implementing Remote Interface, Compiling and Executing Server and Client.

Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA Basics, CORBA Services

Introduction Smart Phone Application Development: Introduction to Android Platform, Creating Application Template, Adding Activity, Intent, Services to Application, Using Google Map API

Textbooks

1. H. M. Deitel, P. J. Deitel, S. E. Santry , Advanced JAVA 2 Platform HOW TO PROGRAM,
   Prentice Hall

Reference books

2. Antonio Goncalves, Beginning JAVA™ EE 6 Platform with Glass Fish 3 From Novice to Professional.

BCS-52 .NET TECHNOLOGY

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous Assessment through Tutorials, Assignments, Quizzes and Three Minor Tests and One MajorTheory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the most important features of .NET Frameworktechnology
2. Use Visual Studio .NET and .NET Framework SDK to design, run and debug simple C# consoleapplications
3. Write programs that use fundamental C# programmingtools.
4. Use advanced OOP tools when designing C#programs.
5. Design web forms usingASP.Net

Topics Covered

UNIT-I

The .Net Framework: Introduction, Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-in –Time Compilation, Framework Base Classes. 9

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals,

Array And Strings, Object And Classes.

UNIT-II

C -Sharp Language (C#) (Cont.): Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type Conversion. C# Using Libraries: Namespace- System, Input-Output, Multi-Threading 9

UNIT-III

Managing Console I/O Operations, Windows Forms, Error Handling. Advanced Features Using C#: Web Services, Window Services, Unsafe Mode, Graphical Device Interface With C#, Introduction About Generic. 9

UNIT-IV

ASP .Net: Web Forms in ASP.NET, States, Validation, Login, ASP.NET Administrative Tasks, Learning about SQL Basics and Advanced Queries, ADO.NET, ASP.NET Data Controls, Ajax Extensions, LINQ, Working With XML Data, Web Services. 9

Textbooks

1. Deitel et al. Visual C# 2012 How to program. Prentice-Hall Inc., 2014, Fifth Edition
2. Aitken, Peter G. .NET Graphics and Printing Optimax Publishing, 2003
3. Prosise, Jeff. Programming Microsoft .NET Microsoft Press, 2002

Reference books

1. Wrox, Beginning Visual C# 2008,Wiley
2. Fergal Grimes, Microsoft .Net for Programmers. SPI
3. Balaguruswamy, Programming with C#, TMH
4. Mark Michaelis, Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. ShibiParikkar, C# with .Net Frame Work, Firewall Media
6. Wrox, Beginning ASP.NET 4.5 in C# and VB, 2012
7. Lippman, Stanley B. C# Primer - A Practical Approach Addison-Wesley, 2012

BCS-53 LAMP TECHNOLOGY

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The studentsare expected to be able to demonstrate the following knowledge, skills and attitudes after completingthis course.

1. Use Open Source Operating system and its distributions like Fedora, Google chrome OS,Ubuntu.
2. To comprehend framework of BSD (Berkley System Distribution) and itsinstallation
3. Study of Web technologies based on open Software‟s LAMP (Linux Apache MySqlandPHP/Python)
4. To Learn HTML, XHTML, PHP and JAVAScript

Topics Covered

UNIT-I

Introduction to LAMP Terminologies, Two Tier and Three Tier Web based Application Architecture; Advantages of using LAMP based Technologies, Linux: Distributions – Fedora and Ubuntu; Installation – Disk Partitioning, Boot Loader, Etc; Using Linux – Shell, File System Familiarity; Linux Administration – Managing Users, Services and Software; Network Connectivity and Configurations; Security. 9

UNIT-II

Apache: Web Server ConceptualWorking, Web Browser, HTTP, Installationand Configuration; *Httpd. Conf* File; Logging; Security; Running Website 9

UNIT-III

Mysql: Database Management System, ER Diagram, Relational Database, Installation, Configuration, Administration, Common SQL Queries – Create, Describe, Select, Insert, Delete, Update, Etc. 9

UNIT-IV

PHP: Dynamic Content, Server Side Scripting, Installation, Configuration, Administration, Language Syntax, Built-in Functions, PHP and Mysql Connectivity, Installation, Configuration and Administration of All Four LAMP Components Namely Linux, Apache Web Server, Mysql and PHP, Testing with Any Project Example. 9

Textbooks

1. Eric Rosebrock, Setting Up LAMP, Sybex Publishers.
2. James Lee, Brent Ware, Open Source Development with LAMP, Addison-Wesley Professional.
3. Jason Gerner, Elizabeth Naramore, Professional LAMP, John Wiley & Sons.

Reference books

1. Ben Laurie, Peter Laurie, Apache – Definitive Guide, O‟Reilly Publications.
2. Paul DuBois, MySQL, Addison-Wesley.
3. Rasmus L Erdorf, Kevin Tatroe, Programming PHP, O‟Reilly Publications.

BCS-54 NETWORK PROGRAMMING

Course Category : Program Elective (PE1&PE2)
Pre-requisite Subject : NIL
Contact Hours/Week : Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits : 4

Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse.

1. To write socket API basedprograms
2. To design and implement client-server applications using TCP and UDPsockets
3. To analyze networkprograms

Topics Covered

UNIT-I

Introduction, Overview of UNIX OS, Environment of a UNIX Process, Process Control, Process Relationships, Signals, Inter-process Communication, Overview of TCP/IP Protocols. 9

UNIT-II

Elementary TCP Sockets- Introduction to Socket Programming: Introduction to Sockets, Socket Address Structures, Byte Ordering Functions, Address Conversion Functions, Elementary TCPSockets,socket,connect,bind,listen,accept,read,write,closefunctions,Iterative Server, Concurrent Server. 9

UNIT-III

TCP Echo Server, TCP Echo Client, Posix Signal Handling, Server with Multiple Clients, Boundary Conditions: Server Process Crashes, Server Host Crashes, Server Crashes and Reboots, Server Shutdown, I/O Multiplexing, I/O Models, Select Function, Shutdown Function, TCP Echo Server (with Multiplexing), Poll Function, TCP Echo Client (with Multiplexing). 9

UNIT-IV

Socket Options, Getsocket and Setsocket Functions, Generic Socket Options, IP Socket options, ICMP Socket Options ,TCP Socket Options, Elementary UDP Sockets, UDP Echo Server, UDP Echo Client, Multiplexing TCP and UDP Sockets, Domain Name System, Gethos by name Function, Ipv6 Support in DNS, Gethostbyadr Function, Getserv by name and Getserv by port Functions. 9

Textbooks

1. W. Richard Stevens, S.A Rago, Programming in the Unix environment, 2nd edition, Pearson, 2005.

Reference books

1. W. Richard Stevens, B. Fenner, A.M. Rudoff, Unix Network Programming – The Sockets Networking API, 3rd edition, Pearson, 2004.
2. W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Addison-

Wesley, 1994

BCS-55 MOBILE APPLICATION PROGRAMMING

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse.

1. Know the components and structure of mobile application development frameworks for Android and windows OS basedmobiles.
2. Understand how to work with various mobile application developmentframeworks.
3. Learn the basic and important design concepts and issues of development of mobile applications.
4. Understand the capabilities and limitations of mobiledevices.

Topics Covered

UNIT-I

Android Development, Android Operation System, Important Android Components, Security and Permissions, Android SDK, Eclipse, Create an Android Emulator Device, Design, Develop and Deploy Application on a Real Device. 9

UNIT-II

Introduction to Windows Phone 7, Type of applications that can be built- using Silverlight and XNA, Developer tools to be used for building apps 9

UNIT-III

Introduction to App Makr, Creating a Developer Account on App Hub: using a Dream Spark Account, App Certification Guidelines for the Windows Phone Marketplace 9

UNIT-IV

iOS overview, iOS Application Life Cycle, Design, Develop and Deploy Applications for iPhone, iPad and iPod Touch, Human Interface and use of Sensors for AppDevelopment. 9

Textbooks

1. Jeff Mcwherter, Scott Gowell, Professional Mobile Application Development, Wrox Publisher (2012), 1e

Reference books

1. Lauren Darcy, Shane Conder, Sams Teach Yourself Android Application Development in 24 Hrs, 1e

2. Himanshu Dwivedi, Chris Clark, David Thiel, Mobile Application Security, Tata McGraw Hill (2010), 1e

BCS-56 LINUX ADMINISTRATION AND SYSTEM CALL PROGRAMMING

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. use the LINUX based system through variouscommands
2. understand the task of LINUX systemadministration
3. write programs for system programming like IPC, semaphoreetc.

Topics Covered

UNIT-I

History of Unix and Linux, Architecture of Linux, Advantages of Linux, Introduction to Kernel, Introduction to Linux Shell: Types of Shell, Feature and Benefits of Shell. I/O Redirection and Piping, Pipes, Filters, Introduction to Various Text Editor, Various Vi Editing Modes, Scrolling, Yank and Paste, Put and Delete, Set Commands, Comparison of Emacs Editor, Vi Editor, Pico Editor. 9

UNIT-II

Introduction to Linux Files: Rules for Creating Files, Linux Files System, File Printing, Searching Files using Grep, Change Permission to Set Files and Change Owner of Files. 9

Process, Listening with Ps, Killing with Kill, PID, UID, GID, Signals, Nice, Renice.

UNIT-III

General Administration Issues: Root Account, Creating User in Linux, Changing Password, Deleting User, Disabling User Account, Linux Password & Shadow File Formats System Shutdown and Restart Creating Groups, Custom Configuration and Administration Issues, Simple Commands 9

UNIT-IV

System Call Programming: System Calls, Usage of File Related System Calls through C 9

Programming. Process: Concept, Types, Related Commands & System Calls, Usage of Process Related System Calls through C Programming

Textbooks

1. Ellen Siever, Robert Love and Arnold Robbins, Linux in Nutshell, Fifth Edition, Oreilly Media.
2. Kurt Wall, Mark Watson, Mark Whitis, Linux Programming, Third Edition, SAMS Techmedia
3. Mark Sobell, Practical Guide to Linux Programming, Pearson Education.

Reference books

1. Graham Glass & King Ables, UNIX for Programmers and Users , Pearson Education
2. J.Purcell, Linux Complete Command Reference, Red Hat Software, McGraw hill.

BCS-57 DATABASE ADMINISTRATION WITH ORACLE

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous Assessment through Tutorials, Assignments, Quizzes and Three Minor Tests and One MajorTheory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Gain a conceptual understanding of the Oracle database architecture and how its components work and interact with oneanother.
2. will also learn how to create an operational database and properly manage the various structures in an effective and efficient manner including performance monitoring, database security, user management, and backup/recoverytechniques
3. Establish and in depth understanding of Database Administration using the DBMS Interfaces
4. Create and understand the application of user rolls, privileges, and the security of the database.
5. Discuss and understand the concepts of Backup and RecoveryProcedures

Topics Covered

UNIT-I

Introduction: DBMS Architecture and Data Independence, DBA Roles and Responsibilities,SQL 9

*PLUS Overview: SQL Plus Fundamentals, Producing More Readable Outputs, Accepting Values At Urntime, Using Isql *Plus, Modifying Data: Introduction to DML Statements, Truncating A Table, Transaction Control Language, Managing Constraints: CreatingConstraints,

Dropping Constraints, Enabling and Disabling Constraints, Deferring Constraints Checks

UNIT-II

Managing Views: Creating and Modifying Views, Using Views, Inserting, 9

Updating and Deleting
Data through Views, User Access and Security: Creating and Modifying Use Accounts, Creating and Using Roles, Granting and Revoking Privileges, Managing User Groups with Profiles, Oracle Overview and Architecture: An Overview of Logical and Physical Storage Structures, Oracle Memory Structures, Oracle Background Processes, Connecting to Oracle Instance, Processing SQL Command., Managing Oracle: Starting Up the Oracle Instance, Managing Sessions, Shutting
Down the Oracle Instance, Instances Messages and Instance Alerts.

UNIT-III

Control and Redo Log Files: Managing the Control Files, Maintaining and Monitoring Redo Log Files, Managing Tables, Indexes and Constraints: Storing Data (Create, Alter, Analyzing, Querying Table Information), Managing Indexes, Managing Constraints, Managing Users and Security: Profiles, Managing Users, Managing Privileges, Managing Roles, Querying Role Information, Introduction to Network Administration: Network Design Considerations, Network Responsibilities for the DBA, Network Configuration, Overview of Oracle Net Features, Oracle
Net Stack Architecture 9

UNIT-IV

Backup and Recovery Overview: Database Backup, Restoration and Recovery, Types of Failure in Oracle Environment, Defining A Backup and Recovery Strategy, Testing the Backup and Recovery Plan, Introduction to Performance Tuning: Brief Overview of Tuning Methodology, General Tuning Concepts 9

Textbooks

1. C.J. Date, Database Systems, Addison Wesley, 2000
2. Chip Dawes, Biju Thomas, Introduction to Oracle 9i SQL, BPB, 2002
3. Bob Bryla, Biju Thomas, Oracle 9i DBA Fundamental I, BPB, 2002
4. Doug Stums, Matthew Weshan, Oracle 9i DBA Fundamental I, BPB, 2002
5. Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

Reference books

1. Loney and Koch, Oracle Database 10g: The Complete Reference, McGraw-Hill Osborne Media
2. Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

BCS-58 DATA WAREHOUSING & DATA MINING

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Approach business problems data-analytically by identifying opportunities to derive business value fromdata.
2. know the basics of data mining techniques and how they can be applied to extract relevant business intelligence

Topics Covered

UNIT-I

Introduction to Data Mining: Motivation for Data Mining, Data Mining- Definition &Functionalities, Classification of DM Systems, DM Task Primitives, Integration of a Data Mining System with A Database or A Data Warehouse, Major Issues in Data Mining. Data Warehousing .Overview of Concepts Like Star Schema, Fact and Dimension Tables, OLAP Operations, from OLAP to Data Mining. Data Pre Processing: Why? Descriptive Data Summarization, Data Cleaning: Missing Values, Noisy Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Dimensionality Reduction, Data Compression, Numerosity Reduction, Data Discretization and Concept Hierarchy Generation for
Numerical and Categorical Data. 9

UNIT-II

Mining Frequent Patterns, Associations and Correlations: Market Basket Analysis, Frequent Item Sets, Closed Item Sets, and Association Rules, Frequent Pattern Mining, Efficient and Scalable Frequent Item Set Mining Methods, The Apriori Algorithm for Finding Frequent Item Sets Using Candidate Generation, Generating Association Rules from Frequent
Item Sets, Improving the Efficiency of Apriori, Frequent Item sets without Candidate Generation using FP Tree, Mining Multilevel Association Rules, Mining Multidimensional Association Rules, from Association Mining to Correlation Analysis, Constraint-Based Association Mining. Issues Regarding Classification and Prediction: Classification Methods: Decision Tree, Bayesian Classification, Rule Based Prediction: Linear and Non Linear Regression Accuracy and Error
Measures, Evaluating the Accuracy of A Classifier or Predictor. 9

UNIT-III

Cluster Analysis: Types of Data in Cluster Analysis, Categories of Clustering Methods, Partitioning Methods K-Means, K-Mediods Hierarchical Clustering- Agglomerative and Divisive Clustering, BIRCH and ROCK Methods, DBSCAN, Outlier Analysis Stream Data Classification, Clustering Association Mining in Stream Data. Mining Sequence Patterns in Transactional
Databases 9

UNIT-IV

Spatial Data and Text Mining: Spatial Data Cube Construction and Spatial OLAP, Mining Spatial Association and Co-location Patterns, Spatial Clustering Methods, Spatial Classification and Spatial Trend Analysis. Text Data Analysis and Information Retrieval, Dimensionality Reduction for Text, Text Mining Approaches Web Mining Introduction, Web Content Mining, Web Structure Mining, Web Usage Mining, Automatic Classification of Web Documents. Data Mining for Business Applications like Balanced Scorecard, Fraud Detection, Click Stream Mining, Market Segmentation, Retail Industry, Telecommunications Industry, Banking & Finance and CRM etc. 9

Textbooks

1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 2nd Edition
2. P. N. Tan, M. Steinbach, Vipin Kumar, .Introduction to Data Mining., Pearson Education

Reference books

1. MacLennan Jamie, Tang Zhao Hui and Crivat Bogdan, .Data Mining with Microsoft SQL Server 2008, Wiley India Edition.
2. G. Shmueli, N.R. Patel, P.C. Bruce, .Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XL Miner, Wiley India.
3. Michael Berry and Gordon Linoff .Data Mining Techniques., 2nd Edition Wiley Publications
4. Alex Berson and Smith, .Data Mining and Data Warehousing and OLAP, McGraw Hill Publication.
5. E. G. Mallach, .Decision Support and Data Warehouse Systems", Tata McGraw Hill.
6. Michael Berry and Gordon Linoff .Mastering Data Mining- Art & science of CRM., Wiley Student Edition
7. Arijay Chaudhary & P. S. Deshpande, Multidimensional Data Analysis and Data Mining Dreamtech Press
8. Vikram Pudi & Radha Krishna, .Data Mining, Oxford Higher Education.

BCS-59 ANALYTICS AND SYSTEMS OF BIG DATA

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Demonstrate the knowledge of big data, data science, data analytics, distributed file systems, parallel Map Reduce paradigm, NoSQL, machine learning,etc
2. Program and implement examples of big data and NoSQL applications using open source Hadoop, HDFS, Map Reduce, Hive, Pig, Mahout,etc
3. Read current research papers and implement example research group project in big data

Topics Covered

UNIT-I

Big Data, Complexity of Big Data, Big Data Processing Architectures, Big Data Technologies, 9

Big Data Business Value, Data Warehouse, Re-Engineering the Data Warehouse, Workload Management in the Data Warehouse, New Technology Approaches.

Integration of Big Data and Data Warehouse, Data Driven Architecture, Information Management and Lifecycle, Big Data Analytics, Visualization and Data Scientist, Implementing the "Big Data" Data. Choices in Setting Up R for Business Analytics, R Interfaces, Manipulating Data, Exploring Data, Building Regression Models, Clustering and Data Segmentation,

Forecasting and Time Series Models

UNIT-II

Writing Hadoop Map Reduce Programs, Integrating R and Hadoop, Using Hadoop Streaming with R, Learning Data Analytics with R and Hadoop, Understanding Big Data Analysis with Machine Learning. Big Data, Web Data, A Cross-Section of Big Data Sources and the Value 9

They Hold, Taming Big Data, The Evolution of Analytic Scalability.

UNIT-III

The Evolution of Analytic Processes, The Evolution of Analytic, Processes the Evolution of Analytic Tools and Methods. Legacy Data, Hypothesis Testing, Prediction, Software, 9

Complexity, Business problems suited to Big Data Analytics.

UNIT-IV

High Performance Appliances for Big Data Management using Graph Analytics, The New Information Management Paradigm, Big Data's Implication for Businesses, Big Data Implications for Information Management, Splunk's Basic Operations on BigData. 9

Textbooks

1. Anand Rajaraman, Jure Leskovec, and Jeffrey D. Ullman, Mining of Massive Data Sets,
   Cambridge University Press. 2011.
2. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.

Reference books

1. Viktor Mayer Schönberger, Kenneth Cukier, Big Data: A Revolution That Will Transform How

We Live, Work, and Think, John Murray 2013

2. Pramod J. Sadalage, Martin Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of
   Polyglot Persistence, Addison Wesley
3. Eric Sammer, Hadoop Operation, O"Reilly 2012
4. Donald Miner, Adam Shook, MapReduce Design Patterns: Building Effective Algorithms and
   AnalyticsforHadoopandOtherSystems,O"Reilly2012
5. "BigDataNow",byO"ReillyMediaInc.,0"Reilly2012

BCS-60 GAME THEORY

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The studentsare expected to be able to demonstrate the following knowledge, skills and attitudes after completingthis course.

1. Discuss the basics of games and the mathematics for games as well as the typical application areas for gametheory.
2. Explain the concepts of non-cooperative and cooperative games and the basic computational issues.
3. Describe the concepts of Games with Perfect Information as well as Games with Imperfect Information.
4. Study the non-cooperative gametheory.
5. Designing the mechanisms and understand the computational applications of mechanismdesign.

Topics Covered
UNIT-I

Introduction–Making RationalChoices: Basics of Games–Strategy-Preferences– 9 Payoffs

– Mathematical Basics -Game Theory-Rational Choice - Basic Solution Concepts-Non- Cooperative versus Cooperative Games - Basic Computational Issues - Finding Equilibrium and Learning in Games- Typical Application Areas for Game Theory (e.g. Google'sSponsored

Search, ebay Auctions, Electricity Trading Markets)

UNIT-II

Games With Perfect Information- Strategic Games - Prisoner's Dilemma, Matching Pennies- Nash Equilibrium- Theory and Illustrations - Cournot's and Bertrand's Models of Oligopoly- Auctions- Mixed Strategy Equilibrium- Zero-Sum Games- Extensive Games with Perfect Information-Repeated Games (Prisoner's Dilemma)- Sub Game Perfect Nash Equilibrium; ComputationalIssues. 9

Games with Imperfect Information- Bayesian Games – Motivational Examples – General Definitions –Information Aspects – Illustrations - Extensive Games with Imperfect - Information - Strategies- Nash Equilibrium – Beliefs and Sequential Equilibrium–

Illustrations - Repeated Games - Prisoner's Dilemma - Bargaining

UNIT-III

NON-COOPERATIVE GAME THEORY-Non-Cooperative Game Theory - Self-Interested Agents- Games in Normal Form – Analyzing Games: from Optimality to Equilibrium - Computing Solution Concepts of Normal-Form Games - Computing Nash Equilibrium of Two- Player, Zero-Sum Games - Computing Nash Equilibrium of Two-Player, General-Sum Games - 9

Identifying Dominated Strategies

UNIT-IV

MECHANISM DESIGN-Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of Social Functions - Ranking Systems- Protocols for Strategic Agents: Mechanism Design - Mechanism Design with Unrestricted Preferences- EfficientMechanisms 9

-Vickrey and VCG Mechanisms (Shortest Paths) - Combinatorial Auctions - Profit Maximization Computational Applications of Mechanism Design - Applications inComputer

Science - Google's Sponsored Search - ebay Auctions

Textbooks

1. Kevin Leyton-Brown,Yoav Shoham,Ronald J Brachman,Thomas Dietterich, Essentials of
   Game Theory, Morgan and Claypool Publishers, 2008
2. Roger A McCain, Game Theory: A Nontechnical Introduction to the Analysis of Strategy,
3. Fudenberg, Drew, and Jean Tirole, Game Theory, Cambridge, MA: MIT Press, 1991
4. Osborne, Martin, and Ariel Rubinstein. A Course in Game Theory. Cambridge, MA: MIT Press,
   1994
5. Mailath, George J., and Larry Samuelson, Repeated Games and Reputations. New York, NY:
   Oxford University Press, 2006
6. Weibull, Jorgen. Evolutionary Game Theory. Cambridge, MA: MIT Press, 1995.

Reference books

1. M. J. Osborne, An Introduction to Game Theory. Oxford University Press, 2004.
2. M. J. Osborne and A. Rubinstein, A Course in Game Theory. MIT Press, 1994.
3. N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani (Editors), Algorithmic Game Theory.
   Cambridge University Press, 2007

4. A. Dixit and S. Skeath, Games of Strategy, Second Edition. W W Norton & Co Inc, 2004.
5. Yoav Shoham, Kevin Leyton-Brown, Multiagent Systems: Algorithmic, Game-Theoretic, and
Logical Foundations, Cambridge University Press 2008
6. Zhu Han, Dusit Niyato, Walid Saad, Tamer Basar and Are Hjorungnes, Game Theory in Wireless and Communication Networks, Cambridge University Press, 2012

BCS-66 ADVANCE PROGRAMMING TECHNIQUES

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Develop algorithms from user problemstatements.
2. Express the solutions to computer oriented problems using pseudocode.
3. Proficiently transform designs of problem solutions into a standard programming language.
4. Use an integrated programming environment to write, compile, and execute programs involving a small number of sourcefiles.
5. Applydebuggingandtestingtechniquestolocateandresolveerrors,andtodetermine the effectiveness of a program.
6. Apply standard/structured programming techniques including design approaches, use of functions/methods, use of documentation, and avoidance of excessivebranching.
7. Proficiently use fundamental programming elements including: variable declaration, use of data types and simple data structures (arrays and objects), decision structures, loop structures, input and output for console and text files, andfunctions/methods.

Topics Covered

UNIT-I

Introduction-History of Computers, Components of a Computer, Programming Languages, Compilation vs. Interpretation, Basic Program Structure and the Integrated Development Environment-Essential Program Structure, Documentation and Standard Programming Practices, Integrated Development Environment(IDE) Overview, Editing (with the IDE), Compilation (with the IDE), Execution (with the IDE), Debugging (with the IDE) 9

UNIT-II

Algorithm Development using Psuedo-code-Software Engineering Method, Procedural Problem Solving Approaches, Assignments, Conditionals, Loops, Classic Formula Problems, Classic Aggregate Problems (E.G., Maximum, Minimum, Sum, Average), 9

Basic Input And Output-Console Output including Basic Data Formatting, Console Input Variables and Expressions-Variable Declarations including Common Data Types (E.G. Int, Float, String), Arithmetic, Expressions Including Precedence and Associativity, Assignment Statements (Numeric and String Data), Library Functions, Standard Programming Practicesfor

Variables and Assignments, Case Problems Using Variables and Expressions

UNIT-III

Decision Structures-Boolean Expressions, Single Alternative Conditional Statements (E.G., If), Double Alternative Conditional Statements (E.G., If/Else), Multi-Way Statements (E.G., Case), Nested Conditional Structures, Standard/ Structures Programming Practices for Decision Structures, Case Problems using Decisions Structures 9

Loop Structures-Loop Control Variables, Initialization, Test and Modifications, Pre-Test Loop (E.G., While Loop), Post-Test Loop (E.G., Do-While Loop), Counting Loop (E.G., For Loop), Nested Loop Structures, Standard/ Structures Programming Practice for Loop Structures, Case Problems using Loop Structures

Input and Output using Files-Input Streams from Files, Priming Read Loop, Output Streams to

Files, Case Problems using File Input and Output

UNIT-IV

Simple Data Structures-One Dimensional Arrays, Strings as Arrays, Multi-Dimensional Arrays, Records (E.G., Objects/Entities), Case Problems using Arrays and Records 9

Functions-Argument Passing, Returning Results, Recursion, Testing A Program System, Standard/Structures Programming Practices for Functions, Case Problems using Functions Introduction to the Object Oriented Approach-Class Declarations, Instance Variables, Methods, Object Instantiation, Standard/Structures Programming Practice for Classes, Case Problems usingObjects

Textbooks

1. Gaddis Tony, Starting Out with C++: From control structures through objects, 7th Edition,
   Addison-Wesley Publishing, 2012.

Reference books

1. Deitel&Deitel, JAVA: How to Program, 9th Edition, Prentice Hall, 2012.
2. Deitel&Deitel, C++ How to Program: Late Objects Version, 7th Edition, Prentice Hall,2011.
3. Gaddis, Tony, Starting Out with JAVA: Control Structures to Objects, 2nd Edition, Pearson,
   2012.
4. Horstmann, Cay, JAVA Concepts, 6th Edition, Wiley, 2009.
5. Liang, Y. Daniel, Introduction to Programming with JAVA, 8th Edition,

Pearson, 2010.
6. Liang, Y. Daniel, Introduction to Programming with C++, 2nd Edition, Pearson, 2010.
7. Lewis, John, and Loftus, William, JAVA Software Solutions: Foundations of Program Design,
7th Edition, Pearson, 2012.
8. Malik, D. S., JAVA Programming: From Problem Analysis to Program Design, 5th Edition,
Course Technology, 2011.
9. Malik, D. S., C++ Programming: From Problem Analysis to Program Design, 5th Edition,
Course Technology, 2010.
10. Savitch, Walter, Absolute JAVA, 4th Edition, Addison Wesley, 2009.
11. Stroustrup, Bjarne, Programming: Principles and Practice Using C++, Addison-Wesley Professional, 2008.

BCS-67 COMPUTER VISION: FOUNDATIONS AND APPLICATIONS

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the various operations performed on 2Dimage.
2. To recover the information, knowledge about the objects in the scene and projection geometry and understanding of 3Dimage.

Topics Covered

UNIT-I

Introduction: Computer Vision, Brief History. Image Formation: Geometric Primitives and Transformations, PhotometricImage Formation, Digital Camera. Image Processing: Point Operators, Linear Filtering, Neighborhood Operators, Fourier Transform, Pyramids andWavelet, Geometric Transforms, Global Optimization. 9

UNIT-II

Feature Detection and Matching: Points and Patches, Edges, Lines. **Segmentation:** Active Contours: Snakes, Dynamic Snake and Condensation, Scissor, Level Sets, Split and Merge, Mean Shift and Mode Finding, **Feature Based Alignment:** 2D and 3D Feature Based Alignment, Pose Estimation, Geometric Intrinsic Calibration. 9

UNIT-III

Structure from Motion: Triangulation, Two Frame Structure from Motion, Factorization, Bundle Adjustment. **Dense Motion Estimation:** Translational Alignment, Parametric Motion, SplineBasedMotion,LayeredMotion.**ImageStitching:**MotionModels,GlobalAlignment, Composing. 9

UNIT-IV

3D Reconstruction: Surface Representation, Point based Representation, Volumetric Representation, Model based Reconstruction, Application: 3D Photography. **Image Based Rendering:** View Interpolation, Layered Depth Images, Video based Rendering. **Recognition:** Object Detection, Face Recognition, Context and Scene Understanding. 9

Textbooks

1. R. Szeliski, Computer Vision: Algorithms and Applications, Springer.
2. D. Forsyth and J. Ponce, Computer Vision- A Modern Approach, Prentice Hall.
3. B. K. P. Horn, Robot Vision, McGraw Hill.

Reference books

1. E. Trucco and A. Verri, Introductory Techniques for 3D Computer Vision, Publisher: Prentice Hall.
2. R. Jain et. Al, Machine Vision, McGraw Hill, 1995.
3. E. Trucco, and A. Verri, Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998.
4. V. Nawla, A Guided Tour of Computer Vision, Addison-Wesley, 1993.
5. Various journal and conference articles, research reports, and book excerpts as appropriate.

BCS-68 SOFTWARE REUSE

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. To provide a solid background knowledge about softwareReuse.
2. To educate Metrics used in softwarereuse.
3. To provide Knowledge about various frameworks andCOTS.

Topics Covered

UNIT-I

INTRODUCTION: Software Reuse and Software Engineering –State of Art and the Practice - Aspects of Software Reuse- Software Reuse Organizations – Support Services – Institutionalizing Reuse. 9

DOMAIN ENGINEERING: Building Reusable Assets – Domain Analysis: Basic Concepts – Domain Scoping – Domain vs Application Requirements – Domain Analysis Methods – Domain
Analysis Tools- Programming Paradigms and Reusability.

UNIT-II

OBJECT ORIENTED DOMAIN ENGINEERING: A Pragmatic Introduction to Object Orientation: Introduction- the Tenets of Object Oriented Programming. Abstraction and Parameterization Techniques in Object Orientation: Abstraction Techniques in Object Oriented Modeling – Abstraction Techniques in Object Oriented Programming Languages, Meta-
programming – Design Patterns. 9

UNIT-III

FRAMEWORKS AND APPLICATION ENGINEERING-Application Frameworks: Framework – Fulfilling the Framework Contract–Building Frameworks-SWING Framework. Architectural Frameworks: Architecture–Architecture and Reuse–CORBA – Application
Engineering – Component Storage and Retrieval – Reusable Asset Integration. 9

UNIT-IV

MANAGERIAL ASPECTS OF SOFTWARE REUSE Software Reuse Metrics – Software Reuse Cost Estimation – Software Reuse Return on Investment – Component Based Software Engineering – Product-Line Engineering – COTS Based Development. 9

Textbooks

1. Hongji Yang and Xiaodong Liu, Software Reuse in the Emerging Cloud Computing Era, IGI
   Publishing Hershey, PA, USA, 2012.
2. HafedhMili, Ali Mili, Sherif Yacoub, Edward Addy, Reuse-Based Software Engineering:
   Techniques, Organizations, and Control", John Wiley &Sons, 2002.

Reference books

1. Carma McClure, Software Reuse: A Standards-Based Guide, IEEE, 2001.
2. Wayne C. Lim, Managing Software Reuse, Prentice Hall, 2004.
3. Ivar Jacobson, Martin Gres, Patrick Johnson, Software Reuse, Pearson Education, 2004.

BCS-69 SOFTWARE VERIFICATION & VALIDATION

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the concepts and theory related to softwaretesting.
2. Understand different testing techniques used in designing test plans, developing test suites, and evaluating test suitecoverage
3. Understand the relationship between black-box and white-box testing and know how to apply asappropriate.
4. Learn to use automated testing tools in order to measure codecoverage.
5. Understand how software developers can integrate a testing framework into code development in order to incrementally develop and testcode.

UNIT-I

An Introduction to Software Verification and Validation/Basic Concepts, Methods for Evaluating 9

Software for Correctness and Reliability including Code, Inspections, Program Proofs, System Test Categories, Code inspections and their role in software verification.

UNIT-II

Review of Software Engineering Methods and Challenges, Role of Verification and Validation. Economics of Verification and Validation, Software Reviews and Inspections, Conducting 9

Reviews and Inspection, Software Quality Metrics

UNIT-III

Review of Software Configuration Management, Software Testing Overview, Functional & 9

Structural Testing, Integration and System Testing

UNIT-IV

Software validation metrics, Assessing and Improving the Validation Process, Improving the development Process 9

Textbooks

1. Stephen H Kan, Metric and Model in Software Quality Engineering, Pearson Education
2. William Perry, Effective methods for Software Testing, Wiley Publication
3. Dorotny Graham, Erik Van Veenendaal, Foundation of Software Testing By: CENGAGE learning,
4. Dr. K.V.K. Prasad, Software Testing Tools, Dreamtech Press
5. *Pankaj Jalote*, An Integrated Approach To*Software* Engineering, Springer Verlag, NY, 1991
6. Rajib Mall, Fundamentals of Software Testing, PHI Publication

Reference books

1. Steven R. Raktitin, Software Verification and Validation for Practitioners and Managers, ed. Artech House, 2nd Edition

BCS-70 SOFTWARE DESIGN &CONSTRUCTION

Course Category	:	Program Elective (PE3 &PE4)
Pre-requisiteSubject	:	NIL
ContactHours/Week	:	Lecture : 3, Tutorial : 1 , Practical:0
NumberofCredits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
CourseOutcomes	:	Thestudentsareexpectedtobeabletodemonstratethe following knowledge, skills and attitudes after completing thiscourse.

1. Understand Architectural styles and QualityAttributes.
2. Understand common tools and terminology related to software design and construction.
3. Understand the role of the Software Architect with a developmentproject.
4. Use methods for constructing and evaluatingarchitectures.
5. Understand Advance Concepts in design andconstruction.

Topics Covered

UNIT-I

Software Architecture –Architecture Structures and Views – Importance of Software 9
Architecture – Predicting System Quality-Influencing Organizational Structure – Improving Cost and Schedule estimates – Context of Softwarearchitecture.

UNIT-II

Understanding Quality Attributes – Availability – Interoperability – Modifiability - Performance 9
and Security – Testability - Usability – Quality Attribute Modeling andAnalysis.

UNIT-III

Architecture in Agile Projects – Architecture and Requirements – Designing andDocumentation 9
– Implementation and Testing – Architecture Reconstruction and Conformance.

UNIT-IV

EconomicAnalysisofArchitecture–ArchitectureCompetence–
ArchitectureandSoftware 9
Product Lines – Case Studies, Architecture in Cloud - Cloud Definition – Service Model – Economic Justification – Base Mechanism – Architecture for Edge – Edge Document System – SDLC – MetropolisModel.

Textbooks

1. Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, 3 rd edition Pearson,
   2013.
2. Mary Shaw, David Garlan, Software Architecture: Perspectives on an Emerging Discipline,
   Prentice Hall, 1996.

Reference books

1. Taylor R. N, Medvidovic N, Dashofy E. M, Software Architecture: Foundations, Theory, and
   Practice, Wiley, 2009.
2. Booch G, Rumbaugh J, Jacobson I, The Unified Modeling Language User Guide, Addison- Wesley, 1999

BCS-71 SOFTWARE QUALITY MANAGEMENT

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing thiscourse.

1. Define quality assuranceplans
2. Apply quality assurance tools &techniques
3. To learn about standards andcertifications
4. To describe procedures and work instructions in softwareorganizations

Topics Covered

UNIT-I

INTRODUCTION: Software Quality Challenge - Software Quality Factors - Components of theSoftwareQualityAssuranceSystem.Pre-ProjectSoftwareQualityComponents-Contract Review - Development and Quality Plans 9

UNIT-II

SQA COMPONENTS IN THE PROJECT LIFE CYCLE : Integrating Quality Activities in the Project Life Cycle – Reviews - Software Testing – Strategies - Software Testing – Implementation - Assuring the Quality of Software Maintenance - Assuring The Quality of External Participants' Parts - Case Tools and their effect on Software Quality. 9

UNIT-III

SOFTWARE QUALITYINFRASTRUCTURE COMPONENTS: Procedures and Work Instructions -Supporting Quality Devices - Staff Training, Instructing and Certification - 9

Preventive and Corrective Actions - Configuration Management - Documentation and Quality
Records Controls.

UNIT-IV

SOFTWARE QUALITY MANAGEMENT COMPONENTS & STANDARDS: Project 9

Progress Control - Components of Project Progress Control- Progress control of internal projects and external participants- Implementation of Project Progress Control, ISO 9001 Certification - Software Process Assessment. Organizing for Quality Assurance -Management and its Role in Quality Assurance - Software Quality Assurance Unit - SQA Trustees and Committees

Textbooks

1. Daniel Galin, Software Quality Assurance: From Theory to Implementation, Pearson Addison-Wesley, 2012.
2. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005
3. Stephen H Kan, Metrics & Models in Software Quality Engineering, Pearson Education
4. Kshirasagar Naik &Priyadarshi Tripathi, Software Testing & Quality Assurance, Wiley India Edition
5. Stephen H. Kan, Metrics and models in software quality Engineering, Addison – Wesley, 1955.
6. RogerS.Pressman,SoftwareEngineering-APractitioner′sApproach, McGrawHill publication

Reference books

1. Mordechai Ben – Menachem and Garry S. Marliss, "Software Quality", Thomson Asia Pte Ltd, 2003.
2. Allen Gilles, "Software quality: Theory and management" - International Thomson - Computer press, 1997.

BCS-72 ASPECT ORIENTED PROGRAMMING

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. To master basics of aspect-oriented software development, this enables a higher degree of the separation of concerns through crosscutting concernmodularization.
2. Provides an overview of aspect-oriented approaches to software development throughoutallofitsstages,aswellasprogramminglanguagesconnectedwiththese

approaches. The course also covers the relationship of aspect-oriented software development and software product lines.

3. Will gain experience with Aspect J, which is the most important aspect-oriented programming language oftoday.

Topics Covered

UNIT-I

Introduction to Aspect Oriented Programming, AOP Language Anatomy, AOP Language, Specification, AOP Language Implementation, AspectJ, Example Aspect, Obtaining and Installing AspectJ — 9

UNIT-II

Writing the Component First, Aspect Code, Identifying the Join Point, Determining the Point cut, Giving Advice, Adding an Aspect, Compiling and Executing the Example, Adding a New Concern, Exposing Context, Inter-type Declarations, Aspect Granularity, AspectJ Compiler Functionality — 9

UNIT-III

Introduction to AspectJ Joint Point: The Dynamic Join Point Model, AspectJ Join Points, Join Point Signatures, Patterns, Reflection, Example Join Points, AspectJ Pointcuts: Building Pointcuts, Using Designators, Combining Pointcuts — 9

UNIT-IV

Advice: Definition of Advice, Issues Common to All Types of Advice, Types of Advice: An Overview, Before Advice, After Advice, Around Advice, Advice Precedence, Inter type declarations, Aspects, Structure, Extensions, Aspect Instantiation and Associations, Use of AspectJ and its Tools, Error Handling and Common Problems — 9

Textbooks

1. Ivan Kiselev, Aspect-Oriented Programming with AspectJ, Sams, 2002.
2. Robert E. Filman, TzillaElrad, Siobhan Clarke, Mehmet Aksit, Aspect-Oriented Software Development, Addison-esley, 2004
3. Ivar Jacobson and Pan-Wei Ng. Aspect-Oriented Software Development with Use Cases. Addison-Wesley, 2004
4. Krzysztof Czarnecki and Ulrich Eisenecker. Generative Programming: Methods, Tools, and Applications. Addison-Wesley, 2000.

Reference books

1. Joseph D. Gradecki, Nicholas Lesiecki, Mastering AspectJ: Aspect Oriented programming in JAVA, Wiley, First Edition, 2003
2. O .Vladimir Safonov, Using Aspect-Oriented Programming for Trustworthy Software Development, John Wiley & Sons, 2008.

3. Siobhan Clarke and Elisa Baniassad. Aspect-Oriented Analysis and Design: The Theme Approach. Addison-Wesley, 2005.

BCS-73 NEURAL NETWORK & FUZZY SYSTEM

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Basics of ANN and its learningalgorithms.
2. Fuzzy principles andrelations.
3. Genetic algorithms and itsapplications.
4. Hybrid systems and usage of MATLABtoolbox

Topics Covered

UNIT-I

Neural Networks-1(Introduction &Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks, Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory — 9

UNIT-II

Neural Networks-II (Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation LearningMethods,EffectofLearningRuleCo-Efficient;BackPropagationAlgorithm,Factors Affecting Back-propagation Training, Applications. — 9

UNIT-III

Fuzzy Logic-I (Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion, Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial Applications. — 9

UNIT-IV

Genetic Algorithm(GA) Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications — 9

Textbooks

1. S. Rajsekaran& G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic
Algorithm: Synthesis and Applications, Prentice Hall of India.
2. N. P. Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press.
3. SimanHaykin, Neural Netw0rks, Prentice Hall of India
4. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India.
5. S.N. Sivanandam& S.N. Deepa, Principles of Soft Computing, John Wiley & Sons, 01-Jun-
2007

Reference books

1. Hertz J. Krogh, R.G. Palmer, Introduction to the Theory of Neural Computation, Addison-
Wesley, California, 1991
2. Freeman J.A. & D.M. Skapura, Neural Networks: Algorithms, Applications and Programming Techniques, Addison Wesley, Reading, Mass, (1992).

BCS-74 FUNDAMENTALS OF CLOUD COMPUTING

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. understand the concept of Existing Hosting Platforms and computing paradigms currently being used in industry andacademia
2. Identify the issues related to Cloud Computing. To analyse IASS/ PAAS and SAAS services along with Cloudmodels.
3. Understand the concepts of various Cloud Platforms with comparative analysis and the concepts of virtualization with the advantages inCloud.

Topics Covered

UNIT-I

Introduction: Basics of Emerging Cloud Computing Paradigm, Cloud Computing History and Evolution, Cloud Enabling Technologies, Practical Applications of Cloud Computing for Various Industries, Economics and Benefits of CloudComputing 9

Cloud Computing Architecture: Cloud Architecture Model, Types of Clouds: Public Private &Hybrid Clouds, Resource Management and Scheduling, QOS (Quality Of Service) and
Resource Allocation, Clustering

UNIT-II

Classification of Cloud Implementations- Amazon Web Services - IaaS, Elastic Compute Cloud (EC2), Simple Storage Service (S3), Simple Queuing Services (SQS), VMware vCloud - IaaS, vCloud Express, Google AppEngine - PaaS, JAVA Runtime Environment 9

UNIT-III

Data Center : Classic Data Center, Virtualized Data Center (Compute, Storage, Networking and Application) , Business Continuity in VDC 9

Virtualization: Virtualization, Advantages and disadvantages of Virtualization, Types of Virtualization: Resource Virtualization i.e. Server, Storage and Network virtualization, Migration of processes, VMware vCloud – IaaS

UNIT-IV

Cloud Security and Privacy: Infrastructure Security: Infrastructure Security: The Network Level, Infrastructure Security: The Host Level, Infrastructure Security: The Application Level, Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security. Privacy: Data Life Cycle, Key Privacy Concerns in the Cloud, Responsibility for Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relationto Cloud Computing, Legal and Regulatory Implications 9

Textbooks

1. Dr. Kumar Saurabh, Cloud Computing, Wiley
2. ArshdeepBahga, Vijay Madisetti, Cloud Computing: A Hands-on Approach, Universities Press
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy, O'Reilly Media

Reference books

1. Gerard Blokdijk, Ivanka Menken , The Complete Cornerstone Guide to Cloud Computing Best Practices, Second Edition, Emereo Pty Ltd, 2009
2. Anthony Velte, Toby Velte and Robert Elsenpeter, Cloud Computing: A practical Approach, Tata McGraw Hill
3. Raj Kumar Buyya, James Broberg, Andrezei M. Goscinski, Cloud Computing: Principles and Paradigms, , John Wiley and Sons2011
4. Michael Miller, Cloud Computing, Pearson Education India, 2008
5. Judith Hurwitz, Robin Bllor, Marcia Kaufmann, Fern Halper, Cloud Computing for Dummies, Wiley, 2009

BCS-75 ADVANCED MULTI-CORE SYSTEMS

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the architectural techniques used in modern multi-core chips for mobile and server systems.
2. Understand the hardware support for security and parallel programming, and advanced memorysystems.
3. Become acquainted with recent processor design techniques (superscalar cores, VLIW cores, multi-threaded cores, energy-efficient cores), cache coherence, memory consistency, vector processors, graphics processors, heterogeneousprocessors.
4. Exposing with complex trade-offs between performance-power-complexity, hardware- software interactions, and architecture-technologyinteractions.

Topics Covered

UNIT-I

Introduction to Multi-Core Architectures, Virtual Memory and Caches, Introduction to Parallel Programming, Cache Coherence and Memory Consistency Models, Hardware Support for Synchronization, Case Studies of Chip-Multiprocessor. 9

UNIT-II

Introduction to Program Optimization, Control-Flow Analysis, Data-Flow Analysis, Compilers for High-Performance Architectures, Data Dependence Analysis, Loop Optimizations. 9

UNIT-III

CPU Scheduling, OS Support for Synchronization, Multi-Processor Scheduling, Security Issues. 9

UNIT-IV

A Tutorial on OpenMP, A Tutorial on Intel Threading Tools. 9

Textbooks

1. J. L. Hennessy and D. A. Patterson. Computer Architecture: A Quantitative Approach. Morgan Kaufmann publishers.
2. D. E. Culler, J. P. Singh, with A. Gupta. Parallel Computer Architecture: A Hardware/Software Approach. Morgan Kaufmann publishers.

Reference books

1. Steven S. Muchnick. Advanced Compiler Design and Implementation. Morgan Kaufmann publishers.
2. Wolfe. Optimizing Supercompilers for Supercomputers. Addison-Wesley publishers.
3. Allen and Kennedy. Optimizing Compilers for Modern Architectures. Morgan Kaufmann publishers.
4. A. S. Tanenbaum. Distributed Operating Systems. Prentice Hall.
5. Coulouris, Dollimore, and Kindberg. Distributed Systems Concept and Design. Addison-Wesley publishers.
6. Silberschatz, Galvin, and Gagne. Operating Systems Principles. Addison-Wesley publishers.

BCS-76 CRYPTOGRAPHY AND INFORMATION SECURITY

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Encryption techniques and key generationtechniques.
2. Authentication and securitymeasures.
3. Intrusion and filteringanalysis.

Topics Covered

UNIT-I

Introduction to Cryptography, Attacks, Services and Mechanism, Conventional Encryption Model, Classical Encryption Techniques- Substitution Ciphers and Transposition Ciphers, Cryptanalysis, Steganography, Stream and Block Ciphers, Modern Block Ciphers: Block Ciphers Principals, Data Encryption Standard (DES), Strength of DES, Differential and Linear Crypt Analysis of DES, Block Cipher Modes of Operations, Triple DES, IDEA Encryption and Decryption, Strength of IDEA, Confidentiality using Conventional Encryption, Traffic Confidentiality, Key Distribution, Random Number Generation. 9

UNIT-II

Introduction to Graph, Ring and Field, Prime and Relative Prime Numbers, Modular Arithmetic, Fermat"sandEuler"sTheorem,Euclid"sAlgorithm,ChineseRemainderTheorem.Principalsof Public Key Crypto Systems, RSA Algorithm, Security of RSA, Key Management, Diffle-Hellman Key Exchange Algorithm, Elganel Encryption. 9

UNIT-III

Message Authentication and Hash Function: Authentication Requirements, Authentication Functions, Message Authentication Code, Hash Functions, Birthday Attacks, Security of Hash Functions and MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA). Digital Signatures: Digital Signatures, Authentication Protocols, Digital Signature Standards (DSS), Authentication Applications: Kerberos, Electronic Mail Security-Pretty Good Privacy (PGP), S/MIME. 9

UNIT-IV

IP Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management. Web Security: Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction (SET), System Security: Intruders, Viruses and Related Threads, 9

Firewall Design Principals, Trusted Systems.

Textbooks

1. William Stallings, Cryptography and Network Security: Principals and Practice, Pearson Publication.
2. Johannes A. Buchmann, Introduction to Cryptography, Springer-Verlag.
3. Bruce Schiener, Applied Cryptography, John Wiley and Sons, 1996
4. Behrouz A. Frouzan, Cryptography & Network Security, Tata McGraw Hill
5. Bruce Schiener, Applied Cryptography, John Wiley & Sons
6. Atul Kahate, "Cryptography and Network Security" Tata McGraw Hill

Reference books

1. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, Private communication in public world, PHI Second Edition, 2002
2. Douglas R Simson, Cryptography – Theory and practice, CRC Press, First Edition, 1995

BCS-77 DIGITAL IMAGE PROCESSING

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. To understand Digital Image Processingfundamentals
2. To learn Image Transformation, Enhancement, Restoration and Compression Techniques.
3. To implement various techniques for Segmentation ofImages
4. To learn the Image Reconstructionoperations.
5. To implement Image Processing Techniques for suitableapplications

Topics Covered

UNIT-I

Light, Brightness Adaptation and Discrimination, Pixels, Coordinate Conventions, Imaging Geometry, Perspective Projection, Spatial domain Filtering, Sampling and quantization. Intensity Transformations, Contrast Stretching, Histogram Equalization, Correlation and Convolution, 2-D Sampling, Discrete Cosine Transform, Frequency Domain Filtering. 9

UNIT-II

Transform, Fourier Transforms and Properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Basic Framework, Interactive Restoration, Image Deformation and Geometric Transformations, Image Morphing, Restoration Techniques, Noise Characterization, Noise Restoration Filters, Adaptive Filters, Linear, Position Invariant Degradations, Estimation of Degradation Functions, Restoration from Projections. 9

UNIT-III

Types of Redundancies, Lossy and Lossless Compression, Entropy af An Information Source, Shannon's Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, Bit-Plane Encoding, Bit-Allocation,ZonalCoding,ThresholdCoding,LosslessPredictiveCoding,LossyPredictive Coding, Motion Compensation Expansion of Functions, Multi Resolution Analysis, Scaling Functions, Wavelet Series Expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D Wavelet Transform, Digital Image Watermarking. 9

UNIT-IV

Basics of Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole Filling, Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning, Geodesic Dilation, Erosion, Reconstruction by Dilation and Erosion. Boundary Detection Based Techniques, Point, Line Detection, Edge Detection, Edge Linking, Local Processing, Regional Processing, Hough Transform, Thresholding, Iterative Thresholding, OTSU's Method, Moving Averages, Multivariable Thresholding, Region-Based Segmentation, Watershed Algorithm, Use of Motion inSegmentation 9

Textbooks

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, Second Edition, 2012.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson 2012.
3. Kenneth R. Castleman, Digital Image Processing, Pearson, 2011.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB, Pearson Education, Inc., 2010.
5. William K. Pratt, Digital Image Processing, John Wiley, New York, 2012.
6. D, E. Dudgeon and R M. Mersereau, Digital Signal Processing, Prentice Hall Professional Technical Reference, 2010.
7. Milan Sonka et al, Image Processing, Analysis and Machine Vision, Brookes/Cole,

Reference books

1. Jayaraman S., Esaki Rajan S., T.Veera Kumar, “Digital Image Processing”, Tata McGraw Hill Pvt. Ltd., Second Reprint, 2010
2. Bhabatosh Chanda, Dwejesh Dutta Majumder, “Digital Image Processing and analysis”, PHI Learning Pvt. Ltd., Second Edition, 2011

3. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, PHI Learning Pvt. Ltd.,
First Edition, 2011
4. Annadurai S., Shanmugalakshmi R., “Fundamentals of Digital Image Processing”, Pearson Education, First Edition, 2007

BCS-78 HIGH PERFORMANCE COMPUTING

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Understand the role of HPC in science andengineering.
2. Become acquainted with the most commonly used HPC platforms and parallel programmingmodels.
3. Become acquainted with the means by whichto measure, analyze and assess the performance of HPC applications and their supportinghardware.
4. Develop mechanisms for evaluating the suitability of different HPC solutions to common problems found in ComputationalScience.
5. Perform the role of administration, scheduling, code portability and data management in an HPC environment, with particular referenceto GridComputing.
6. Understand potential benefits and pitfalls of GridComputing.

Topics Covered

UNIT-I

Program Execution: Program, Compilation, Object Files, Function Call and Return, Address Space, Data And Its Representation. Computer Organization: Memory, Registers, Instruction Set Architecture, Instruction Processing. — 9

UNIT-II

Pipelined Processors: Pipelining, Structural, Data and Control Hazards, Impact on Programming. — 9
Virtual Memory: Use of Memory by Programs, Address Translation, Paging,
Cache Memory: Organization, Impact on Programming, Virtual Caches

UNIT-III

Operating Systems: Processes And System Calls, Process Management, Program Profiling, File Systems: Disk Management, Name Management, Protection — 9

UNIT-IV

Parallel Architecture: Inter-Process Communication, Synchronization, Mutual Exclusion, Basics of Parallel Architecture, Parallel Programming with Message Passing using MPI — 9

Textbooks

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar : Introduction to Parallel
Computing, Second Edition Pearson Education, 2007

2. Michael J. Quinn, Parallel Programming in C with MPI and Open MP McGraw-Hill International Editions, Computer Science Series, 2004

Reference books

1. J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann.
2. Silberschatz, P. B. Galvin, G. Gagne, Operating System Concepts, John Wiley.
3. R.E.BryantandD.R.0″Hallaron,ComputerSystems:AProgrammer″sPerspective,Prentice Hall.

BCS-79 INTRODUCTION TO REAL TIME SYSTEM

Course Category	:	Program Elective (PE3 & PE4)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Real-time scheduling and schedulabilityanalysis
2. Formal specification and verification of timing constraints andproperties
3. Design methods for real-timesystems
4. Development and implementation of new techniques to advance the state-of-the-art real-time systemsresearch

Topics Covered

UNIT-I

Introduction- Issues in Real Time Computing, Structure of A Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run Times. Task Assignment and Scheduling - Classical Uniprocessor Scheduling Algorithms, Uniprocessor Scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling. 9

UNIT-II

Programming Language and Tools – Desired Language Characteristics, Data Typing, Control Structures, Facilitating Hierarchical Decomposition, Packages, Run-Time (Exception) Error Handling, Overloading and Generics, Multitasking, Low Level Programming, Task Scheduling, Timing Specifications, Programming Environments, Run-Time Support. 9

UNIT-III

Real Time Databases - Basic Definition, Real Time vs General Purpose Databases, Main Memory Databases, Transaction Priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-Phase Approach to Improve Predictability,Maintaining Serialization Consistency, Databases for Hard Real Time Systems. 9

UNIT-IV

Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error Containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure Handling. Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error Models. Clock Synchronization - Clock,A Non-Fault-Tolerant SynchronizationAlgorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software 9

Textbooks

1. Alan C. Shaw, Real – Time Systems and software; John Wiley & Sons Inc
2. Rajib Mall, Real Time Systems: Theory and Practice by -Pearson Education, 2007
3. Jane W S Liu, Real Time Systems, Pearson

Reference books

1. Stuart Bennett, Real Time Computer Control-An Introduction", Second edition Prentice Hall PTR, 1994.
2. Peter D. Lawrence, Real time Micro Computer System Design – An Introduction, McGraw Hill, 1988
3. S.T. Allworth and R.N. Zobel, Introduction to real time software design", Macmillan, II Edition, 1987.
4. R.J.A Buhur, D.L. Bailey, An Introduction to Real-Time Systems", Prentice-Hall International, 1999.
5. Philip. A. Laplante Real Time System Design and Analysis" PHI, III Edition, April2004.
6. C.M. Krishna, Kang G. Shin, Real-Time Systems", McGraw-Hill International Editions, 1997.
7. Other materials required for the class will be made available during the course.

BCS-80 Programming in C

Course Category: :Engineering Fundamental (EF)
Pre-requisite Subject: :NIL
Contact Hours/Week: :Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits: 5
Course Assessment Methods:Continuous assessment through tutorials, attendance, home

assignments, quizzes, practical work, record, viva voce and three minor tests and one major theory &practical examination.

Course Outcomes:The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Basic terminology used in computer programming.
2. Programs development in C Language by writing, compiling and debugging.
3. Design of programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion, structure and union.
4. Difference between call by value and call by reference.
5. Dynamic memory allocations and use of pointers.
6. Basic operations on a file.
7. Basics of dynamic memory.

UNIT-I

Basics of programming: Approaches to Problem Solving, Concept of Algorithm and Flow Charts, Types of Computer Languages: Machine Language, Assembly Language and High-Level Language, Concept of Assembler, Compiler, Linker and Loader. Data types, Storage Classes: Auto, Extern, Register and Static.Operators, Expressions, Operator Precedence and Associativity.
Fundamentals of C Programming: Structure of C Program, Writing and Executing the First C Program, Components of C Language, Standard I/O, Formatted I/O.
Conditional Program Execution: Applying if and switch Statements, Nesting if and else.
Program Loops and Iterations: Use of while, do while and for Loops, Multiple Loop Variables, Use of break and continue Statements, goto Statement.

UNIT-II

Arrays: One Dimensional, Multidimensional Array and Their Applications, Declaration and Manipulation of Arrays.
Strings: String Variable, String Handling Functions, Array of Strings.
Functions: Designing Structured Programs, Functions in C, User Defined and Standard Functions, Formal vs. Actual Arguments, Function Category, Function Prototype, Parameter Passing, Recursive Functions.
Storage Classes revisited.

UNIT-III

Pointers: Pointer Variable and its Importance, Pointer Arithmetic Pointers and Arrays, Pointer and Character Strings, Pointers and Functions, Array of Pointers, Pointers to Pointers.
Structure: Declaration and Initialization of Structures, Structure as Function Parameters, Structure Pointers.
Union: Declaration and Initialization of Unions, Union as Function Parameters, Union Pointers.

UNIT-IV

Dynamic Memory Allocation: malloc, calloc, realloc, free functions.
File Management: Defining and Opening a File, Closing a File, Input/ Output Operations in Files.
The Pre-processor Directives, Macros.
Command Line Arguments.
Introduction to Graphics Programming.

EXPERIMENTS

1. Write programs to print statements in sequential order using simple printf, scanf input/output functions.
2. Write programs to implement if-else condition (simple as well as nested) on suitable problems.
3. Write program to implement switch-case conditional logic on suitable examples.

4. Write programs to implement for, while and do-while loop control statements on suitable problems.
5. Write programs to implement 1D & 2D array concepts on suitable problems such as sorting of elements, searching of element, matrix addition, subtraction, multiplication etc.
6. Write programs to implement string related concepts such as sorting of a string, finding its length, reversing, concatenation, comparing two strings etc.
7. Write programs to implement concept of user defined functions (call by value, call by reference, recursive calling etc.) on suitable examples.
8. Write programs to implement concepts of pointer.
9. Write programs to implement the concept of structure and union.
10.Write programs to implement dynamic memory allocation functions (calloc, malloc, free, realloc)
11.Write programs to implement file handling concepts such as reading from a file, writing to a file using file related functions (fclose, fopen, sscanf, sprint, fread, fwrite, getc, putc, getw, putw etc.)

Textbooks

1. Jeri R. Hanly and Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson.
2. Schildt, Herbert, Complete Reference with C, Tata McGraw Hill.
3. Kerninghan and Ritchie, The C programming Language, 2nd Edition, Prentice Hall.
4. Richard Bird, Introduction to Functional Programming using Haskell, 2nd Edition, Prentice-Hall International, 1998.

Reference Books

1. Greg Michaelson, An Introduction to Functional Programming Through Lambda Calculus, Dover Edition, Addition Wesley Publication.
2. Samuel P. Harbison, and Guy L. Steele Jr., C-A Reference Manual, Fifth Edition, Prentice Hall, 2002.

BCS-04A OBJECT ORIENTED MODELING &C++

Course Category	: Engineering Fundamental (EF)
Pre-requisite Subject	: NIL
Contact Hours/Week	: Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	: 5
Course Assessment Methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course 1. Understand the Concept of Object Oriented Programming and Master OOPusing C++ 2. Implementing the Real-Life Problems using Object OrientedTechniques. 3. Improvement in Problem Solving Skills.

UNIT-I **9**

Object Modeling: Objects and Classes, Links and Associations, Generalization and Aggregation, Metadata,
Candidate Keys, Constraints, Dynamics Modeling: State and State Diagram, Functional Modeling: Data Flow Diagram

UNIT-II **9**

Object Oriented Programming: Features of Object Oriented Programming, C++ Fundamentals: data types, Operators and Expressions, Reference variables, Control flow, Arrays, Structures, Strings, Pointers and Functions, Overloading functions, Friend Function.

UNIT-III **9**

DefiningClass,creatingobjectsandaccessingitsmember,ConstructorsandDestructors,Operator overloading and Type conversions, Inheritance and Polymorphism: Single inheritance, multi-level inheritance, multiple inheritance, hierarchical inheritance, runtime polymorphism, Virtual Functions and Abstractclass.

UNIT-IV **9**

TemplatesandExceptionHandling:Useoftemplates,functiontemplates,classtemplates,handlingexceptions.
Filehandling:StreaminC++,Filesmodes,Filepointerandmanipulators,typeoffiles,acceptingcommand
line arguments, Standard template library.

EXPERIMENTS

Write C++ Programs to illustrate the concept of the following:

1. Arrays
2. Structures
3. Pointers
4. Objects andClasses
5. Console I/O Operations
6. Scope Resolution and Memory ManagementOperators
7. Inheritance
8. Polymorphism
9. VirtualFunctions
10. FriendFunctions
11. Operator Overloading
12. FunctionOverloading
13. Constructors andDestructors
14. thisPointer
15. File I/OOperations

Analyse, Design and Develop Code for the Following System (one for a batch of three students) using C++

1. ATM (Automated Teller Machine)System
2. Contact ManagementSystem
3. Employee Record ManagementSystem
4. Stock Maintenance System
5. Course Registration System
6. PayrollSystem
7. Library Management System
8. Calendar

Textbooks

1. B. Trivedi Programming with ANSI C++, Oxford University Press,2007.
2. Ira Pohl, Object Oriented Programming using C++, Pearson Education, SecondEdition
3. B. Stroustrup, The C++ Programming Language, 3rdedition, Pearson Education,2004
4. James Rumbaugh, et. al Object Oriented Modeling and Design-,PHI
5. Robert Lafore, Object Oriented Programming in Turbo C++, Galgotia Publication,1994
6. E. Balaguruswamy, Object Oriented Programming with C++, TMHPublication
7. Grady Booch, James Rumbaugh and Ivar Jacobson The Unified Modeling Language UserGuide, Pearson Education
8. Booch, Maksimchuk, Engle, Young, Conallen and Houstan, Object Oriented Analysis and Design with Applications, Pearson Education
9. S. B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer,4th edition, Pearson Education,2005

Reference Books

1. Coleman, D. et.al. Object-Oriented Development, The Fusion Method. PrenticeHall
2. Booch, G. Object-Oriented Design with Applications. Redwood City,Bengamin/Cummings
3. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, McGraw Hill, Second Edition, 2005.

BCS-13A Internet & JAVA Programming

Coursecategory	:	Department Core (DC)
Pre-requisites	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To identify different components of client server architecture on Internetcomputing.
2. Knowledge of how to develop and deploy applications and applets inJAVA.
3. Knowledge of how to develop and deploy GUI using Java Swing andAWT.
4. Design, develop and implement interactive webapplications.
5. Beabletoimplement,compile,testandrunJAVAprogramscomprisingmorethanoneclassandtoaddress a particular softwareproblem.
6. To understand the basic concepts of Internet services and relatedtechnologies.
7. Develop programs using the JAVA Collection API as well as the JAVA standard classlibrary.

UNIT-I

Internet: Introduction to Internet Services, Core Java: Introduction, Operator, Data type, Variables, Control Statements, Arrays, Methods & Classes, Constructors, String Handling, Inheritance, Package and Interface.

UNIT-II

Exception Handling, Multithread programming, I/O, Java Applet, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers. 9

UNIT-III

Java Swing: Creating a Swing Applet, Labels, Text fields, Buttons, Tabbed Panes, JDBC: Connectivity Model, JDBC/ODBC Bridge, JAVA SQL package, connectivity to Remote Database, Remote method invocation (RMI). 9

UNIT-IV

JavaBeans:ApplicationBuildertools,TheBeanDeveloperKit(BDK),JARfiles,Introspection,developingasimple bean,usingBoundproperties,TheJavaBeansAPI,SessionBeans,EntityBeans,IntroductiontoJavaServlet:Servlet Basics, Servlet API basic, Life cycle of a Servlet, Running Servlet. 9

EXPERIMENTS

1. Basic programs of simple statements, conditional statements, iterative statement, andarrays.
2. Programs having object-oriented concepts like Inheritance andInterface.
3. Programs for Exception Handling and Event Handling.
4. Programs of Threads andMultithreading.
5. Programs related to Applets andSwings.
6. Program including JAVA Beans andServlets.

Textbooks

1. Naughton, Schildt, “The Complete Reference JAVA2”, TMH.
2. Balagurusamy E, “Programming in JAVA”, TMH

Reference Books

1. Margaret Levine Young, “The Complete Reference Internet”, TMH.
2. Dustin R. Callway, “Inside Servlets”, Addison Wesley.
3. Mark Wutica, “Java Enterprise Edition”, QUE.
4. Steven Holzner, “Java2 Black book”, Dreamtech.