PONDICHERRY UNIVERSITY

Bachelor of Technology
COMPUTER SCIENCE AND ENGINEERING

Revised
Regulations, Curriculum & Syllabus
(for all semesters)
Effective from the academic year 2013-2014

PONDICHERRY UNIVERSITY
RV NAGAR, KALAPET, PUDUCHERRY – 605 014

PONDICHERRY UNIVERSITY
BACHELOR OF TECHNOLOGY PROGRAMMES
(EIGHT SEMESTERS)

REGULATIONS

1. Conditions for Admission:

a) Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed :

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (40% marks for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

b) For Lateral entry in to third semester of the eight semester B.Tech programme :

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology from an AICTE approved institution with at least 45% marks (40% marks for OBC and SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in B.Sc. degree from a recognized university as defined by UGC with at least 45% marks (40% marks for OBC and SC/ST candidates) and passed XII standard with mathematics as a subject.

Provided that in case of students belonging to B.Sc Stream shall clear the subjects of Engineering Graphics and Engineering Mechanics of the first year Engineering program along with the second year subjects.

Provided further that, the students belonging to B.Sc Stream shall be considered only after filling the supernumerary seats in this category with students belonging to the Diploma stream.

The list of diploma programs approved for admission for each of the degree programs is given in **Annexure A**.

2. Age Limit :

The candidate should not have completed 21 years of age as on 1st Julyof the academic year under consideration. For Lateral Entry admissionto second year of degree programme, there is no age limit. For SC/STcandidates, the age limit is relaxable by 3 years.

3. Duration of Programme:

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semestersconstituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

4. Eligibility for the award of Degree:

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. Branches of Study:

Branch I - Civil Engineering
Branch II - Mechanical Engineering
Branch III - Electronics & Communication Engineering
Branch IV - Computer Science & Engineering
Branch V - Electrical & Electronics Engineering
Branch VI - Chemical Engineering
Branch VII - Electronics & Instrumentation Engineering
Branch VIII - Information Technology
Branch IX - Instrumentation & Control Engineering
Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. Subjects of Study:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. Examinations:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination**.**

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

5 marks for 95% and above
4 marks for 90% and above but below 95%
3 marks for 85% and above but below 90%
2 marks for 80% and above but below 85%
1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

(b) Practical courses for which there is a university practical examination of 50 marks**:**

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

10 marks for 95% and above

8 marks for 90% and above but below 95%

6 marks for 85% and above but below 90%

4 marks for 80% and above but below 85%

2marks for 75% and above but below 80%

8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.
(*Candidates who secure overall attendance greater than60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director*)

ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester

iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.
A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. Procedure for completing the course:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.
However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. Passing Minimum:

a. A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

b. A candidate who has been declared "Failed" in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.
   i. Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.
   ii. The candidate should have attended all the college examinations as well as university examinations.

iii. If a candidate has failed in more than four papers in the current university examination, his/her representation for revaluation will not be considered.

iv. The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

Further the University examination marks obtained in the latest attemptshall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts

11. Award of Letter Grades

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

Range of Total Marks	Letter Grade	Grade Points
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	F	0
Incomplete	FA	

'F' denotes failure in the course. 'FA' denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.
(b) The list of courses enrolled during the semester and the grades scored.
(c) The Grade Point Average (GPA) for the semester and Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.
(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$GPA = (SUM\ OF\ (C \times GP) / SUM\ OF\ C)$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

$$\%\ Marks = (CGPA - 0.5) \times 10$$

12. Award of Class and Rank:

i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.

iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in **FIRST CLASS**.

iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semesteralone should beconsidered and it is mandatory that the candidate shouldhave passed all thesubjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. Provision for withdrawal:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencementof the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. Discontinuation of Course:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. Revision of Regulations and Curriculum:

The University may from time to time revise, amend or change theregulations of curriculum and syllabus as and when found necessary.

ANNEXURE – A

B.Techcoursesinwhich admissionissought	Diplomacourseseligible foradmission
Civil Engineering	Civil Engineering CivilandRuralEngineering ArchitecturalAssistantship Architecture Agricultural Engineering
Mechanical Engineering	Mechanical Engineering AutomobileEngineering Agricultural Engineering Mechanical andRural Engineering RefrigerationandAir-conditioning AgriculturalEngineering&Farm Equipment Technology Metallurgy Production Engineering Machine Design&Drafting Machine toolmaintenanceand Repairs PrintingTechnology /Engineering TextileEngineering/Technology Tool Engineering
Electrical and Electronics Engineering Electronics&Communication Engineering Electronic and Instrumentation Engineering InstrumentationandControlEngineering	Electrical Engineering Electrical and Electronics Engineering Electronicsand Instrumentation Engineering Instrumentation Engineering / Technology ElectronicsandCommunication Engg. ElectronicsEngineering MedicalElectronics InstrumentationandControl Engineering Applied Electronics
Bio Medical Engineering	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology PlasticEngineering Paper&PulpTechnology / PolymerTechnology
InformationTechnology ComputerScience & Engineering	ComputerScience and Engineering ComputerTechnology Electrical and Electronics Engineering Electronics&CommunicationEngineering Electronics & InstrumentationEngineering InstrumentationEngineering / Technology Information Technology

CURRICULUM &SYLLABUS
B.Tech(Computer Science &Engineering)

I Semester

Sub. Code	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T101	Mathematics – I	3	1	-	4	25	75	100
T102	Physics	4	-	-	4	25	75	100
T103	Chemistry	4	-	-	4	25	75	100
T104	Basic Electrical and Electronics Engineering	3	1	-	4	25	75	100
T105	Engineering Thermodynamics	3	1	-	4	25	75	100
T106	Computer Programming	3	1	-	4	25	75	100
	Practical							
P101	Computer Programming Lab	-	-	3	2	50	50	100
P102	Engineering Graphics	2	-	3	2	50	50	100
P103	Basic Electrical & Electronics Lab	-	-	3	2	50	50	100
	Total	**22**	**4**	**9**	**30**	**300**	**600**	**900**

II Semester

Sub. Code	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T107	Mathematics – II	3	1	-	4	25	75	100
T108	Material Science	4	-	-	4	25	75	100
T109	Environmental Science	4	-	-	4	25	75	100
T110	Basic Civil and Mechanical Engineering	4	-	-	4	25	75	100
T111	Engineering Mechanics	3	1	-	4	25	75	100
T112	Communicative English	4	-	-	4	25	75	100
	Practical							
P104	Physics lab	-	-	3	2	50	50	100
P105	Chemistry lab	-	-	3	2	50	50	100
P106	Workshop Practice	-	-	3	2	50	50	100
P107	NSS / NCC *	-	-	-	-	-	-	-
	Total	**22**	**2**	**9**	**30**	**300**	**600**	**900**

* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.

III Semester

Code	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T31	Mathematics –III	3	1	-	4	25	75	100
CS T32	Electronics Devices and Circuits	3	1	-	4	25	75	100
CS T33	Object Oriented Programming and Design	3	1	-	4	25	75	100
CS T34	Digital System Design	3	1	-	4	25	75	100
CS T35	Data Structures	3	1	-	4	25	75	100
CS T36	Computer Organization and Architecture	3	1	-	4	25	75	100
	Practical							
CS P31	Electronics Devices and Circuits Laboratory	-	-	3	2	50	50	100
CS P32	Data Structures Laboratory	-	-	3	2	50	50	100
CS P33	Digital System Design Laboratory	-	-	3	2	50	50	100
	Total	18	6	9	30	300	600	900

IV Semester

Code No	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T41	Mathematics –IV	3	1	-	4	25	75	100
CS T42	Microprocessors and Microcontrollers	3	1	-	4	25	75	100
CS T43	Automata Languages and Computations	3	1	-	4	25	75	100
CS T44	Design and Analysis of Algorithms	3	1	-	4	25	75	100
CS T45	Object Oriented Programming	3	1	-	4	25	75	100
CS T46	Graphics and Image Processing	3	1	-	4	25	75	100
	Practical							
CS P41	Microprocessors and Microcontrollers Laboratory	-	-	3	2	50	50	100
CS P42	Design and Analysis of Algorithms Laboratory	-	-	3	2	50	50	100
CS P43	Object Oriented Programming Laboratory	-	-	3	2	50	50	100
SP P44	Physical Education *	-	-	-	-	-	-	-
	Total	**18**	**6**	**9**	**30**	**300**	**600**	**900**

* Student is required to secure a pass and no grade will be awarded

V Semester

Code	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UEE	TM
	Theory							
CS T51	Operating Systems	3	1	-	4	25	75	100
CS T52	Computer Networks	3	1	-	4	25	75	100
CS T53	Database Management Systems	3	1	-	4	25	75	100
CS T54	Language Translators	3	1	-	4	25	75	100
CS T55	Software Engineering	3	1	-	4	25	75	100
	Practical							
CS P51	Operating Systems Laboratory	-	-	3	2	50	50	100
CS P52	Computer Networks Laboratory	-	-	3	2	50	50	100
CS P53	Database Management System Laboratory	-	-	3	2	50	50	100
HS P54	General Proficiency – I	-	-	3	1	100	-	100
	Total	**15**	**5**	**12**	**27**	**375**	**525**	**900**

VI Semester

Code	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
CS T61	Enterprise Solutions	3	1	-	4	25	75	100
CS T62	Embedded Systems	3	1	-	4	25	75	100
CS T63	Web Technology	3	1	-	4	25	75	100
	Elective –I	3	1	-	4	25	75	100
	Elective -II	3	1	-	4	25	75	100
	Practical							
CS P61	Enterprise Solutions Laboratory	-	-	3	2	50	50	100
CS P62	Embedded Systems Laboratory	-	-	3	2	50	50	100
CS P63	Web Technology Laboratory	-	-	3	2	50	50	100
CS P64	Industrial Visits/Training				1	100	-	100
HS P65	General Proficiency - II	-	-	3	1	100	-	100
	Total	**20**	**4**	**12**	**28**	**475**	**525**	**1000**

VII Semester

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
CS T71	Artificial Intelligence	3	1	-	4	25	75	100
CS T72	Computer Hardware and Network Trouble Shooting	3	1	-	4	25	75	100
CS T73	Platform Technology	3	1	-	4	25	75	100
	Elective-III	3	1	-	4	25	75	100
	Practical							
CS P71	Artificial Intelligence Laboratory	-	-	3	2	50	50	100
CS P72	Troubleshooting Laboratory	-	-	3	2	50	50	100
CS P73	Platform Technology Laboratory	-	-	3	2	100	-	100
CS PW7	Project Work – Phase I	-	-	6	6	200	-	200
	Total	**12**	**4**	**15**	**28**	**500**	**400**	**900**

VIII Semester

Code No.	Name of the SubjCSts	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
CS T81	Professional Ethics	-	-	3	1	100	-	100
CS T82	Engineering Economics and Management	3	1	-	4	25	75	100
CS T83	Information Security	3	1	-	4	25	75	100
	Elective - IV	3	1	-	4	25	75	100
	Elective-V	3	1	-	4	25	75	100
	Practical							
CS P81	Seminar	-	-	3	1	100	-	100
CS P82	Comprehensive Viva-Voce	-	-	3	1	100	-	100
CS PW8	Projects Work – Phase II	-	-	6	8	300	300	600
	Total	**12**	**4**	**15**	**27**	**700**	**600**	**1300**

Electives for Sixth Semester

1. CS E61 Object Oriented Analysis and Design
2. CS E62 Network Design and Management
3. CS E63 E-Business
4. CS E64 Principles of Programming Languages
5. CS E65 Information Theory and Coding Techniques
6. CS E66 Language Technologies
7. CS E67 UNIX Internals
8. CS E68 Data Mining and Warehousing
9. CS E69 SOA and Web Services
10. CS E610 Distributed Computing
11. CS E611 Agile Methodoloiges
12. CS E612 Application Outsourcing Services

Electives for Seventh Semester

1. CS E71 Software Testing and Quality Assurance
2. CS E72 Advanced Databases
3. CS E73 Client Server Computing
4. CS E74 Real Time Computing and Communication
5. CS E75 Software Architecture
6. CS E76 High Speed Networks
7. CS E77 Network Protocols
8. CS E78 Modeling and Simulation
9. CS E79 Business Process Domains
10. CS E710 Software Project Management
11. CS E711 Natural Language Processing
12. CS E712 Optical Networks

Electives for Eighth Semester

1. CS E81 Intelligent Information Retrieval
2. CS E82 Soft Computing
3. CS E83 Bio Inspired Computing
4. CS E84 Mobile Computing
5. CS E85 Grid Computing
6. CS E86 Agent Technologies
7. CS E87 Bio Informatics
8. CS E88 High Performance Computing
9. CS E89 Wireless Communication Networks
10. CS E810 Big Data Management
11. CS E811 Cloud Computing
12. CS E812 Mobile Application Development

T101 MATHEMATICS – I

OBJECTIVES:

- *To introduce the idea of applying calculus concepts to problems in order to find curvature, etc. and to give basic introduction on Beta and Gamma functions.*
- *To familiarize the student with functions of several variables. This is needed in many branches of engineering.*
- *To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.*
- *To introduce effective mathematical tools for the solutions of differential equations that model physical processes*

UNIT I – CALCULUS

Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT II– FUNCTIONS OF SEVERAL VARIABLES

Partial derivatives, Total derivatives, Differentiation of implicit functions, Change of variables, Jacobians and their properties, Taylor's series for functions of two variables, Maxima and minima, Lagrange's method of undetermined multipliers.

UNIT III – MULTIPLE INTEGRALS AND APPLICATIONS

Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).

UNIT IV – DIFFERENTIAL EQUATIONS

Exact equations, First order linear equations, Bernoulli's equation, orthogonal trajectories, growth, decay and geometrical applications. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT V – DIFFERENTIAL EQUATIONS (Higher order)

Linear differential equations of higher order - with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, simultaneous linear differential equations, solution by variation of parameters method.

Text Books

1. Venkataraman M.K, Engineering Mathematics-First year, National Publishing Company, Chennai.
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 41st Edition, 2011. (For Unit II only)

Reference Books

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
2. Kandasamy P. et al, Engineering Mathematics, Vol.1 & 2, S. Chand & Co., New Delhi.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New Delhi, 8th Edition.
5. Bali N. and Goyal M., Advanced Engineering Mathematics, Lakshmi Publications Pvt. Ltd., New Delhi, 7th Edition, 2010.

T102 PHYSICS

OBJECTIVES:

- *To understand the concepts of physics and its significant contributions in the advancement of technology and invention of new products that dramatically transformed modern-day society.*
- *To expose the students to different areas of physics which have direct relevance and applications to different Engineering disciplines*
- *To understand the concepts and applications of Ultrasonics, optics and some optical devices, Lasers and Fiber optics, Nuclear energy sources and wave mechanics*

Unit I – Acoustics & NDT

*Ultrasonics- U*ltrasonic Waves Productions (Piezoelectric & Magnetostriction method) – Detections (Acoustic Grating) *NDT applications – Ultrasonic* Pulse Echo Method - Liquid Penetrant Method.

Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine's formula for Reverberation Time.

Unit II – Optics

Interference- Air Wedge – Michelson's Interferometer - Wavelength Determination – Interference Filter – Antireflection Coatings.

Diffraction - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating & Prism.

Polarisation Basic concepts of Double Refraction - Huygens Theory of Double Refraction- Quarter and Half Wave Plates – Specific Rotary Power – Laurent Half Shade Polarimeter.

Unit III – Lasers & Fiber Optics

Lasers - Principles of Laser – Spontaneous and Stimulated Emissions - Einstein's Coefficients – Population Inversion and Laser Action – types of Optical resonators (qualitative ideas) – Types of Lasers - NdYAG, CO_2 laser, GaAs Laser-applications of lasers.

Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)- applications to sensors and Fibre Optic Communication.

Unit IV – Wave mechanics

Matter Waves – de Broglie Wavelength – Uncertainty Principle – Schrödinger Wave Equation – Time Dependent – Time Independent – Application to Particle in a One Dimensional potential Box – Quantum Mechanical Tunneling – Tunnel Diode.

Unit V – Nuclear energy source

General Properties of Nucleus (Size, Mass, Density, Charge) – Mass Defect – Binding Energy - Disintegration in fission –*Nuclear Reactor:* Materials Used in Nuclear Reactors. – PWR – BWR – FBTR. Nuclear fusion reactions for fusion reactors-D-D and D-T reactions, Basic principles of Nuclear Fusion reactors.

Text Books

1. V Rajendran, Engineering Physics, *2nd Edition*, TMH, New Delhi *2011*
2. Avadhanulu M N , Engineering Physics, S. Chand & Co, 2009.
3. Arthur Beiser, Concepts of Modern Physics, 6th Edition, TMH, New Delhi 2008.

Reference Books

1. Ajoy Ghatak, Optics, 5th Edition TMH, New Delhi, 2012.
2. K. Thyagarajan and Ajoy Ghatak, Lasers Fundamentals and Applications, 2nd Edition, Springer 2010.
3. Richtmyer, Kennard and cooper, Introduction to Modern Physics, TMH, New Delhi 2005.
4. R. Murugesan, Modern Physics, S. Chand & Co, New Delhi 2006.
5. K.R.Nambiar, Lasers, New Age International, New Delhi, 2008.
6. C.M. Srivastava and C. Srinivasan,Science of Engineering Materials, 2nd Edition, New Age Int. (P) Ltd, New Delhi, 1997

T103 CHEMISTRY

OBJECTIVES

- *To know about the importance of Chemistry in Engineering domain*
- *To understand the chemistry background of industrial process*
- *To apply chemistry knowledge for engineering disciplines*

Unit I - Water

Hardness of water - units and calcium carbonate equivalent. Determination of hardness of water-EDTA method. Disadvantages of hardwater – boiler scale and sludge, caustic embrittlement, priming & foaming and boiler corrosion. Water softening methods – internal & external conditioning – Lime-Soda process, Zeolite process and Ion-exchange process. Desalination – reverse osmosis & electrodialysis.

Unit II – Polymers

Classification, types of polymerization reactions – mechanism of radical, ionic and Ziegler-Natta polymerizations. Polymer properties – chemical resistance, crystallinity and effect of temperature, Mn and Mw. Thermoplastics and thermosets. Preparation, properties and uses of PVC, TEFLON, Nylons, Bakelite, Polyurithane, Rubbers – vulcanization, synthetic rubber, BuNa-S, BuNa-N, silicone and butyl rubber. Conducting polymers – classification and applications. Polymer composites – FRP – laminar composites. Moulding constituents of plastic, moulding techniques – compression, injection, transfer and extrusion moulding.

Unit III - Electrochemical Cells

Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes – hydrogen, calomel, Ag/AgCl & glass electrodes. Batteries – primary and secondary cells, Leclanche cell, Lead acid storage cell, Ni-Cd battery & alkaline battery. Fuel cells – H_2-O_2 fuel cell.

Unit IV - Corrosion and its Control

Chemical & electrochemical corrosion – Galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion – corrosion control methods – cathodic protection and corrosion inhibitors. Protective coating – types of protective coatings – metallic coating – tinning and galvanizing, cladding, electroplating and anodizing.

Unit V -Phase Rule

Definition and derivation of phase rule. Application to one component system – water and sulfur systems. Thermal analysis, condensed phase rule.Two component systems – Pb-Ag, Cu-Ni, and Mg-Zn systems.

Text books

1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi 2004.
2. P. Kannan and A. Ravi Krishnan "Engineering Chemistry" Hi-Tech Sri Krishna Publications, Chennai, 9th Ed, 2009
3. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2nd Ed. PHI Learning PVT., LTD, New Delhi, 2008.

Reference Books

1. S. S. Dara, A Textbook of Engineering Chemistry, 11th Ed, S.Chand & Co., Ltd. New Delhi, 2008.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P) Ltd., Meerut, 2001.

T104 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

OBJECTIVES

- *To understand and gain basic knowledge about magnetic and electrical circuits, single* phase and three phase power measurement and the operating principles of stationary and rotating machines.
- *To understand the basic operation, functions and applications of PN junction diode, transistor, logic gates and flip flops.*
- *To gain knowledge on various communication systems and network models and the use of ISDN.*

PART A - ELECTRICAL

UNIT – I - DC CIRCUITS

Definition of Voltage, Current, Power & Energy, circuit parameters, Ohm's law, Kirchoff's law & its applications – Simple Problems - Division of current in Series & parallel circuits - star/delta conversion - Node and mesh methods of analysis of DC circuits.

UNIT – II - AC CIRCUITS

Concepts of AC circuits – rms value, average value, form and peak factors – Simple RLC series circuits – Concept of real and reactive power – Power factor - Introduction to three phase system - Power measurement by two wattmeter method.

UNIT – III – ELECTRICAL MACHINES AND POWER PLANTS

Law of Electromagnetic induction, Fleming's Right & Left hand rule - Principle of DC rotating machine, Single phase transformer and single phase induction motor (Qualitative approach only) - Simple layout of thermal and hydro generation (block diagram approach only).

PART B – ELECTRONICS

UNIT – IV

V-I Characteristics of diode - Half-wave rectifier and Full-wave rectifier – with and without capacitor filter - Transistor - Construction & working - Input and output characteristics of CB and CE configuration - Transistor as an Amplifier - Principle and working of Hartley oscillator and RC phase shift oscillator - Construction and working of JFET & MOSFET.

UNIT – V

Boolean algebra – Reduction of Boolean expressions - De-Morgan's theorem - Logic gates -Implementation of Boolean expressions - Flip flops - RS, JK, T and D.
Combinational logic - Half adder, Full adder and Subtractors.
Sequential logic - Ripple counters and shift registers.

UNIT – VI

Model of communication system - Analog and digital - Wired and wireless channel. Block diagram of various communication systems - Microwave, satellite, optical fiber and cellular mobile system.
Network model - PAN, LAN, MAN and WAN - Circuit and packet switching - Overview of ISDN.

Text Books

1. Kothari D P and Nagrath I J, Basic Electrical Engineering, Tata McGraw Hill, 2009.
2. S.K. Sahdev, Fundamentals of Electrical Engineering and Electronics, Dhanpat Rai & Co, 2013.
3. Jacob Millman and Christos C. Halkias, "Electronic Devices and Circuits" Tata McGraw Hill
4. R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", PHI Learning Private Limited, Ninth Edition, 2008
5. Morris Mano, "Digital design", PHI Learning, Fourth Edition, 2008.
6. Rajendra Prasad , " Fundamentals of Electronic Engineering", Cengage learning, New Delhi, First Edition, 2011
7. Wayne Tomasi, "Electronic Communication Systems- Fundamentals Theory Advanced", Fourth Edition, Pearson Education, 2001.

Reference Books

1. R.Muthusubramaniam, S.Salivahanan and K.A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering", Tata McGraw Hill, 2004..
2. J.B.Gupta, "A Course in Electrical Power", Katson Publishing House, New Delhi, 1993.
3. David. A. Bell, "Electronic Devices and Circuits", PHI Learning Private Ltd, India, Fourth Edition, 2008
4. Donald P Leach, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications," 6th edition, Tata McGraw Hill Publishing Company Ltd.,New Delhi,2008.

T105 THERMODYNAMICS

OBJECTIVES

- *To convey the basics of the thermodynamic principles*
- *To establish the relationship of these principles to thermal system behaviors*
- *To develop methodologies for predicting the system behavior*
- *To establish the importance of laws of thermodynamics applied to energy systems*
- *To explain the role of refrigeration and heat pump as energy systems*
- *To develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world*

Unit I - Basic Concepts and Definitions

Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics – Pure substance - P, V and T diagrams – Thermodynamic diagrams.

Unit II - First Law of Thermodynamics

The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

Unit III - Second Law of Thermodynamics

Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

Unit IV - Gas Power Cycles

Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

Unit V - Refrigeration Cycles and Systems

Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system – Liquefaction – Solidification (only theory).

Text Books

1. Nag, P. K., "Engineering Thermodynamics", 4th edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi, 1995
2. Wark, K., "Thermodynamics", 4th edition ,Mc Graw Hill, N.Y.,1985

Reference Books

1. Arora, C.P., "Thermodynamics", Tata Mc Graw Hill Publishing Co. Ltd., New Delhi,1998.
2. Burghardt, M.D., "Engineering Thermodynamics with Applications", 4th edition, Harper & Row, N.Y.,1986.
3. Huang, F.F., "Engineering Thermodynamics" 2nd edition , Macmillan Publishing Co. Ltd., N.Y.,1989.
4. Cengel, Y.A. and Boles, M.A., "Thermodynamics - An Engineering Approach", 5th edition, Mc-Graw Hill, 2006

T106 COMPUTER PROGRAMMING

OBJECTIVES

- *To introduce the basics of computers and information technology.*
- *To educate problem solving techniques.*
- *To impart programming skills in C language.*
- *To practice structured programming to solve real life problems.*

Unit – I

History of Computers – Block diagram of a Computer – Components of a Computer system –Classification of computers - Hardware – Software – Categories of Software – Operating System – Applications of Computers – Network structure – Internet and its services – Intranet – Study of word processor – Preparation of worksheets.

Unit – II

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.

Introduction to C – History of C – Importance of C - C tokens – data types – Operators and expressions – I/O functions.

Unit – III

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions.

Storage classes – Strings – String library functions.

Unit – IV

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types – Union.

Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and Structures.

Unit – V

Files – operations on a file – Random access to files – command line arguments.

Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives.

Text Books

1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, Sixth edition, 2012.

Reference Books

1. Vikas Verma, “A Workbook on C “,Cengage Learning, Second Edition,2012
2. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008.

P101 COMPUTER PROGRAMMING LAB

OBJECTIVES

- *To study and understand the use of OS commands*
- *To gain a hands on experience of compilation and execution of 'C' programs*

List of Exercises:

1. Study of OS Commands
2. Write a simple C program to find the Area of the triangle.
3. Write a simple C program to find the total and average percentage obtained by a student for 6 subjects.
4. Write a simple C program to read a three digit number and produce output like

   1 hundreds

   7 tens

   2 units

   for an input of 172.
5. Write a simple C program to check whether a given character is vowel or not using Switch – Case statement.
6. Write a simple C program to print the numbers from 1 to 10 along with their squares.
7. Write a simple C program to find the sum of 'n' numbers using for, do – while statements.
8. Write a simple C program to find the factorial of a given number using Functions.
9. Write a simple C program to swap two numbers using call by value and call by reference.
10. Write a simple C program to find the smallest and largest element in an array.
11. Write a simple C program to perform matrix multiplication.
12. Write a simple C program to demonstrate the usage of Local and Global variables.
13. Write a simple C program to perform various string handling functions: strlen, strcpy, strcat, strcmp.
14. Write a simple C program to remove all characters in a string except alphabets.
15. Write a simple C program to find the sum of an integer array using pointers.

16. Write a simple C program to find the Maximum element in an integer array using pointers.
17. Write a simple C program to create student details using Structures.
18. Write a simple C program to display the contents of the file on the monitor screen.
19. Create a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.
20. Write a simple C program to pass the parameter using command line arguments.

P102 ENGINEERING GRAPHICS

OBJECTIVES

- *To convey the basics of engineering drawing*
- *To explain the importance of an engineering drawing*
- *To teach different methods of making the drawing*
- *To establish the importance of projects and developments made in drawing that are used in real systems*
- *To explain the role of computer aided design _Auto Cad*
- To develop an intuitive understanding of underlying significance of using these drawings

Unit 0
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning.

Unit I
Conic sections, Involutes, Spirals, Helix. Projection of Points, Lines and Planes.

Unit II
Projection of Solids and Sections of Solids.

Unit III
Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone).

Unit IV
Isometric projections and Orthographic projections.

Unit V
Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books

1. K.R. Gopalakrishna and Sudhir Gopalakrishna, Engineering Graphics, Inzinc Publishers,2007.
2. K.V. Natarajan, A Text Book of Engineering Drawing, Dhanalakshmi Publishers, 2006.
3. BIS, Engineering Drawing practice for Schools & College, 1992.

Reference Books

1. N.D. Bhatt, Engineering Drawing, 49th edition, Chorotar Publishing House, 2006.
2. K. Venugopal, Engineering Drawing and Grahics + Auto CAD, 4th edition, New AgeInternational Publication Ltd., 2004.
3. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn. 1985.
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int., 1989.

P103 BASIC ELECTRICAL AND ELECTRONICS LAB

OBJECTIVES

- *To get an exposure on the basic electrical tools, applications and precautions*
- *To gain training on different types of wiring used in domestic and industrial applications.*
- *To detect and find faults in electrical lamp and ceiling fan*
- *To get an exposure on the measurements of voltage and phase using CRO, basic operation and applications of devices such as PN junction diode and transistor*
- *To gain a practical knowledge on the functions and application of basic logic gates and flip flops*

ELECTRICAL LAB

List of Experiments

1. Electrical Safety, Precautions, study of tools and accessories.
2. Practices of different joints.
3. Wiring and testing of series and parallel lamp circuits.
4. Staircase wiring.
5. Doctor's room wiring.
6. Bed room wiring.
7. Go down wiring.
8. Wiring and testing a ceiling fan and fluorescent lamp circuit.
9. Study of different types of fuses and A.C and D.C meters.

ELECTRONICS LAB

List of Experiments

1. Study of CRO
   (a) Measurement of AC and DC voltages
   (b) Frequency and phase measurements (using Lissajou's figures)
2. Verification of Kirchoff's Voltage and Current Laws

Determine the voltage and current in given circuits using Kirchoff's laws theoretically and verify the laws experimentally.

3. Characteristics and applications of PN junction diode.

Forward and Reverse characteristics of PN junction diode.

Application of Diode as Half wave Rectifier – Measurement of ripple factor with and without capacitor filter

4. Frequency Response of RC Coupled Amplifiers

Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.

5. Study of Logic Gates

(a) Verification of Demorgan's theorems

(b) Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D

(c) Implementation of digital functions using logic gates and Universal gates.

T107 MATHEMATICS – II

OBJECTIVES

- *To develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
- *To introduce the concepts of Curl, Divergence and integration of vectors in vector calculus which is needed for many application problems.*
- *To introduce Laplace transform which is a useful technique in solving many application problems and to solve differential and integral equations.*
- *To acquaint the students with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.*

UNIT I – MATRICES

Eigenvalues and Eigen vectors of a real matrix, Characteristic equation, Properties of Eigenvalues and Eigenvectors. Cayley-Hamilton Theorem, Diagonalization of matrices. Reduction of a quadratic form to canonical form by orthogonal transformation. Nature of quadratic forms.

UNIT II – VECTOR CALCULUS

Gradient, divergence and curl, their properties and relations. Gauss divergence theorem and Stoke's theorem (without proof). Simple application problems.

UNIT III – LAPLACE TRANSFORM

Definition, Transforms of elementary functions, properties. Transform of derivatives and integrals. Multiplication by tand division by t. Transform of unit step function, transform of periodic functions. Initial and final value theorems.

UNIT IV – APPLICATIONS OF LAPLACE TRANSFORM

Methods for determining inverse Laplace Transforms, convolution theorem, Application to differential equations and integral equations. Evaluation of integrals by Laplace transforms.

UNIT V – FOURIER TRANSFORM

Fourier Integral theorem (statement only), Fourier transform and its inverse, properties. Fourier sine and cosine transforms, their properties, convolution and Parseval's identity.

Text books

1. Venkataraman M.K., Engineering Mathematics, National Publishing Company, Chennai.
2. Kandasamy P. et al, Engineering Mathematics, Vol.2 & 3, S. Chand & Co., New Delhi.

Reference Books

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 41st Edition, 2011.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New Delhi.
5. Bali N. and Goyal M., Advanced Engineering Mathematics, Lakshmi Publications Pvt. Ltd., New Delhi, 7th Edition, 2010.

T108 MATERIAL SCIENCE

OBJECTIVES:

- *To understand the importance of Material Science as a subject that revolutionized modern day technologies*
- *To understand the significance of material science in the development of new materials and devices for all branches of Engineering*
- *To impart knowledge to the Engineering students about some of the important areas of Materials Science so as to enable them perceive the significant contributions of the subject in Engineering and Technology*

Unit I - Crystal structure and Lattice Defects

Crystal structure - Bravais Lattices , Crystal Systems — Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices- Powder X Ray Diffraction Method.

Lattice defects – Qualitative ideas of point, line, surface and volume defects.

Unit II – Dielectric properties

Dielectric Polarization and Mechanism –Temperature dependence of polarization, Internal or local Field - Clausius-Mossotti relation. Basic ideas of Dielectric loss - frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and Applications.

Unit III – Magnetic Properties

Origin of atomic magnetic moment – Bohr magneton-Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro, antiferro & Ferri). – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis – Heisenberg Theory of Exchange Interaction (without derivation) – Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications. Magnetic data storage – Magnetic tapes, Hard disks, Magneto optical recording.

Unit IV – Semiconductors and superconductors

Semiconductors -Derivation of Carrier concentration in intrinsic Semiconductors –Basic ideas of Electrical conductivity in intrinsic and extrinsic semiconductors (without derivations) -temperature dependence of carrier concentration and electrical conductivity in semiconductors (qualitative ideas), Hall effect in Semiconductors -- Application of Hall Effect, Basic Ideas of Compound Semiconductors (II-VI & III-V).

Superconductivity - Basic concepts – transition temperature – Meissener effect – Type I and II superconductors – high temperature superconductors – 123 superconductor – Applications of superconductors.

Unit V – Advanced Materials

Liquid Crystals – Types – Application as Display Devices.

Metallic Glasses – preparation by melt spinning. Twin roller system, properties and applications.

Shape Memory alloys (SMA), Shape memory effect, Properties and applications of SMA

Nanomaterials- Nano materials (one, Two& three Dimensional) –Methods of synthesis (PVD, CVD, Laser Ablation, Solgel, Ball-milling Techniques), Properties and applications of nanomaterials. carbon nanotubes– Properties and applications.

Text books

1. V Rajendran, Engineering Physics, *2nd Edition*, TMH, New Delhi *2011.*
2. V Raghavan , Materials Science and Engineering- A First Course, 5th Edition, Prentice Hall of India, 2008.

Reference Books

1. Ali Omar M, Elementary Solid State Physics, Addison Wesley Publishing Co., 2009.
2. William D Callister Jr., Material Science and Engineering, 6th Edition, John Wiley and sons, 2009.
3. Srivatsava J P, Elements of Solid State Physics, Prentice Hall of India, 2004.
4. Charles Kittel, Introduction to Solid State Physics, 7th Edition, John Wiley & sons, Singapore, 2007.
5. Pillai S.O, Solid State Physics, 6th Edition – New Age International, 2005.
6. B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, and James Murday, Text book of Nanoscience and Nanotechnology, Universities Press, Hyderabad 2012
7. Charles P Poole & Frank J Owens, Introduction to Nanotechnology, Wiley nterscience, 2003.
8. M Arumugam , Materials Science, Anuratha Printers, 2004.
9. M.N. Avadhanulu, Enginerring Physics- Volume-II, S.Chand &Co, New Delhi, 2009.

T109 ENVIRONMENTAL SCIENCE

OBJECTIVES

- *To know about the environment.*
- *To understand about environmental pollution.*
- *To apply the knowledge in understanding various environmental issues and problems.*

UNIT I – Environment and Energy Resources

Environmental segments – atmosphere, hydrosphere, lithosphere and biosphere. Atmospheric layers. Pollution definition and classification. Pollutants classification. Forest resources – use and over exploitation, deforestation, forest management. Water resources – use and conflicts over water, dams – benefits and problems. Mineral resources – mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources – world food problems, environmental impact of modern Agriculture – fertilizer and pesticides. Energy resources – growing needs, renewable and non-renewable energy resources and use of alternate energy sources. From unsustainable to sustainable development.

UNIT II - Ecosystem and Biodiversity

Concept of an ecosystem - structure and function of an ecosystem.Producers, consumers, and decomposers.Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grassland, desert and aquatic (fresh water, esturine and marine) ecosystems. Biodiversity – definition, genetic species and ecosystem diversity. Value of biodiversity - consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity, habitat loss, poaching of wildlife, human wildlife conflicts. Endangered and endemic species. Conservation of biodiversity – in-situ and ex-situ conservation of biodiversity.

UNIT III - Air Pollution

Definition and classification. Chemical and photochemical reaction in different layers of atmosphere. Causes, sources, effects and control measures of air pollutants - oxides of Nitrogen, oxides of Carbon, oxides of Sulfur, hydrocarbons, chloro-fluoro carbons and particulates. Mechanism and effects of air pollution phenomenon – Global Warming, Ozone Depletion, Acid Rain, Sulfurous Smog and Photochemical Smog.

UNIT IV- Water and Land Pollution

Water pollution – causes and effects of organic water pollutants – pesticides, insecticides, detergents and surfactants. Causes and effects of inorganic water pollutants – heavy metal pollution due to Hg, Pb, Cr & Cu. Water pollution control and monitoring – DO, COD, BOD & TOC. Land Pollution – Solid waste management – causes, effect and control measures of urban and industrial wastes. Thermal and radioactive pollution.

UNIT V -Pollution Control and Monitoring

Basic concepts and instrumentation of IR, UV-VIS, atomic absorption spectrometry, Gas Chromatography and Conductometry. Analysis of air pollutants – NO_x, CO_x, SO_x, H_2S, Hydrocarbons and particulates.

Text Books:

1. A. K. De, "Environmental chemistry" 7th Ed; New age international (P) Ltd, New Delhi, 2010.
2. K. Raghavan Nambiar, "Text Book of Environmental Studies" 2nd Ed, Scitech Publications (India) Pvt Ltd, India, 2010.
3. G. S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000.

Reference Books:

1. B.K. Sharma, "Environmental chemistry" 11th Ed, KRISHNA Prakashan Media (P) Ltd, Meerut, 2007.
2. S.S.Dara, and D.D. Mishra "A text book of environmental chemistry and pollution control, 5th Ed, S.Chandand Company Ltd, New Delhi, 2012.
3. Richard T. Wright, Environmental Science: Toward a Sustainable Future, 10th edition, Prentice Hall, 2008

T 110 BASIC CIVIL AND MECHANICAL ENGINEERING

OBJECTIVES

- *To appreciate the role of civil engineering in daily walks of life.*
- *To be able to differentiate the types of buildings according to national building code.*
- *To understand building components and their functions as well as different types of roads, bridges and dams*
- *To convey the basic principles of Mechanical Engineering and its relationship to other branches of engineering*
- *To explain the concepts of thermal systems used in power plants and narrate the methods of harnessing renewable energies*
- *To explain the role of basic manufacturing processes*
- *To develop an intuitive understanding of underlying working principles of mechanical machines and systems.*

Part-A Civil Engineering

Unit I - Buildings, Building Materials

Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

Unit II - Buildings and their components

Buildings: Various Components and their functions. Soils and their classification. Foundation: function and types. Masonry- function and types. Floors: definition and types of floors. Roofs: definition f and types.

Unit III - Basic Infrastructure

Surveying: classification, general principles, types, Uses, instruments used. Roads-types: components, types and their advantage and disadvantages. Bridges: components and types of bridges. Dams: Purpose, types of dams. Water supply-sources and quality requirements, need and principles of rainwater harvesting.

PART - B Mechanical Engineering

Unit - IV

Internal and external combustion systems:
IC engines – Classification – Working principles - Diesel and petrol engines: two stroke and four stroke engines – Merits and demerits.

Steam generators (Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories – Merits and demerits - Applications.

Unit - V

Power Generation Systems – Convectional and Non-Conventional:
Hydraulic – Thermal – Nuclear power plants – Schemes and layouts (Description Only)
Solar – wind –Geothermal - Wave – Tidal and Ocean Thermal Energy Conversion systems – Basic power plant schemes and layouts (Description only).

Unit - VI

Manufacturing Processes:
Machines – Lathe – Drilling – Bending – Grinding – Shearing (Description only)
Machining Processes – Turning – Planning – Facing – Blanking – Drilling – Punching – Shearing – Bending – Drawing – Filing – Sawing – Grinding.
Moulding and Metal Joining - Pattern making – Green and dry sand moulding – Arc and Gas welding – Brazing – Soldering (process description only).

Text Books

1. Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai, 2001.
2. Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications Chennai, 2001.
3. Lindberg, R.A.Process and Materials of Manufacture, PHI, 1999.
4. H.N.Gupta, R.C.Gupta and Arun Mittal, Manufacturing Processes, New Age Publications, 2001
5. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi, 1998.

Reference Books

1. Rajput, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2002.
2. Punmia, B.C., et. al., Surveying , Vol-I, Laxmi Publishers, New Delhi, 2002.
3. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2002.
4. El.Wakil, M.M., Power Plant Technology, Mc Graw Hill Book Co.,1985.
5. Hajra Choudhry, et. al., Workshop Technology Vol I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.

T 111 ENGINEERING MECHANICS

OBJECTIVES

- *To understand the vector and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two dimensions*
- *To comprehend the effect of friction on equilibrium*
- *To understand the laws of motion, the kinematics of motion and the interrelationship and to learn to write the dynamic equilibrium equation*
- *To emphasis the concepts through solved examples*

Unit I - Fundamental of Mechanics

Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, , applications in solving the problems on static equilibrium of bodies.

Unit II – Practical application of force system

Structural member: definition, Degree of freedom, concept of free body diagrams, types of supports and reactions, types of loads, Analysis of Trusses-method of joints, method of sections.

Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges.

Unit III - Properties of Surfaces

Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

Unit IV - Kinematics and Kinetics of Particles

Equations of motion - Rectilinear motion, curvelinear motion, Relative motion, D'Alembert's principle, work- Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.

Unit V - Kinematics and Kinetics of Rigid bodies

Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books

1. Bhavikatti,S.S and K.G.Rajashekarappa, Engineering Mechanics, New Age International (P) Ltd, New Delhi,2008.

2. Rajesekaran, S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2002.

Reference Books

1. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill,2001.

2. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 1997.

T112 COMMUNICATIVE ENGLISH

OBJECTIVES

- *To improve the LSWR skills of I B.Tech students*
- *To instill confidence and enable the students to communicate with ease*
- *To equip the students with the necessary skills and develop their language prowess*

Unit I – Basic Communication Theory

Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

Unit II – Comprehension and Analysis

Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context-Intensive Reading and Reviewing

Unit III – Writing

Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

Unit IV – Business Writing / Correspondence

Report writing – Memoranda – Notice – Instruction – Letters – Resumes – Job applications

Unit V – Oral Communication

Basics of phonetics – Presentation skills – Group Discussions – Dialogue writing – Short Extempore – Debates-Role Plays-Conversation Practice

Reference Books

1. Ashraf M.Rizvi., Effective Technical Communication. Tata-McGraw, 2005.
2. Boove, Courtland R et al., Business Communication Today. Delhi. Pearson Education,2002.
3. Meenakshi Raman and Sangeeta Sharma., Technical Communication Principles And Practice,OUP, 2007.
4. Robert J.Dixson. ,Complete Course in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2006.
5. Robert J.Dixson., Everyday Dialogues in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2007.
6. Sethi,J and Kamalesh Sadanand., A Practical Course in English Pronunciation, Prentice-Hall of India Pvt. Ltd, New Delhi,2007.

P104 PHYSICS LABORATORY

OBJECTIVES

- *To provide a practical understanding of some of the concepts learnt in the theory course on Physics.*

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee's DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton's rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly's experiment – determination of α
10. Magnetism: i – h curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber
16. Electrical conductivity of semiconductor – two probe / four probe method
17. Hall effect in semiconductor

P105 CHEMISTRY LABORATORY

OBJECTIVES

- *To gain a practical knowledge of Engineering Chemistry in relevance to Industrial applications*

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
6. Estimation of acetic acid in vinegar.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
9. Estimation of available chlorine in bleaching powder.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments (Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

Reference:

Laboratory Manual prepared by the Department of Chemistry

P106 WORKSHOP PRACTICE

OBJECTIVES

- *To convey the basics of mechanical tools used in engineering*
- *To establish hands on experience on the working tools*
- *To develop basic joints and fittings using the hand tools*
- *To establish the importance of joints and fitting in engineering applications*
- *To explain the role of basic workshop in engineering*
- *To develop an intuitive understanding of underlying physical mechanism used in mechanical machines.*

Sl. No.	Trade	List of Exercises
1.	Fitting	Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.
2.	Welding	Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding
3	Sheet metal work	Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.
4.	Carpentry	Study of tools and Machineries – Exercises on Lap joints and Mortise joints

List of Exercises

I Fitting
1. Study of tools and Machineries
2. Symmetric fitting
3. Acute angle fitting

II Welding
1. Study of arc and gas welding equipment and tools
2. Simple lap welding (Arc)
3. Single V butt welding (Arc)

III Sheet metal work
1. Study of tools and machineries
2. Frustum
3. Waste collection tray

IV Carpentry
1. Study of tools and machineries
2. Half lap joint
3. Corner mortise joint.

Reference Books

1. Hajra Choudhry, et. al., Workshop Technology Vol. I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.
2. H.N.Gupta, R.C.Gupta and Arun Mittal, Manufacturing Processes, New Age Publications, 2001

P107 NCC / NSS

NCC/NSS training is compulsory for all the Undergraduate students

1. The above activities will include Practical/field activities/Extension lectures.
2. The above activities shall be carried out outside class hours.
3. In the above activities, the student participation shall be for a minimum period of 45 hours.
4. The above activities will be monitored by the respective faculty incharge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.

III SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
MA T31	**MATHEMATICS III**	3	1	-

Course Objectives:

1. To provide the concepts of functions of a complex variable, conformal mapping, complex integration, series expansion of complex functions, Harmonic analysis and Fourier series.
2. To make the students understand and work out problems of constructing analytic functions, conformal mapping, bilinear transformation, contour integration and expanding functions into Fourier series including Harmonic analysis.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the concepts of function of a complex variable and complex integration and apply these ideas to solve problems occurring in the area of engineering and technology.
2. Expand functions into Fourier series which are very much essential for application in engineering and technology.

UNIT I

Function of a complex variable: Continuity, derivative and analytic functions – Necessary conditions – Cauchy-Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions.

UNIT II

Conformal mapping – Simple and standard transformations like $w = z+c$, cz, z^2, e^z, sin z, cosh z and $z+1/z$ – Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation). Taylor's and Laurent's theorem (without proof) – Series expansion of complex valued functions – classification of singularities.

UNIT III

Complex Integration: Cauchy's integral theorem and its application, Cauchy's integral formula and problems. Residues and evaluation of residues – Cauchy's residue theorem – Contour integration: Cauchy's and Jordan's Lemma (statement only) – Application of residue theorem to evaluate real integrals – unit circle and semicircular contour (excluding poles on boundaries).

UNIT IV

Fourier Series: Dirichlet's conditions – General Fourier series – Expansion of periodic function into Fourier series – Fourier series for odd and even functions – Half-range Fourier cosine and sine series – Change of interval – Related problems.

UNIT V

Root Mean Square Value – Parseval's theorem on Fourier Coefficients. Complex form of Fourier series – Harmonic Analysis.

TOTAL PERIODS: 60

Text Books:

1. Veerarajan T., Engineering Mathematics for first year, Tata-McGraw Hill, 2010.
2. Venkataraman M.K., Engineering Mathematics, Vol. II & III, National Publishing Company, Chennai, 2012.

Reference Books:

1. Kandasamy P. et al, Engineering Mathematics, Vol. II & III, S. Chand & Co., New Delhi, 2012.
2. Bali N. P and Manish Goyal, Text book of Engineering Mathematics, 3rd Edition, Laxmi Publications (p) Ltd., 2008.
3. Grewal B.S., Higher Engineering Mathematics, 40th Edition, Khanna Publishers, Delhi 2007.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 7Th Edition, Wiley India, 2007.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T32	**ELECTRONIC DEVICES AND CIRCUITS**	3	1	-

Course Objectives:

1. To introduce the basic principle, operation and applications of electronic devices
2. To understand the concept of biasing and different types of biasing circuits used for BJT, JFET and MOSFET
3. To study the basic models of BJT, JFET and MOSFET
4. To understand the basic concept of feedback and operation of different types of amplifiers and oscillators
5. To understand the characteristics and applications of operational amplifiers

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the operation and applications of various electronic devices like diodes, UJT, SCR, DIAC and TRIAC
2. Compare the different biasing circuits used for BJT, JFET and MOSFET
3. Analyze the device models of BJT, JFET and MOSFET
4. Comprehend the concepts of feedback and understand the operation of amplifiers and oscillators
5. Understand the characteristics of operational amplifiers and their applications

UNIT I

Diode and its Applications : PN junction diode, Diode equivalent circuit, Diode as a switch – transition and diffusion capacitance – reverse recovery time, Zener diode, Applications of diode – AND/OR gates using diodes, Clippers and clampers – Voltage doubler and tripler – Voltage regulation – Series and shunt voltage regulators.

UNIT II

Biasing and Modeling for BJT and FET : Biasing and operating point, BJT Bias circuits - Fixed-bias, Emitter stabilized bias, Voltage divider bias and DC bias with voltage feedback, FET biasing – Fixed-bias, Self-bias, Voltage-divider bias, MOSFET biasing. Transistor modeling – Important parameters of BJT- ***h***- parameter model of BJT (***CE*** only) – Important parameters of JFET, Small signal model of JFET and MOSFET

UNIT III

RC-coupled amplifier, Operation and Frequency response, Power amplifier – Series fed and transformer coupled Class A amplifiers, Class B amplifier, Circuit and Operation, conversion efficiency, amplifier distortion, Class C and D amplifiers. Concept of feedback- Negative and positive feedback, Barkhausen Criterion - Wien bridge oscillators, Hartley, Colpitts andcrystal oscillator - Frequency stability.

UNIT IV

Operational Amplifier: Introduction to op-amp, Characteristics of op-amp. - Differential and common mode operation, op-amp parameters - Applications: Inverting and non-inverting amplifier, summer, subtractor, differentiator, integrator, comparator, analog multiplier, second order low pass and high pass active filters.

UNIT V

Special Devices: Varactor diode, Tunnel diode, PIN diode,LED, LCD, Seven segmentdisplays, Opto-isolator.UJT - Characteristics and equivalent circuit – intrinsic standoff ratio –UJT relaxation oscillator, SCR - Two transistor model, DIAC and TRIAC - Operation, Characteristics and their applications.

TOTAL PERIODS: 60

Text Books:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education, Tenth Edition, 2009.
2. Jacob Millman, C. Halkias and Satyabrata Jit, "Electronic Devices and Circuits", Tata McGraw Hill, Third Edition, 2010.

Reference Books:

1. Jacob Millman and Arvin Grabel, "MicroElectronics", Tata McGraw Hill, Second Edition, 2008.
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition, 2008

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T33	**OBJECT ORIENTED PROGRAMMING AND DESIGN**	3	1	-

Course Objectives:

1. To introduce the object oriented concepts.
2. To learn object oriented programming using C++.
3. To understand the challenges in developing object oriented programming.
4. To design programs using UML concepts.

Course Outcomes:

On successful completion of this course students will be able to:

1. Understand the concepts of Features of object oriented programming.
2. Learn the programming details of object oriented programming.
3. Develop C++ programs for various real time applications.
4. To develop UML design diagrams using OOP concepts.

UNIT – I

Introduction to Object-Oriented Programming: Evolution of programming methodologies –Disadvantages of conventional programming – programming paradigms – key concepts of object –oriented programming – advantages of OOP – usage of OOP.

Input and output in C++ : Limitations of C –Introduction to C++ – Structure of the C++ program – stream classes – formatted and unformatted data – unformatted console I/O operations – Bit fields, Manipulators – Manipulators with multiple parameter

Control structures: Decision making statements – jump statement –switch case statement – looping statements.

Classes and objects: Defining member functions – rules of inline functions – data hiding or encapsulation – classes – objects and memory – static object – array of objects – objects as function arguments, friend functions, member functions and non-member functions –overloading member functions.

Functions in C++ : Passing arguments – LValues and RValues – return by reference – default arguments –inline functions –function overloading.

UNIT – II

Constructors and Destructors: Purpose of Constructors and Destructors – overloading constructors – constructors with default arguments – copy constructors – calling constructors and destructors – dynamic initialization using constructors – recursive constructor.

Overloading Functions: Overloading unary operators – constraint on increment and decrement operators –overloading binary operators – overloading with friend functions – type conversion – one argument constructor and operator function – overloading stream operators.

Inheritance: Introduction – Types of Inheritance – Virtual base classes – constructors and destructors and inheritance – abstract classes – qualifier classes and inheritance – common constructor – pointers and inheritance –overloading member function.

UNIT - III

Pointers and arrays: Pointer to class and object – pointer to derived classes and base classes –accessing private members with pointers – address of object and void pointers – characteristics of arrays –array of classes.

Memory: Memory models – The new and delete operators – Heap consumption – Overloading new and delete opetaors – Execution sequence of constructors and destructors – specifying address of an object –dynamic objects.

Binding, Polymorphism and Virtual Functions: Binding in C++ –Pointer to derived class objects – virtual functions – Array of pointers – Abstract classes – Virtual functions in derived classes – constructors and virtual functions – virtual destructors – desctructos and virtual functions.Strings - Declaring and initializing string objects – relational operators – Handling string objects – String attributes – Accessing elements of strings – comparing and exchanging and Miscellaneous functions.

UNIT – IV

Files: File Stream classes – Checking for errors – file opening modes – file pointers and manipulators – manipulators with arguments – read and write operations – Binary and ASCII files – Random access operation – Error handling functions – command line arguments – stdstreams.

Generic Programming with Templates: Generic Functions- Need of Template – Normal function template – class template with more parameters – Function template with more parameters, overloading of function templates, class template with overloaded operators – class templates and inheritance.

Exception Handling: Fundamentals of Exception Handling – Catching Class Types – Using Multiple catch statements – Catching All Exception – Rethrowing Exception – Specifying Exception – Exceptions in constructors and destructors – controlling uncaught Exceptions – Exception and operator overloading –Exception and inheritance –Class Template and Exception handling.

UNIT –V

Object Modelling and Object Oriented Software development: Overview of OO concepts – UML – Use case model – Class diagrams – Interaction diagrams – Activity diagrams – state chart diagrams - Patterns – Types – Object Oriented Analysis and Design methodology – Interaction Modelling – OOD Goodness criteria.

TOTAL PERIODS: 60

Text Books:

1. Ashok N.Kamthane,Object Oriented Progemmaing with ANSI and Turbo C++, Pearson Edition
2. Deitel & Deitel, C++ How to program, Prentice Hall, Eighth Edition, 2011.
3. Rajib Mall, “Fundamentals of Software Engineering”. PHI Learning, Third Edition, 2013.

Reference Books:

1. Eric Nagler, Learning C++ A Hands on Approach, Jaiho publishing house.
2. E Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, 2nd Edition.
3. Sotter A Nicholas and Kleper J Scott, Professional C++, Wiley Publishing Inc.

Websites:

1. http://www.cplusplus.com/articles/cpp11

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T34	**DIGITAL SYSEM DESIGN**	3	1	-

Course Objectives:

1. To introduce the fundamentals of digital system design.
2. To lay strong foundation to the combinational and sequential logic.
3. To educate from basic concepts to advanced system design.
4. To impart understanding of the hardware fundamentals of computer design.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the binary number systems and Boolean algebra.
2. Design combinational logic using only of universal gates, MSI gates and PLDs
3. Design and implement sequential logic circuits of any complexity.
4. Simulate and validate correctness of the digital circuits using VHDL packages.
5. Develop any prototypes using the state of the art reconfigurable devices.

UNIT – I

Review of Binary number systems: Binary, Decimal, Octal, Hexadecimal number systems – Number base conversions – Signed binary numbers – Arithmetic operations – Binary codes – weighted BCD codes, Excess-3 codes, Gray Codes – Alphanumeric Codes – Error detecting and Correction codes – **Boolean Algebra & Theorems**: Fundamental postulates, DeMorgan's theorems – Sum of Products and Product of Sums functions – Canonical form – Minimization of expressions using Karnaugh Maps and Quine-McCluskey method – Implementation of Boolean functions using universal gates and multilevel gates.

UNIT – II

Combinational Logic: Half & full adders/subtractors – Parallel Adders – Look-ahead carry adders - BCD adders/subtractors – Binary Multiplier – Code convertors – Decoders – Encoders – Parity encoders – Multiplexers – Implementation of combinational logic using Multiplexers - Demultiplexers - Magnitude comparators – Parity generator/checker.

UNIT – III

Sequential Logic: Latches versus Flip Flops – SR, D, JK, Master Slave Flip Flops – Excitation table – Conversion of Flip flops – Counters: Asynchronous, synchronous, decade, presettable – Shift Registers: types, applications – Ring counter – Analysis and design of clocked sequential circuits – Mealy and Moore models – State machine notations – state reduction techniques.

UNIT – IV

Reconfigurable Digital Circuits: Types of Memories – Organization of ROM and RAM – Address Decoding – Programmable Logic Devices (PLDs) – Programmable Logic Arrays (PLAs) – Programmable Array Logic (PAL) devices – Field Programmable Gate Arrays (FPGAs) - Combinational Logic implementation using PROMs, PLAs, PALs.

UNIT – V

Digital Design with Verilog HDL: Hierarchical Modeling concepts – 4-bit ripple carry counter – modules – instances – Data types – Arrays – System tasks – directives – Modules and Ports – Gate-Level Modeling – Dataflow Modeling – Design of Multiplexers, counters and full adders – Introduction to Behavioral Modeling.

TOTAL PERIODS: 60

Text Books:

1. M. Morris Mano and Michael D. Ciletti, "Digital Systems: With an Introduction to the Verilog HDL", Fifth Edition, Prentice Hall of India, 2012
2. Samir Palnitkar, "VERILOG HDL – A Guide to Digital Design and Synthesis", Pearson Education Inc., Second Edition, 2012

Reference Books:

1. A. P. Godse and D. A. Godse, "Digital Systems Design", Technical Publications, Pune, 2008.
2. Leach Malvino, "Digital Principles and Applications", Tata McGraw Hill, Fifth edition, 2005.
3. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice Hall, 2009.

Websites:

1. NPTEL course on Digital Circuits Design available at http://www.nptel.iitm.ac.in/video.php?subjectId=117106086
2. CPLDS and FPGAs tools available athttp://www.xilinx.com
3. Digital ICs datasheets available athttp://www.electronics-lab.com/downloads/datasheets/ic_digital.html.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T35	DATA STRUCTURES	3	1	-

Course Objectives:

1. To acquaint students with data structures used when programming for the storage and manipulation of data.
2. The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.
3. To understand the applications of graph theory in various domains.

Course Outcomes:

On successful completion of the module students will be able to:

1. Selection of relevant data structures and combinations of relevant data structures for the given problems in terms of memory and run time efficiency.
2. Apply data abstraction in solving programming problems.
3. Apply Graph theoretical approaches for solving real-life problems.

UNIT – I

Introduction: Algorithmic notation – Programming principles – Creating programs- Analyzing programs. Arrays: One dimensional array, multidimensional array, pointer arrays. Searching: Linear search, Binary Search, Fibonacci search. Sorting techniques: Internal sorting - Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort and Radix Sort.

UNIT – II

Stacks: Definition – operations - applications of stack. Queues: Definition - operations - Priority queues - De queues – Applications of queue. Linked List: Singly Linked List, Doubly Linked List, Circular Linked List, linked stacks, Linked queues, Applications of Linked List – Dynamic storage management – Generalized list.

UNIT – III

Trees: Binary tree, Terminology, Representation, Traversals, Applications – Binary search tree – AVL tree. B Trees: B Tree indexing, operations on a B Tree, Lower and upper bounds of a B Tree - B + Tree Indexing – Trie Tree Indexing.

UNIT – IV

Graph: Terminology, Representation, Traversals – Applications - spanning trees, shortest path and Transitive closure, Topological sort. Sets: Representation - Operations on sets – Applications.

UNIT – V

Tables: Rectangular tables - Jagged tables – Inverted tables - Symbol tables – Static tree tables - Dynamic tree tables - Hash tables. Files: queries - Sequential organization – Index techniques. External sorting: External storage devices – Sorting with tapes and disks.

TOTAL PERIODS: 60

Text Books:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Book Source, Pvt. Ltd., 2004.
2. D. Samanta, "Classic Data Structures", Second Edition, Prentice-Hall of India, Pvt. Ltd., India 2012.

Reference Books:

1. Robert Kruse, C.L. Tondo and Bruce Leung, "Data Structures and Program Design in C", Prentice-Hall of India, Pvt. Ltd., Second edition, 2007.
2. Mark Allen Weiss", Data Structures and Algorithm Analysis in C", Pearson Education, Second edition, 2006.

Website:

1. http://www.cse.unt.edu
2. http://nptel.ac.in/courses/106102064/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T36	**COMPUTER ORGANIZATION AND ARCHITECTURE**	3	1	-

Course Objectives:

1. To provide an overview of computer hardware.
2. To give a methodical treatment of machine instructions, addressing techniques, and instruction sequencing.
3. To explain the basics of I/O data transfer synchronization.
4. To understand the common components and organizations used to implement memory and to know the implementation of instruction fetching and execution in a processor.
5. To provide details on use of pipelining and multiple functional units.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand Basics of Computers, Machine Instructions and Programs.
2. Understand the implementation of concepts is done on commercial processors.
3. Gain knowledge regarding the ways for increasing main memory bandwidth.
4. Understands Processor implementation by both hardwired and Microprogrammed control.
5. Understands relation between pipelined execution and instruction set design.

UNIT – I

BASIC STRUCTURES OF COMPUTER: Functional Units, Multiprocessors and Multicomputers, Memory Locations and Addresses, Memory operations, Instructions and Instruction Sequencing, Addressing modes, Assembly Language, Basic Input/Output operations, Stacks and Queues, Subroutines, Shift and rotate Instructions, Byte-Sorting program.

UNIT – II

The IA-32 Pentium Example: Registers and Addressing, IA-32 Instructions, IA-32 Assembly Language, Program Flow Control, Logic and Shift/Rotate Instructions, I/O Operations, Subroutines, Other Instructions, Program Examples.

UNIT – III

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts, Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Use Of Interrupts in Operating Systems, Pentium Interrupt Structure, Direct Memory Access, Busses, Interface Circuits, Standard I/O Interfaces.

UNIT – IV

THE MEMORY SYSTEM: Some Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size, and Cost, Cache Memories, Performance Considerations, Virtual memories, Memory Management requirements, Secondary Storage.

UNIT – V

BASIC PROCESSING UNIT : Some Fundamental Concepts, Execution Of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control, PIPELINING: Basic Concepts, Data Hazards, Instruction Hazards, Influence On Instructions Sets, Datapath and Control Considerations, Superscalar Operations, Performance Considerations

TOTAL PERIODS: 60

Text Books:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", fifth edition, TataMcGraw Hill Education, 2011.

Reference Books:

1. John P. Hayes, "Computer Architecture and Organization", Third edition, Tata McGraw Hill, 2013
2. William Stallings, "Computer organization and Architecture – Designing for performance", 9th edition, Pearson education, 2012
3. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.

Website:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/comp_org_arc/web/
2. http://pages.cs.wisc.edu/~markhill/cs354/Fall2008/notes/Pentium.html
3. http://williamstallings.com/ComputerOrganization/COA9e-student/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P31	**ELECTRONIC DEVICES AND CIRCUITSLABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. VI characteristics of LED and Zener diodes
2. Application of Diodes - Clippers, Clampers, AND gate and OR gate
3. Input and Output Characteristics of Common Emitter transistor configuration and determination of ***h*-**parameters
4. Drain characteristics of JFET and determination of Drain resistance, Mutual conductance and Amplification factor
5. VI Characteristics of Silicon Controlled Rectifier and Uni-Junction transistor.
6. Frequency Response of RC-coupled amplifier and determination of input and output impedances
7. Class B push – pull power amplifier
8. Applications of Operational amplifier
   a) Adder and subtractor
   b) Integrator and differentiator
   c) Wien bridge oscillator
9. LC Oscillators - Hartley and Colpitts oscillators
10. Frequency response of second order active low pass and high pass filters

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P32	**DATA STRUCTURES LAB**	-	-	3

LIST OF EXPERIMENTS

1. Searching algorithms - sequential, binary and Fibonacci search algorithms on an ordered list. Compare the number of key comparisons made during the searches
2. Sorting algorithms :Insertion Sort, Selection Sort, Bubble Sort,
3. Sorting algorithms: Shell Sort, Quick Sort, Heap Sort.
4. Sorting algorithms: Merge Sort, and Radix Sort
5. Sparse matrix representation and find its transpose.
6. Evaluation of arithmetic expression to postfix expression.
7. Queue, circular queue, priority queue, Dequeue.
8. Singly Linked List, Doubly Linked List, Circular Linked List
9. Concatenation oflinked lists.
10. Tree traversals
11. Graph traversals
12. Impelemetation of Dijkstra's algorithm
13. Impelemetation of Hash tables.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P33	**DIGITAL DESIGN LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Verification of DeMorgan's theorems using basic logic gates.
2. Design and implementation of adders and subtractors.
3. Design and implementation of Carry Look-Ahead Adders.
4. Design and implementation of Parity Generator/Checkers.
5. Design and implementation of Priority encoders using logic gates.
6. Design and implementation of simplified Boolean expressions using Multiplexers.
7. Design and implementation of simplified Boolean expressions using Decoders.
8. Design and implementation of Magnitude Comparators.
9. Study of clocked RS, D, and JK Flip-Flops.
10. Design and implementation of Serial Input Parallel Output (SIPO) and Parallel Input Serial Output (PISO) Shift Registers.
11. Design and implementation of ripple and synchronous counters.
12. Simulation of a combinational logic using HDL.
13. Simulation of a sequential logic using HDL.
14. Implementation of given Boolean expressions using multioutput PAL/PLA realization.
15. Implementation of a sequential circuit using PAL/PLA realization.

IV SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
MA T41	**MATHEMATICS - IV**	3	1	-

Course Objectives:

1. Importance of problems in Partial Differential Equations
2. Problem solving techniques of PDE
3. To make the students knowledgeable in the areas of Boundary Value Problems like vibrating string (wave equation), heat equation in one and two dimensions.
4. To acquaint the students with the concepts of Theory of sampling.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the different types of PDE and will be able to solve problems occurring in the area of engineering and technology.
2. Know sampling theory and apply to solve practical problems in engineering and technology.

UNIT – I

PARTIAL DIFFERENTIAL EQUATIONS: Formation by elimination of arbitrary constants and arbitrary functions – General, singular, particular and integrals – Lagrange's linear first order equation – Higher order differential equations with constant coefficients

UNIT – II

PARTIAL DIFFERENTIAL EQUATIONS: Solution of partial differential equation by the method of separation of variables – Boundary value problems – Fourier series solution – Transverse vibration of an elastic string.

UNIT – III

PARTIAL DIFFERENTIAL EQUATIONS: Fourier series solution for one dimensional heat flow equation – Fourier series solutions for two dimensional heat flow equations under steady state condition – (Cartesian and Polar forms).

UNIT – IV

APPLIED STATISTICS: Curve fitting by the method of least squares – fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large samples test for single proportions, differences of proportions, single mean, difference of means and standard deviations.

UNIT – V

APPLIED STATISTICS: Small samples – Test for single mean, difference of means and correlations of coefficients, test for ratio of variances – Chi-square test for goodness of fit and independence of attributes.

TOTAL PERIODS: 60

Text Books:

1. Venkataraman M. K, "Engineering Mathematics, Third year Part A& B", 12th Edition, The National Publishing Company, Madras 1996.
2. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and sons, 1975.

Reference Books:

1. Kandasamy P. et al, "Engineering Mathematics, Vol. II & III", S. Chand & Co., New Delhi, 2012.
2. Grewal B.S., "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, Delhi 2007.
3. Bali N.P., "Manish Goyal, "Engineering Mathematics", 7th Edition, Laxmi Publications, 2007.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India, 2007.
5. Ray Wylie C. "Advanced Engineering Mathematics", 6th Edition, Tata McGraw Hill, 2003.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T42	**MICROPROCESSORS AND MICROCONTROLLERS**	3	1	-

Course Objectives:

1. To understand the architectures and the instruction set of 8085 microprocessor
2. To understand the architectures and the instruction set of 8086 microprocessor
3. To understand the architectures and the instruction set of 8051 microcontroller
4. To learn the assembly language program using 8085, 8086 and 8051 instructions
5. To learn interfacing of microprocessors and microcontrollers with various devices

Course Outcomes:

On successful completion of this course students will be able to:

1. Understanding the inner working components of the microprocessor and microcontrollers
2. Developing assembly language program using 8085 instruction set
3. Developing assembly language program using 8086 instruction set
4. Developing assembly language program using 8051 instruction set
5. Developing various I/O programs for 9085, 8086 and 8051

UNIT – I

Intel 8085 Microprocessor: Introduction - Need for Microprocessors – Evolution – Intel 8085 Hardware - Architecture – Pin description - Internal Registers – Arithmetic and Logic Unit – Control Unit – Instruction word size - Addressing modes – Instruction Set – Assembly Language Programming - Stacks and Subroutines - Timing Diagrams. Evolution of Microprocessors – 16-bit and 32-bit microprocessors.

UNIT – II

Intel 8085 Interrupts and DMA: 8085 Interrupts – Software and Hardware Interrupts – 8259 Programmable Interrupt Controller - Data Transfer Techniques – Synchronous, Asynchronous and Direct Memory Access (DMA) and 8237 DMA Controller- 8253 Programmable Interval Timer.

UNIT – III

Memory & I/O Interfacing: Types of memory – Memory mapping and addressing – Concept of I/O map – types – I/O decode logic – Interfacing key switches and LEDs – 8279 Keyboard/Display Interface - 8255 Programmable Peripheral Interface – Concept of Serial Communication – 8251 USART – RS232C Interface.

UNIT – IV

Intel 8086 Microprocessor: Introduction-Intel 8086 Hardware – Pin description – External memory Addressing – Bus cycles – Interrupt Processing. Addressing modes - Instruction set – Assembler Directives.

UNIT – V

Microcontroller: Intel 8051 Microcontroller: Introduction – Architecture – Memory Organization – Special Function Registers – Pins and Signals – Timing and control – Port Operation – Memory and I/O interfacing – Interrupts – Instruction Set and Programming.

TOTAL PERIODS: 60

Text Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publications, Fifth Edition.
2. Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008.

Reference Books:

1. N. Senthil Kumar, M Saravanan and S. Jeevananthan, "Microprocessors and Microcontrollers" , Oxford University Press, First Edition 2010.
2. A. P. Godse and D.A Godse, "Microprocessors and Microcontrollers", Technical Publications, Fourth Edition, 2008.
3. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386 and 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III Pentium 4 – Architecture, Programming and Interfacing, 7th Edn., PHI, 2008.
4. Ajay V Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw-Hill, Seventh Edition, 2007.

Websites:

1. http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.dai0211a/index.html
2. http://www.arm.com/products/processors/classic/arm7/index.php
3. http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.dai0211a/index.html
4. http://www.embeddedindia.com/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T43	**AUTOMATA LANGUAGES AND COMPUTATION**	3	1	-

Course Objectives:

1. To understand the foundation of computing
2. To realize the theoretical knowledge behind the computation
3. To understand the construction of formal languages
4. To apply this mathematical model for various computing research environment

Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to apply the mathematical methodologies in various research environment
2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
3. An ability to design a system, component, or process using automata.

UNIT – I

Finite Automata and Regular Expressions: Formal Languages and Regular expressions, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ε-moves,Equivalence of NFA and DFA, Minimization of finite automata, Two-way finite automata, Mooreand Mealy machines, Applications of finite automata.

UNIT – II

Regular Sets and Context Free Grammars: Properties of regular sets, Context-Free Grammars –Derivation trees, Chomsky Normal Forms and Greibach Normal Forms, Ambiguous andunambiguous grammars.

UNIT – III

Pushdown Automata and Parsing Algorithms: Pushdown Automata and Context-FreeLanguages; Top-down parsing and Bottom-up parsing, Properties of CFL, Applications ofPumping Lemma, Closure properties of CFL and decision algorithms.

UNIT – IV

Turing machines: Turing machines (TM) – computable languages and functions – TuringMachine constructions – Storage in finite control – variations of TMs – Recursive andRecursive. Enumerable languages, Recursive Function, Partial and Total Recursive Function, PrimitiveRecursive Function.

UNIT – V

Introduction to Computational Complexity: Time and Space complexity of TMs – Complexityclasses – Introduction to NP-Hardness and NP-Completeness.

TOTAL PERIODS: 60

Text Books:

1. John E. Hopcroft and Jeffrey D. Ullman, "Introduction to Automata Theory, Languagesand Computation", Narosa Publishers, 2002.

Reference Books:

1. Michael Sipser, "Introduction to the Theory of Computations", Brooks/Cole, ThomsonLearning, 1997.
2. John C. Martin, "Introduction to Languages and the Theory of Computation", TataMcGraw-Hill, 2003.

Website:

1. http://nptel.iitm.ac.in/courses/106106049/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T44	**DESIGN AND ANALYSIS OF ALGORITHMS**	3	1	-

Course Objectives:

1. To analyze time and space complexities of algorithms.
2. To acquaint students with algorithm techniques when programming for the storage and manipulation of data.
3. The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.

Course Outcomes:

On successful completion of the module students will be able to:

1. Selection of relevant algorithm technique and combinations of relevant data structures for the given problems in terms of memory and run time efficiency.
2. Apply data abstraction in solving programming problems.
3. Capable of categorizing the given problem into NP-Hard or NP-Complete.

UNIT – I

Algorithms: Definitions and notations: standard notations - asymptotic notations – worst case, best case and average case analysis; big oh, small oh, omega and theta notations; Analysis of Sorting and Searching: Heap, shell, radix, insertion, selection and bubble sort; sequential, binary and Fibonacci search. Recursive algorithms, analysis of non-recursive and recursive algorithms, solving recurrence equations, analyzing control structures.

UNIT – II

Divide and Conquer Method: General Method – binary search –maximum and minimum – merge sort - quick sort – Strassen's Matrix multiplication. Greedy Method: General method – knapsack problem – minimum spanning tree algorithms – single source shortest path algorithm – scheduling, optimal storage on tapes, optimal merge patterns.

UNIT – III

Dynamic Programming: General method – multi-stage graphs – all pair shortest path algorithm – 0/1 Knapsack and Traveling salesman problem – chained matrix multiplication. Basic Search and Traversal technique: Techniques for binary trees and graphs – AND/OR graphs – biconnected components – topological sorting.

UNIT – IV

Backtracking: The general method – 8-queens problem – sum of subsets – graph coloring – Hamiltonian cycle – Knapsack problem.

UNIT – V

Branch and Bound Method: Least Cost (LC) search – the 15-puzzle problem – control abstractions for LC-Search – Bounding – FIFO Branch-and-Bound - 0/1 Knapsack problem – Traveling Salesman Problem. Introduction to NP-Hard and NP-Completeness.

TOTAL PERIODS: 60

Text Books:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt. Ltd., 2008.

Reference Books:

1. Gilles Brassard and Paul Bratley, "Fundamentals of Algorithms", PHI, 1997.
2. Anany Levitin, "Introduction to Design and Analysis of Algorithms", Pearson Education, 2005.
3. Thomas H. Corman, Charles E. Leiserson, Ronald and L. Rivest, "Introduction to Algorithms", Prentice-Hall of India, Second edition, 2003.
4. Richard Johnsonbaugh and Marcus Schaefer, "Algorithms", Pearson Education, 2004.

Website:

1. nptel.iitm.ac.in/Algorithms

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T45	**OBJECT ORIENTED PROGRAMMING**	3	1	-

Course Objectives:

1. To understand the concepts of object oriented programming
2. To expertise the programming skills through JAVA language
3. To learn internet programming using object oriented approach.

Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to conceptualize the problem in terms of object oriented features
2. An ability to use the OO programming techniques in real time applications.
3. An ability to design and develop a complete object oriented applications

UNIT – I

Java features –Java Platform –Java Fundamentals – Expressions, Operators, and Control Structures – Classes and Objects, Constructors – Destructors - Packages and Interfaces – Internationalization.

UNIT – II

Overloading - Inheritance – Files and Stream – Multithreading – Exception Handling

UNIT – III

GUI Components - AWT package - Layouts –Containers - Event Package - Event Model –Painting –Garbage Collection – Java Applets – Applet Application - Swing Fundamentals - Swing Classes.

UNIT – IV

Generics – Collections - Utility Packages –Input Output Packages - Inner Classes - Java DatabaseConnectivity – Java Security

UNIT – V

Java Beans - Application Builder Tools - Using the Bean Developer Kit -Jar Files-Introspection – BDK-Using BeanInfo Interface –Persistence-Java Beans API Using Bean Builder - Networking Basics -Java and the Net –InetAddress –TCP/IP Client Sockets – URL –URL Connection –TCP/IP Server - Sockets - A Caching Proxy HTTP Server – Datagrams – RMI.

TOTAL PERIODS: 60

Text Books:

1. Deitel and Deitel, "JAVA How to Program" Prentice Hall, 2006
2. Hari Mohan Pandey, "JAVA Programming", Pearson, 2012

Reference Books:

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", Tata Mc Graw Hill, 2013
2. John Dean, Raymond Dean, " Introduction to Programming with JAVA –A Problem Solving Approach", Tata Mc Graw Hill, 2012
3. Ralph Bravaco, Shai Simonson, "Java Programming : From the Ground Up", Tata McGraw Hill Edition, 2012

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T46	**GRAPHICS AND IMAGE PROCESSING**	3	1	-

Course Objectives:

1. To learn, develop, design and implement two dimensional graphical structures.
2. To understand the components of Graphics and Image Processing applications.
3. Todesign innovative applications such as animation.
4. To learn the hardware and software facilities available for Graphics and Image Processing applications.

Course Outcomes:

On successful completion of this course

1. The students will get acquainted Graphics and Image Processing domains.
2. They will understand the major intricacies of Graphics and Image Processing.
3. They will be able to convert verbal descriptions to images and vice versa.

UNIT – I

Graphics Systems and Graphical User Interface: Pixel– Resolution– types ofvideo display devices – Graphical input devices – output devices – Hard copy devices – Direct screen interaction – Logical input function – GKS User dialogue – Interactive picture construction techniques.

UNIT – II

Geometric Display Primitives and Attributes: Geometric display primitives – Points– Lines and Polygons – Point display method – Line drawing methods.

2D Transformations and Viewing: Transformations – types – matrix representation – Concatenation – Scaling– Rotation– Translation– Shearing– Mirroring– Homogeneous coordinates.

Window to view port transformations: Windowing And Clipping: Point– Lines– Polygons - boundary intersection methods.

UNIT – III

Digital Image Fundamentals and Transforms: Nature of Image processing – related fields – Image representations – Image types – Image processing operations – Applications of Image processing – Imaging system – Image Acquisition – Image Sampling and Quantization – Image quality – Image storage and file formats - Image processing operations - Image Transforms - need for Transforms – Fourier Transforms and its properties – Introduction to Walsh, Hadamard, Discrete Cosine, Haar, Slant, SVD, KL and Hotelling Transforms.

UNIT – IV

Image Enhancement and Restoration: Image Quality and need for Enhancements – Point operations - Histogram Techniques– Spatial filtering concepts– Frequency Domain Filtering – Image Smoothening – Image Sharpening - Image degradation and Noise Models – Introduction to Restoration Techniques.

UNIT – V

Image Compression: Compression Models and measures – coding types – Types of Redundancy- Lossless compression algorithms – Lossy compression algorithms – Introduction to compression standards.

Image Segmentation: Detection of Discontinuities – Edge Detection – Thresholding – Region Based Segmentation.

Introduction to Color Image Processing.Introduction to Morphological operations.

TOTAL PERIODS: 60

Text Books:

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Pearson Education, 2010.
2. S. Sridhar, "Digital Image Processing", Oxford Press, First edition, 2011.

Reference Books:

1. Anil Jain K, "Fundamentals of Digital Image Processing", Prentice-Hall of India, 1989.
2. Sid Ahmed, "Image Processing", McGraw-Hill, 1995.
3. Gonzalez R. C and Woods R.E., "Digital Image Processing", Pearson Education, Second edition, 2002.
4. Newmann W.M. and Sproull R.F., "Principles of Interactive Computer Graphics", Tata McGraw-Hill, Second edition, 2000.
5. Foley J.D., Van Dam A, Fiener S.K. and Hughes J.F., "Computer Graphics", Second edition, Addison-Wesley, 1993.

Website:

1. http://nptel.ac.in/courses/106106090/
2. http://nptel.ac.in/courses/106105032/

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS P41	**MICROPROCESSORS AND MICROCONTROLLERS LABORATORY**	-	-	3

LIST OF EXPERIMENTS

Experiment Using 8085 Microprocessor:

1. Study of 8085 Microprocessor Trainer Kit
2. 8-bit Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
3. Block Operations (Move, Exchange, Compare, Insert and Delete)
4. Code Conversions
5. Digital Clock simulation
6. Moving Display
7. Serial Communication
8. Interrupt Programming
9. Elevator Simulation
10. Traffic Light Control

Experiments Using 8086 Microprocessor with MASM

11. Arithmetic Operations
12. Sorting and Searching

Experiments Using 8051 Microcontroller

13. Arithmetic operations
14. ADC & DAC Interfacing
15. Stepper Motor and DC Motor Interface

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P42	**DESIGN AND ANALYSIS OF ALGORITHMS LAB**	-	-	3

LIST OF EXPERIMENTS

1. Implementation of binary search using Divide-and-Conquer technique.
2. Implementation of merge sort algorithms using Divide-and-Conquer technique.
3. Implementation of quick sort algorithms using Divide-and-Conquer technique.
4. Implementation of Knapsack using Greedy technique.
5. Implementation of Single-Source Shortest Paths algorithms using Greedy technique.
6. Implementation of Multi-Stage Graphs using Dynamic Programming technique.
7. Implementation of 0/1 Knapsack using Dynamic Programming technique.
8. Implementation of All Pairs Shortest Paths using Dynamic Programming technique.
9. Implementation of Traveling Salesman algorithms using Dynamic Programming technique.
10. Implementation of Pre-order, In-order, Post-order traversals using DFS traversal techniques.
11. Implementation of Pre-order, In-order, Post-order traversals using BFS traversal techniques.
12. Implementation of 8 Queens with the design of Backtracking.
13. Implementation of sum of subsets with the design of Backtracking.
14. Implementation of 0/1 Knapsack problems with Branch-and-Bound technique.
15. Implementation of Traveling Salesman problems with Branch-and-Bound technique.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS P43	**OBJECT ORIENTED PROGRAMMING LABORATORY**	-	-	3

LIST OF EXPERIMENTS

Note: All these experiements to be done using C++ and JAVA.

1. Program to implement classes and objects.
2. Program to implement constructors and destructors with array of objects.
3. Program to demonstrate function overloading.
4. Program to implement different types of inheritances like multiple, Multilevel and hybrid.
5. I/O Program to demonstrate the use of abstract classes.
6. Program to demonstrate I/O streams and functions.
7. Program to perform all possible type conversions.
8. Program to demonstrate exception handlingtechnique.
9. Program to implement networking concepts.
10. Program to implement RMI concepts.
11. Program to implement AWT concepts.
12. Program to implement swing concepts.
13. Program to designand implement applet.
14. Program to designand implement JDBC
15. Program to designan event handling event for simulating a simple calculator.

V SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T51	**OPERATING SYSTEMS**	3	1	-

Course Objectives:

1. To have an overview of different types of operating systems
2. To know the components of an operating system.
3. To have a thorough knowledge of process management
4. To have a thorough knowledge of storage management
5. To know the concepts of I/O and file systems.

Course Outcomes:

On successful completion of the module students will be able to:

1. Gain the knowledge of different types of operating systems.
2. A clear understanding of program, process and thread.
3. Able to realize the need for Process Synchronization and the various constructs for Process Synchronization.
4. Have an insight into real and virtual memory management techniques

UNIT – I

Introduction: Mainframe Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems - Real Time Systems – Hardware Protection – System Components – Handheld Systems - Operating System Services – System Calls – System Programs – Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

UNIT – II

Threads: Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria– Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

UNIT – III

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT – IV

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection.

UNIT – V

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. **Case Study**: The Linux System, Windows.

TOTAL PERIODS: 60

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts Essentials", John Wiley & Sons (ASIA) Pvt. Ltd, 9th edition, 2011.
2. Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, "Operating Systems", PrenticeHall, Third edition, 2003.

Reference Books:

1. William Stallings, Operating Systems: Internals and Design Principles**,** Prentice - Hall of India, Seventh edition, 2009.
2. Gary J. Nutt, "Operating Systems: A Modern Perspective", Addison-Wesley, Second edition, 2001.

Website:

1. web.cs.wpi.edu/~cs3013/c07/lectures/Section01-Overview.ppt
2. http://codex.cs.yale.edu/avi/os-book/OS8/os8c/slide-dir/
3. http://www.cse.iitd.ac.in/~sbansal/os/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T52	**COMPUTER NETWORKS**	3	1	-

Course Objectives:

1. Given an environment, after analyzing the channel characteristics, appropriate channel access mechanism and data link protocols are chosen to design a network.
2. Given an environment, analyzing the network structure and limitations, appropriate routing protocol is chosen to obtain better throughput.
3. Given various load characteristics and network traffic conditions, decide the transport protocols and timers to be used.
4. Given the requirements of the user, an appropriate Internet protocol and proper security options are chosen.

Course Outcomes:

On successful completion of the module, a student should able to:

1. Understand the layer abstraction of any computer network model.
2. Analyze the requirement of various hardware components and software to be developed to establish a network.
3. Analyze the working conditions of a network and able to provide the solutions to improve the performance of the network.

UNIT – I

Introduction – Uses – Network hardware – software – reference models – example networks – Theoretical basis for communication – transmission media – wireless transmission – Communication satellites

UNIT – II

Data link layer – design issues – Services - Framing - Error Control - Flow Control - Error detection and correction codes - data link layer protocols -Simplex Protocol – Sliding window Protocols - Medium Access control sublayer – Channel allocation problem – Multiple Access protocols – ALOHA – CSMA Protocols - Collision-Free Protocols - Limited-Contention Protocols - Wireless LANs - 802.11 Architecture - 802.16 Architecture– Data link layer Switching - Uses of Bridges - Learning Bridges - Spanning Tree Bridges - Repeaters, Hubs, Bridges, Switches, Routers, and Gateways - Virtual LANs.

UNIT – III

Network layer – design issues – Routing algorithms - The Optimality Principle - Shortest Path Algorithm – Flooding - Distance Vector Routing - Link State Routing - Hierarchical Routing - Broadcast Routing - Multicast Routing Congestion Control – Approaches - Traffic-Aware Routing - Admission Control - Traffic Throttling - Load Shedding – Internetworking - Tunneling - Internetwork Routing - Packet Fragmentation - IP v4 - IP Addresses – IPv6 - Internet Control Protocols – OSPF - BGP

UNIT – IV

Transport layer - Services - Berkeley Sockets -Example – Elements of Transport protocols – Addressing - Connection Establishment - Connection Release - Flow Control and Buffering – Multiplexing – Congestion Control - Bandwidth Allocation - Regulating the Sending Rate –UDP- RPC – TCP - TCP Segment Header - Connection Establishment - Connection Release - Transmission Policy - TCP Timer Management - TCP Congestion Control

UNIT – V

Application Layer – DNS – Name space – Resource records – name servers – e-mail - Architecture and Services - The User Agent - Message Formats - Message Transfer - Final Delivery – WWW – Architecture - Static Web Pages - Dynamic Web Pages and Web Applications - HTTP– Network Security - Introduction to Cryptography - Substitution Ciphers - Transposition Ciphers – Public key algorithms – RSA – Authentication Protocols - Authentication Using Kerberos.

TOTAL PERIODS: 60

Text Books:

1. Tanenbaum,A.S. and David J. Wetherall "Computer Networks", 5th ed., Prentice Hall, 2011,

Reference Books:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks- A system approach", 5th edition, ELSEVIER, 2012
2. Stallings, W., 'Data and Computer Communications', 10th Ed., Prentice Hall Int. Ed., 2013
3. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, Third edition, 2006.

Website:

1. http://depa.usst.edu.cn/chenjq/www2/wl/ComputerNetworksTanenbaum.htm
2. http://booksite.mkp.com/9780123850591/lec.php
3. http://williamstallings.com/DataComm/DCC10e-Student/

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T53	**DATABASE MANAGEMENT SYSTEMS**	3	1	-

Course Objectives:

1. To solve queries using Query languages
2. To understand normalization concepts
3. To understand concepts of transactions and concurrency control
4. To understand database authorization and recovery concepts
5. To understand indexing and hashing concepts

Course Outcomes:

On successful completion of the module the students will be able to:

1. Classify modern and futuristic database applications based on size and complexity
2. Design a database from an Universe of Discourse, using ER diagrams
3. Map ER model into Relations and to normalize the relations
4. Create a physical database from a design using DDL statements with appropriate key, domain and referential integrity constraints
5. Aanalyze different ways of writing a query and justify which is the effective and efficient way

UNIT – I

INTRODUCTION: History-purpose-view of Data-Database languages-Data Models-Data Storage and Querying-Transaction management-Database Architecture-Two tier-Three tier-Database users and Authorization.

Relational Algebra-Structure-keys-schema diagrams-Relational operations

Formal Relational Query Languages- Relational Algebra-Tuple Relational calculus-Domian Relational Calculus.

SQL-Overview-Data Definition-basic Structure-basic operations-Set Operations-Null Values-Aggregate Functions-Nested Subqueries-Modifications of the Databases-Join Expressions-Integrity Constraints-views-Authorization-Functions-Procedures-Triggers-Recursive Queries.

UNIT – II

Database Design and the ER Model: Overview of the Design Process- The Entity-Relationship Model- Constraints- Removing Redundant Attributes- Entity-Relationship Diagrams- Reduction to Relational Schemas- Entity-Relationship Design Issues - Extended E-R Features- Alternative Notations for Modeling data -Other Aspects of Database Design - Storage and File Strucure-Indexing and Hashing-Basic Concepts-Ordered Indices- B+-Tree Index Files- Static Hashing-Dynamic Hashing- Comparison of Ordered Indexing and Hashing-Bitmap Indices- Index Definition in SQL

UNIT – III

Relational Database Design: Features of Good Relational Designs- Atomic Domains and First Normal Form- Second Normal Form-Decomposition Using Functional Dependencies- Functional-Dependency Theory-Algorithms for decomposition-Decomposition Using Multivalued Dependencies-More Normal Forms- Database-Design Process- Modeling Temporal Data

UNIT – IV

Query Processing: Measures of Query Cost- Selection Operation- Sorting-Join Operation- Other Operations- Evaluation of Expressions

Query optimization-Overview -Transformation of Relational Expressions- Estimating Statistics of Expression Results- Choice of Evaluation Plan

Transactions-Concept - A Simple Transaction Model- Storage Structure- Transaction Atomicity andDurability-Transaction Isolation- Serializability- Transaction Isolation and Atomicity- Transaction Isolation Levels-Implementation of Isolation Levels-Transactions as SQL Statements

UNIT – V

Concurrency Control-Lock-Based Protocols-Deadlock Handling- Multiple Granularity-TimestampBased Protocols- Validation-Based Protocols- Multiversion Schemes-Snapshot Isolation - Insert Operations, Delete Operations and Predicate Reads- Weak Levels of Consistency-Concurrency in Index Structures- Recovery - Failure Classification- Storage - Recovery and Atomicity- Recovery Algorithm- Buffer Management- Failure with Loss of Nonvolatile Storage- Early Lock Release and Logical Undo Operations.

Case Studies IBM DB2 Universal Database – My SQL.

TOTAL PERIODS: 60

Text Books:

1. Avi Silberschatz, Henry F. Korth and S.Sudarshan, "Database System Concepts", McGraw-Hill International Inc., Sixth edition,2011.

Reference Books:

1. Fred R McFadden, Jeffery A. Hoffer and Mary B. Prescott, "Modern Database Management", Addison-Wesley, 2000.
2. Elmasri and Navathe, "Fundamentals of Database Systems", Addison-Wesley, Seventh edition, 2012.
3. Jefrey D.Ulman and Jenifer Widom, "A First Course in Database Systems", Prentice-Hall, 2007.
4. Bipin C Desai, "An Introduction to Database Systems", Galgotia Publications Pvt. Ltd., 1990.

Website:

1. http://db-book.com/
2. http://nptel.ac.in/video.php?subjectId=106106093

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T54	**LANGUAGE TRANSLATORS**	3	1	-

Course Objectives:

1. To gain basic features of system software (assemblers/loaders/linkers/compilers)
2. To gain knowledge on data structures required for implementation of system software like assemblers/loaders/compliers
3. To understand the design of assemblers.
4. To understand the role of loaders and linkers in Loading, relocation and linking.
5. To understand the various phases of designing a compiler

Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to design and implement assemblers for different computer architectures
2. An ability to design and implement loaders
3. An ability to understand the major phases of compilation, particularly lexical analysis, parsing, semantic analysis, and code generation.
4. The ability to use formal attributed grammars for specifying the syntax and semantics of programming languages, and their impact on compiler design.
5. An ability to understand how the machine code translation occurs

UNIT – I

Introduction to System Software and Machine Structure: System programs – Assembler,Interpreter, Operating system. Machine Structure – instruction set and addressing modes.**Assemblers:** Basic assembler functions, machine – dependent and machine independent assemblerfeatures. Assembler design – Two-pass assembler with overlay structure, one – pass assembler andmulti-pass assembler.

UNIT – II

Loaders and Linkers: Basic loader functions, machine – dependent and machine – independent Loader features. Loader design – Linkage editors, dynamic linking and bootstrap loaders.

UNIT – III

Source Program Analysis: Compilers – Analysis of the Source Program – Phases of a Compiler –Cousins of Compiler – Grouping of Phases – Compiler Construction Tools. **Lexical Analysis:**Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens –A Language for Specifying Lexical Analyzer.

UNIT – IV

Parsing: Role of Parser – Context free Grammars – Writing a Grammar – Predictive Parser – LRParser.**Intermediate Code Generation:** Intermediate Languages – Declarations – AssignmentStatements – Boolean Expressions – Case Statements – Back Patching – Procedure Calls.

UNIT – V

Basic Optimization: Constant-Expression Evaluation – Algebraic Simplifications and Reassociation– Copy Propagation – Common Sub-expression Elimination – Loop-Invariant CodeMotion – Induction Variable Optimization.**Code Generation:** Issues in the Design of Code Generator – The Target Machine – RuntimeStorage management – Next-use Information – A simple Code Generator – DAG Representationof Basic Blocks – Peephole Optimization – Generating Code from DAGs.

TOTAL PERIODS: 60

Text Books:

1. Alfred Aho, V. Ravi Sethi, and D. Jeffery Ullman, "Compilers Principles, Techniques and Tools", Addison-Wesley, Second Edition,2006.
2. Leland L. Beck, "System Software – In Introduction to System Programming", Addison-Wesley, 1990.

Reference Books:

1. Allen Holub, "Compiler Design in C", Prentice-Hall of India, 1990.
2. Charles N. Fischer and Richard J. Leblanc, "Crafting a Compiler with C", Benjamin Cummings, 1998.
3. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman, 1997.
4. Damdhare, "Introduction to System Software", McGraw Hill, 1986.

Website:

1. http://freevideolectures.com/Course/3051/Compiler-Design
2. http://www.dreamincode.net/forums/topic/260592-an-introduction-to-compiler-design-part-i-lexical-analysis/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T55	**SOFTWARE ENGINEERING**	3	1	-

Course Objectives:

1. Identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
2. Elicit, analyze and specify software requirements through a productive working relationship with various stakeholders ofa software project.
3. Understanding professional, ethical and social responsibility of a software engineer
4. Participate in design, development, deployment and maintenance of a medium scale software development project.

Course Outcomes:

On successful completion of the module students:

1. Ability to apply basic knowledge and understanding of the analysis, synthesis and design of complex systems
2. Develop, maintain and evaluate large-scale software systems
3. Produce efficient, reliable, robust and cost-effective software solutions

UNIT – I

Introduction to Software Engineering: The Software Engineering Discipline – Evolution and Impact – Software Development projects – Emergence of Software Engineering – Computer System Engineering – Software Life Cycle Models – classic Waterfall model – Iterative Lifecycle model – prototyping model – Evolutionary model – spiral model – Comparison of Life cycle models.

UNIT – II

Software Project Management and Requirements Analysis: Responsibilities of a Software Project Manager – Project Planning – Metrics for Project Size Estimation – Empirical Estimation Techniques – COCOMO – Halstead's Software Science – Staffing Level Estimation – Scheduling – Organization and Team structures – Staffing – Risk Management – Software Configuration Management – Requirements Gathering and Analysis – Software Requirements specification – Formal System Specification – Axiomatic Specification - Algebraic Specification – 4GL.

UNIT – III

Software Design and Function Oriented Software Design: Outcome of a Design Process – Characteristiscs of a Good Software Design – Coupling and Cohesion – Approaches to Software Design – Object Oriented Vs Function Oriented Software Design approaches – Structured Analysis – Data Flow Diagrams – Applying DFD to Real time systems – Structured and Detailed Design.

UNIT – IV

Object Modelling and Object Oriented Software development: Overview of OO concepts – UML – Use case model – Class diagrams – Interaction diagrams – Activity diagrams – state chart diagrams - Patterns – Types – Object Oriented Analysis and Design methodology – Interaction Modelling – OOD Goodness criteria.

UNIT – V

User Interface Design and Testing: Characteristics of a good User Interface – Types – Fundamentals of Component based GUI Development – A User Interface Design methodology – Coding – Software Documentation – Testing – Unit Testing – Black Box testing – White Box testing – Debugging – Program Analysis tools – Integration testing – Testing Object Oriented programs – System Testing – Issues.

TOTAL PERIODS: 60

TEXT BOOK

1. Rajib Mall, "Fundamentals of Software Engineering", PHI Learning, Third Edition, 2013.

REFERENCE BOOKS

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", McGraw-Hill International Edition, Seventh edition, 2009.
2. S. L. Pfleeger and J.M. Atlee, "Software Engineering Theory and Practice", Pearson Education, Third edition, 2008.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, Third edition, 2008.
4. Ian Sommerville, "Software Engineering", Pearson Education, Eighth edition, 2008.

Website:

1. http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IITKharagpur/SoftEngg/
2. http://www.computer.org/portal/web/swebok

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P51	**OPERATING SYSTEM LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Study of basic UNIX/Linux commands
2. Shell Programming.
3. Programs using the following system calls of UNIX/Linux operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
4. Programs using the I/O system calls of UNIX operating system: (open, read, write, etc).
5. Simulations of UNIX/Linux commands like ls, grep, etc.
6. Simulation of processes scheduling algorithms.
7. Simulation of synchronization problems using Semaphore.
8. Simulation of basic memory management schemes.
9. Simulation of virtual memory management schemes.
10. Simulation of disk scheduling algorithms
11. Simulation of file systems.
12. Develop an application using any RTOS.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P52	**COMPUTER NETWORKS LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Implementation of a socket program for Echo/Ping/Talk commands.
2. Creation of a socket between two computers and enable file transfer between them. Using (a.) TCP (b.) UDP
3. Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4. Implementation of a program for CRC and Hamming code for error handling.
5. Writing a code for simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation.(TCP services).
8. Write a program to implement RCP (Remote Capture Screen).
9. Implementation (using NS2/Glomosim) and Performance evaluation of the following routing protocols:
    a. Shortest path routing
    b. Flooding
    c. Link State
    d. Hierarchical
10. Broadcast /Multicast routing.
11. Implementation of ARP.
12. Throughput comparison between 802.3 and 802.11.
13. Study of Key distribution and Certification schemes.
14. Design of an E-Mail system
15. Implementation of Security Compromise on a Node using NS2 / Glomosim
16. Implementation of Various Traffic Sources using NS2 / Glomosim

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS P53	**DATABASE MANAGEMENT SYSTEMS LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Study of Database Concepts: Relational model – table – operations on tables – index – table space – clusters – synonym – view – schema – data dictionary – privilege – role – transactions.
2. Study of SQL: Primitive Data Types – User Defined data Types – Built-in Functions – Parts of Speech of create, alter, drop, select, insert, delete, update, commit, rollback, save point, grant, revoke.
3. Study of Query Types: Queries involving Union, Intersection, Difference, Cartesian product, Divide Operations – Sub Queries – Join Queries – Nested Queries – Correlated, Queries – Recursive Queries.
4. Study of Procedural Query Language: Blocks, Exception Handling, Functions, Procedures, Cursors, Triggers, Packages.
5. Application: Design and develop any two of the following:
    a. Library Information System
    b. Logistics Management System
    c. Students' Information System
    d. Ticket Reservation System
    e. Hotel Management System
    f. Hospital Management System
    g. Inventory Control
    h. Retail Shop Management
    i. Employee Information System
    j. Payroll System
    k. Any other Similar System

VI SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T61	**ENTERPRISE SOLUTIONS**	3	1	-

Course Objective:

1. To make the students to get familiar with the industry project platforms and to write codes.
2. To learn Systems, Applications, Products.
3. To learn Soft Real-time Business Application Frameworks.

Course Outcomes:

On successful completion of the subject students will be able to :

1. Understand basic concepts of SAP, Oracle, PeopleSoft and Siebel.
2. Write code in SAP, Oracle, PeopleSoft, and Siebel.
3. Ready to cope up with industrial application development.

UNIT – I

Introduction : ERP - Definition – Concept – Fundamentals – Need for ERP - Advantages of ERP – Implementation of ERP – Key issues and Characteristics of ERP Typical architecture components of ERP – ERP system Architecture.ERP and related technologies: Business Process RE-engineering – Management Information System– Decision Support System - Executive Support System – On-Line Analytical Processing, Supply Chain Management, Customer Relationship Management.

UNIT – II

SAP :History – SAP R/2 – SAP R/3 – Characteristics of SAP R/3 – Architecture of SAP R/3 - SAP Modules, NetWeaver, Customer Relationship Management, Business Warehouse, Advanced Planner and Optimiser.ABAP/4: Workbench - Workbench Tools - ABAP/4 Data Dictionary - ABAP/4 Repository Information – Structure of ABAP/4 program - ABAP/4 syntax – Data types – Constants and Variables – Statements : DATA, PARAMETERS, TABLE, MOVE, MOVE-CORRESPONDING, CLEAR, WRITE, CHECK, FORMAT. LOOP STRUCTURES. Sample programs.

UNIT – III

Oracle Suite : Oracle Apps 11i - Application Framework - File System - Workflow Analysis - SQL / PLSQLfundamentals - Creating Forms - Oracle Reports.Oracle Electronic Data Interchange – functions of EDI – Data File Structure - Oracle Data, Oracle Database - Oracle Database - DW vs OLTP - DW Connectors.

UNIT – IV

PeopleSoft: BasicPeopleSoft Functionality – Opening Multiple Windows - Database structure – Understanding People Soft Data Mover – Records - Pages vs. Forms.PeopleSoft HRMS: Introduction to PeopleSoft HRMS database - PeopleSoft products - Functional PeopleSoft - financial management system - PeopleSoft Enterprise HRMS.

UNIT – V

Siebel Enterprise Applications - Siebel eBusiness Applications – Siebel Tools – Tables and Columns – Business Component – Business Objects – Applets – Joins – Links – Views – Screens – Configuring applications.

TOTAL PERIODS: 60

Text Books:

1. V.K. Garg and N.K. Venkatkrishnan, ERP Concepts and Planning, PHI, 2004.
2. SAP ABAP/4, Black Book, DreamTech Press, 2012.
3. Oracle EDI Gateway User guise, Oracle Corporation.
4. Jim J. Marion, PeopleSoft PeopleTools: Tips and Techniques, Oracle Press, 2010.
5. Rishi Kumar Shrivastava, Siebel CRM 8.1: Navigation and Configuration, TMH, 2012.

Reference Books:

1. Chrispopher Allen, Oracle Database PL/SQL, TMH, 2004.
2. Paula Dean and Jim J. Marion, PeopleSoft PeopleTools: Data Management and Upgrade Handbook, Oracle Press, 2013.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T62	**EMBEDDED SYSTEMS**	3	1	-

Course Objectives:

1. To understand the architecture of embedded processors, microcontrollers and peripheral devices
2. To learn programming the embedded processor in assembly
3. To understand the challenges in developing operating systems for embedded systems
4. To learn programming the embedded systems in high level language such as C

Course Outcomes:

On successful completion of this course students will be able to:

1. Understand the concepts of embedded processors with microcontrollers.
2. Learn the programming details of microcontrollers.
3. Develop embedded programs for various embedded processors

UNIT – I

Introduction to Embedded Systems - Processor in Embedded System – Other Hardware Units in the Embedded System - Software Embedded into a System - ARM Architecture: ARM Design Philosophy - Registers - Program Status Register - Instruction Pipeline - Interrupts and Vector Table - Architecture Revision - ARM Processor Families.

UNIT – II

ARM Programming - Instruction Set - Data Processing Instructions - Addressing Modes - Branch, Load, Store Instructions - PSR Instructions - Conditional Instructions.

UNIT – III

Thumb Instruction Set - Register Usage - Other Branch Instructions - Data Processing Instructions - Single-Register and Multi Register Load-Store Instructions - Stack - Software Interrupt Instructions

UNIT – IV

ARM Programming using C: Simple C Programs using Function Calls – Pointers – Structures - Integer and Floating Point Arithmetic - Assembly Code using Instruction Scheduling – Register Allocation - Conditional Execution and Loops.

UNIT – V

Real Time Operating Systems: Brief History of OS - Defining RTOS - The Scheduler - Objects – Services - Characteristics of RTOS - Defining a Task - Tasks States and Scheduling - Task Operations – Structure – Synchronization - Communication and Concurrency. Defining Semaphores - Operations and Use - Defining Message Queue - States – Content – Storage - Operations and Use

TOTAL PERIODS: 60

Text Books:

1. Shibu K.V, Introduction to Embedded Systems, First Edition, McGraw Hill, 2009.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM Systems Developer's Guides- Designing & Optimizing System Software, Elsevier, 2008.
3. Qing Li , Real Time Concepts for Embedded Systems, Elsevier, 2011

Reference Books:

1. Santanu Chattopadhyay, "Embedded System Design", Second Edition, PHI, 2013.
2. Andrew N Sloss, D. Symes and C. Wright, "ARM System Developers Guide",Morgan Kaufmann / Elsevier, 2006.
3. Wayne Wolf, "Computer as Components: Principles of Embedded Computer System Design", Elsevier, 2006

Websites:

1. http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.dai0211a/index.htm
2. http://www.arm.com/products/processors/classic/arm7/index.php
3. http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.dai0211a/index.htm

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T63	**WEB TECHNOLOGY**	3	1	-

Course Objectives:

1. To learn and program features of web programming languages.
2. To understand the major components of internet and associated protocols.
3. Todesign an innovative application for web.

Course Outcomes:

On successful completion of this course

1. The students will get acquainted with client side and server side programming languages for web.
2. They will understand the major components and protocols of internet application.
3. They will become capable of designing web services.

UNIT – I

Internet Principles and Components: History of the Internet and World Wide Web- – HTML - protocols – HTTP, SMTP, POP3, MIME, and IMAP. Domain Name Server, Web Browsers and Web Servers.HTML-Style Sheets-CSS-Introduction to Cascading Style Sheets-Rule-Features- Selectors- Attributes. **Client-Side Programming**: The JavaScript Language- JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers and Regular Expression.

UNIT – II

Server Side Programming:servlet- strengths-Architecture-Life cycle- Generic and HTTP servlet- Passing parameters- Server Side Include- Cookies- Filters.**JSP**- Engines-Syntax- Components- Scriplets- JSP Objects-Actions-Tag Extensions- Session Tracking- Database connectivity- Sql statements-J2EE - Introduction - Beans- EJB.

UNIT – III

XML: Introduction- Revolutions of XML-XML Basics – Defining XML Documents: DTD-XML Schema-Namespaces – XFiles: XLink – XPointer - XPath - XML with XSL – XSL-FO-Parsing XML using DOM-SAX-Integrating XML with database – Formatting XML on the web.

UNIT – IV

Multimedia and Web Application: Multimedia in web design, Audio and video speech synthesis and recognition - Electronic Commerce – E-Business Model – E-Marketing – Online Payments and Security – N-tier Architecture. Search and Design: Working of search engines -optimization- Search interface.

UNIT – V

Web Services: Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. **Ajax** – Improving web page performance using Ajax,Programming in Ajax.

TOTAL PERIODS: 60

TEXT BOOKS

1. Deitel and Deitel, Goldberg, "Internet and World Wide Web – How to Program", PearsonEducation Asia, 2001.
2. Uttam K.Roy, "Web Technologies", Oxford University Press, 2012.
3. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.
4. Ron Schmelzer, Travis Vandersypen, Jason Bloomberg, Madhu Siddalingaiah, Sam hunting, Micheal D.Qualls, David Houlding, Chad Darby, Diane Kennedy, "XML and Web Services", Sams, Feburary 2002.
5. Eric Newcomer, "Understanding Web Services: XML, WSDL, SOAP, and UDDI",Addison-Wesley, 2002.

Reference Books:

1. Phillip Hanna, "JSP 2.0 - The Complete Reference", McGraw-Hill, 2003.
2. Mathew Eernisse, "Build Your Own AJAX Web Applications", SitePoint, 2006.

Websites:

1. http://www.jsptut.com

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P61	**ENTERPRISE SOLUTIONS LABORATORY**	-	-	3

LIST OF EXPERIMENTS

I. ERP

1. Simple application using any of ERP packages.
2. ERP solutions related to Business problems, HRM and financial applications.

II. Oracle:

1. Study and usage of : Primitive Data Types – User Defined data Types – Built-in Functions – DDL, DML, TCL commands CREATE, ALTER, DROP, SELECT, INSERT, DELETE and UPDATE, COMMIT, ROLLBACK, SAVEPOINT, GRANT and REVOKE.
2. Study of PL/SQL
   Blocks, Exception Handling, Functions, Procedures, Cursors, Triggers, Packages.
3. Application : Design and develop any two of the following :
   a) Online Voting system
   b) Railway Ticket reservation system
   c) RTO office - Driving License issuing system
   d) National Identity Card (AADHAR Card) preparation.
   e) Any other Similar System

III. SAP

1. Working with structures in SAP
2. Write programs in ABAP/4 to date and time calculations, processing strings, table controls.
3. Write a program in ABAP/4 to create and maintain table in SAP.
4. Forecasting application of a product using SAP.

IV. **PeopleSoft :** Using PeopleSoft, design and develop

1. Student Administration
2. PeopleSoft Based HR/Payroll applications
3. PeopleSoft Supply Chain Management.

V. **SIEBEL :** Using Siebel, design and develop

1. Any One industry application
2. Any One CRM applications

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS P62	**EMBEDDED SYSTEMS LABORATORY**	-	-	3

LIST OF EXPERIMENTS

The following programs are to be implemented on ARM based Processors/Equivalent.

1. Simple Assembly Program for Addition, Subtraction, Multiplication and Division
2. Simple Assembly Program for System Calls and Interrupts, Loops and Branches
3. Write an Assembly programs to configure and control General Purpose Input/Output (GPIO) port pins.
4. Write an Assembly programs to read digital values from external peripherals and execute them with the Target board.
5. Program to demonstrate Time delay program using built in Timer / Counter feature on IDE environment
6. Program to demonstrate a simple interrupt handler and setting up a timer
7. Program to Interface 8 Bit LED and Switch Interface
8. Program to implement Buzzer Interface on IDE environment Program to Displaying a message in a 2 line x 16 Characters LCD display and verify the result in debug terminal.
9. Program to demonstrate I^2C Interface on IDE environment
10. Program to demonstrate I^2C Interface – Serial EEPROM
11. Demonstration of Serial communication. Transmission from Kit and reception from PC using
12. Serial Port on IDE environment use debug terminal to trace the program.

Write the following programs to understand the use of RTOS with ARM Processor on IDE Environment using ARM Tool chain and Library:

1. Write an application that creates a task which is scheduled when a button is pressed, which illustrates the use of an event set between an ISR and a task
2. Write an application that Demonstrates the interruptible ISRs(Requires timer to have higher priority than external interrupt button)
3. Write an application that creates a two task to Blinking two different LEDs at different timings
4. Write an application that creates a two task displaying two different messages in LCD display in two lines.
5. Sending messages to mailbox by one task and reading the message from mailbox by another task.
6. Sending message to PC through serial port by three different tasks on priority Basis.
7. Basic Audio Processing on IDE environment.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P63	**WEB TECHNOLOGY LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Creation of HTML Files
2. Working with Client Side Scripting
   3.1 VBScript
   3.2 JavaScript
4. Configuration of web servers
   4.1 Apache Web Server
   4.2 Internet Information Server (IIS)
5. Working with ActiveX Controls in web documents.
6. Experiments in Java Server Pages
   6.1 Implementing MVC Architecture using Servlets
   6.2 Data Access Programming (using ADO)
   6.3 Session and Application objects
   6.4 File System Management
7. Working with other Server Side Scripting
   7.1 Active Server Pages
   7.2 Java Servlets
   7.3 PHP
8. Developing Web Applications using XML.
9. Experiments in Ajax Programming
10. Developing Web Services
11. Developing any E-commerce application (Mini Project)

VII SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS T71	ARTIFICIAL INTELLIGENCE	3	1	-

Course Objectives:

1. To search and discover intelligent characteristics of existing AI projects, Intelligent agents.
2. To understand different search strategies for a problem.
3. To understand different Knowledge Representation schemes for typical AI problems.
4. To design and implement a typical AI problem to be solved Using Machine Learning Techniques.

Course Outcomes:

On successful completion of this course students will be able to:

1. Capability to develop intelligent systems
2. Apply heuristic concepts to design efficient algorithms that help to attain the goals in satisfactory manner
3. Design applications related to Natural Language Processing and Web applications.

UNIT – I

Introduction: History of AI - - problem spaces and search- Heuristic Search techniques – Best-first search- Problem reduction-Constraint satisfaction-Means Ends Analysis.Intelligent agents: Agents and environment – structure of agents and its functions

UNIT – II

Knowledge Representation: Approaches and issues in knowledge representation-Propositional Logic –Predicate logic-Forward and backward reasoning - Unification-Resolution- Weak slot-filler structure – Strong slot-filler structure- Knowledge- Based Agent

UNIT –III

Reasoning under uncertainty: Logics of non-monotonic reasoning-Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.

UNIT – IV

Planning and Learning: Planning with state space search-partial order planning-planning graphs-conditional planning-continuous planning-Multi-Agent planning. Forms of learning-inductive learning-learning decision trees-ensemble learning-Neural Net learning and Genetic learning

UNIT – V

Advanced Topics: Game Playing: Minimax search procedure-Adding alpha-beta cutoffs Expert System: Representation-Expert System shells-Knowledge Acquisition. Robotics

Hardware-Robotic Perception-Planning-Application domains

TOTAL PERIODS: 60

Text Books:

1. Elaine Rich and Kevin Knight and Shivashankar B.Nair, Artificial Intelligence, 3rd edition,Tata Mc Graw Hill, 2009.
2. Ben Coppin, "Artificial Intelligence Illuminated", Jones and Bartlett Publishers, 1st edition, 2004.
3. Stuart J.Russell and Peter Norvig, Artificial Intelligence: A Modern Approach,Pearson Education Asia, II edition, 2003.
4. N.P.Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 2nd edition, 2005.

Reference Books:

1. Rajendra Akerkar, "Introduction to Artificial Intelligence", Prentice hall of India, 2005.
2. Patrick Henry Winston, "Artificial Intelligence", 3rd edition Pearson Education, Inc.,2001.

Website:

1. http://aima.cs.berkeley.edu/ai.html
2. www.stanford.edu/class/cs221/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T72	**COMPUTER HARDWARE & NETWORK TROUBLESHOOTING**	3	1	-

Course Objectives:

To study the fundamentals of PC hardware and Peripherals.

1. To understand the working principles of hardware devices and components.
2. To understand the system resources and their uses.
3. To bridge the gap between the theoretical study of Computer Organization and the practical study of the hardware components in use.
4. To practice the troubleshooting of hardware and network bugs in real life.

Course Outcomes:

On successful completion of the module students will be able to:

1. Map the theoretical concepts of Computer Organization and Microprocessors to the Personal Computer organization.
2. Develop device drivers for any of the existing or new devices that is interfaced.
3. Troubleshoot any kind of systems and networking bugs in practice.

UNIT – I

Personal Computer: Introduction – History of the Personal Computers – System Components - Data flow inside the PC – Processor types and specifications – 16-bit to 64-bit evolution – specifications – Cache Memory – Processor Features: System Management Mode – Super scalar execution – Dynamic Execution - Dual independent bus architecture – Hyper threading – Dual and multi core technology - socket and slot types – Intel's Pentium and Core Processors – AMD K6 to K8 series processors.

UNIT – II

Mother board components: Chip sets **–** TraditionalNorth/South Bridge architecture – Sixth and Seventh generation Chipsets – VIA, SiS and NVIDIA chipsets. Desktop versus Laptop motherboards.

Bus standards: ISA – PCI – PCI Express – AGP –MCA – System Resources – Interrupts – DMA channels – I/O Port addresses.

Power Supply: SMPS – Power specifications - Connectors – Switches – RTC/NVRAM batteries.

BIOS: Shadowing – Upgrading – CMOS setup – Plug and Play – Error messages.

UNIT – III

Primary Memory: Basics- RAM types and performance – Fast page mode DRAM – EDO RAM – SDRAM – DDRx RAM – RDRAM - Memory modules: SIMM, DIMM, DDR DIMM – Memory banks – Parity and ECC – logical memory layout.

Secondary Storage: Magnetic Storage: Data Encoding Schemes - Hard disk drive – SATA. Flash memory devices: CompactFlash, MMC, SecureDigital, SSD, RAMdisk, USB Flash disks. Optical Storage - CD, DVD, BD – Disk formats - Optical Drive Performance specifications - Troubleshooting memory problems.

UNIT – IV

Input and Output Devices: Keyboard – Signals and Interface standards – Pointing devices: Mouse - mechanical and optical – Joystick.

Video hardware:Video Display Adaptors – Interfaces – 3D graphics accelerators – LCD and LED monitors - **Printers:** dot matrix – laser jet - ink jet – Pen plotters – BIOS and DOS Interrupt services for I/O devices – Troubleshooting I/O related problems.

UNIT – V

External I/O Interfaces: Serial versus Parallel - USB: system, data transfer, and controller – Hot plugging – Low speed connections: RS232C and Parallel port: SPP, EPP, ECP – Local Area Networking: Requirements – Wired – Wireless – Bluetooth – Network Interface Cards – Wired Topologies – Switches/Access Points – Wireless Ethernet hardware – Network Protocols: IP and TCP/IP, IPX, NetBEUI. – Cables and Connections. Troubleshooting network problems.

PC Diagnostics, Testing & Maintenance: POST – Boot process – Maintenance tools – Preventive Maintenance.

TOTAL PERIODS: 60

Text Books:

1. Scott Mueller, "Upgrading and Repairing PCs", Pearson Education, 21st Edition, 2013.
2. Hans Peter Messmer, "The Indispensable PC Hardware Book", Addison-Wesley, 4th Edition, 2001.

Reference Books:

1. Scott Mueller, "Upgrading and Repairing Laptops", Pearson Education, 3rd Edition, 2012.
2. "The undocumented PC: A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas" Pearson Education, 2nd Edition.

Websites:

1. Scott Mueller's Upgrading and Repairing PCs discussion forum, Available at http://forum.scottmueller.com
2. Computer Troubleshooting Guides for Common Errors and Symptoms, Available at http://pcsupport.about.com
3. BIOS interrupts, Available at http://www.bioscentral.com

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T73	**PLATFORM TECHNOLOGY**	3	1	-

Course Objective:

1. To understand the various types of applications
2. To get expertise in visual programming
3. To understand the functionalities of middleware platform

Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to analyze and apply the programming skills in various application development
2. An ability to use the programming techniques, skills, and modern engineering tools necessary for engineering practice.
3. An ability to design and develop a windows and web application.

UNIT – I

Introduction: NET Framework - Common Language Runtime (CLR) - .NET Framework Class Library - .NET Windows Forms – Uses of Web Forms & Web Services - Common Language Runtime (CLR) – Common Type System - Microsoft Intermediate Language (MSIL) - Components of the CLR - Distinguish Between the .NET Compilers – Organising and Executing Managed Code. NET Framework Class Library – Namespace – Input and Output - Serialisation – Working with XML – Remoting – Enterprise Services – Interoperability – GUIs.

UNIT – II

.NET Languages: C# Language Fundamentals – Classes and Objects – Methods – Fields and Properties - Inheritance and Polymorphism – Operator Overloading – Struts - Interfaces – Arrays – Indexers and Collections – Strings and Regular Expressions – Handling Exceptions – Delegates and Events.

UNIT – III

VB .NET: Language Fundamentals – Classes and Objects – Methods – Fields and Properties - Inheritance and Polymorphism – Operator Overloading – Interfaces – Arrays – Indexers and Collections – Strings and Regular Expressions.

UNIT – IV

VB .NET: Handling Exceptions – Delegates and Events - Accessing Data – ADO .NET Object Model- .NET Data Providers – Direct Access to Data – Accessing Data with Datasets.

UNIT – V

J2EE: Enterprise Edition Overview - Multi-Tier Architecture - Best Practices- Comparison between J2EE and .NET

TOTAL PERIODS: 60

Text Books:

1. David Chappell, "Understanding .NET – A Tutorial and Analysis", Addison Wesley, 2002.
2. Herbert Schildt, "C# 3.0 The Complete Reference", McGraw-Hill Professional, Third Edition, 2008.
3. Harvey M. Deitel, Paul J. Deitel, Tem R. Nieto, Contributor Paul J. Deitel, and Tem R. Nieto, "Visual Basic .NET – How to Program", Prentice Hall, Second edition, 2001.
4. Keogh, "J2EE The Complete Reference", Tata McGraw-Hill, 2008.

Websites:

1. http://msdn.microsoft.com/en-us/library/vstudio/w0x726c2%28v=vs.100%29.aspx
2. http://msdn.microsoft.com/en-us/library/vstudio/w0x726c2.aspx
3. http://msdn.microsoft.com/en-us/library/gg145045.aspx

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P71	**ARTIFICIAL INTELLIGENCE LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Executing simple programs using Prolog like Missionaries and cannibals Problem
2. Graph coloring problem
3. Blocks world problem
4. Water Jug Problem using DFS, BFS
5. Heuristic algorithms (A * Algorithm, best first search)
6. Representation of Knowledge using Prepositional Logic and Querying
7. Representation of Knowledge using Predicate Logic and Querying
8. Forward chaining and Backward chaining
9. Unification
10. Minimax algorithm
11. Developing a Spell checker
12. Development of Expert System

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS P72	**COMPUTERS AND NETWORK TROUBLESHOOTING LABORATORY**	-	-	3

LIST OF EXPERIMENTS

1. Assembling of a Personal Computer:
    a. Identifying parts of mother board, power connections and locating other connectors.
    b. Interconnection of disk drive units, keyboard, mouse and monitor.
2. Hard disk partitioning and OS installation:
    a. Partitioning the hard disk using FDISK/ Partition Magic/ Disk Manager
    b. Installation of Windows 98/XP/2000
    c. Installation of Linux kernel (possibly with dual boot option).
3. Study of In-Circuit Emulator:
    a. The target processor could be 8085/8088/8031 depending on the availability.
    b. Learn the different commands and their usages.
4. Study of Logic Analyser:
    a. Standalone or PC based with multiple channels depending on availability.
    b. Capture important signals and perform timing/state analysis with a known processor/controller environment.
5. Circuit Tracing: Using Multimeter and continuity test mode, to trace a given circuit boardand draw the schematic.
6. Interfacing a timer/programmable I/O using PCI bus.
7. Serial Communication: To establish serial communication (RS232C) between a pair ofPCs. The program shall be developed using C/C++/MASM with functions provided byBIOS and DOS interrupt services.
8. Parallel port interfacing:
    a. To interface two PCs via ECP and perform file transfer using Direct Cable Connection feature of Windows OS
    b. Interface a seven segment LED/LCD using SPP environment.
9. USB port programming and interfacing:
    To interface ADC, DAC, LED/LCD and push buttons.
10. Troubleshooting printer port problems using Logic Analyzer and multimeter.
11. Troubleshooting serial port problems using Logic Analyzer and multimeter.
12. Troubleshooting USB port problems using Logic Analyzer and multimeter.
13. Troubleshooting PCI bus problems using Logic Analyzer and multimeter.
14. Simulation of a given circuit using PSPICE circuit simulator.
15. Formatting and partitioning of hard disk using SATA programming.
16. Networking PCs: setting up Wired/ Wireless LANs and troubleshooting
17. Networking of devices using Bluetooh interface.

Subject	Subject Name	Lectures	Tutorial	Practical

Code		(Periods)	(Periods)	(Periods)
CS P73	**PLATFORM TECHNOLOGY LABORATORY**	-	-	3

LIST OF EXPERIMENTS

Programs using C#.NET

1. Classes and Objects, Inheritance,Polymorphism
2. Interfaces,Operator Overloading, Delegates and Events
3. Exception Handling,Multi-Threading
4. Ado .NET

Program using VB .NET

1. Console & Windows Forms
2. Layout Managers & Containers
3. SDI & MDI
4. Database Controls

Application any one of the following or similar application using .NET framework

1. Inventory Control
2. Retail Shop Management
3. Employee Information System
4. Personal Assistant Program
5. Students' Information System
6. Ticket Reservation System
7. Hotel Management System
8. Hospital Management System

VIII SEMESTER

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T81	PROFESSIONAL ETHICS	-	-	3

UNIT – I

Indian Constitution : Structure – Preamble - Fundamental Rights – Directive Principles of State policies - Fundamental Duties – overview of articles & Schedules.

UNIT – II

Ethics - Ethical Behaviour : Moral Sensitivity – Moral Judgement – Moral Motivation – Moral Courage. Ethical Decision Making – Check points – Steps – Moral Compass

UNIT – III

Professional Ethics as applied to Engineering – Characteristics of Professional and Professional Ethics – Engineering Ethics. Professional Code of Ethics – IEI & NSPE.

UNIT – IV

Engineering Ethics : Honesty – Responsibility to Employer – Rights of Engineers – Responsibility towards public – Risk and Liability

UNIT – V

Responsibility towards Environment. International Engineering Professionalism

TOTAL PERIODS: 60

Text Books:

1. Charles E Harris Jr, Michael S Pritchard, Michael J Rabins, Engineering Ethics Concepts and Cases, Cengage Learning 2012.

Reference Books:

1. Mike W.Martin, Roland Schinzinger, Ethics in Engineering, Tata MaGraw Hill Education (P) Ltd., 2012

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T82	**ENGINEERING ECONOMICS AND MANAGEMENT**	3	1	-

UNIT – I

Micro and Macro Economics and Its applications: Nature and Scope of Economics Science; Micro economics, Macro economics; Concept of Equilibrium; Economic efficiency, Technical efficiency; Demand and Supply concepts, Elasticity of Demand and supply; Determinants of Demand; Fixed cost, variable cost, Average cost, marginal cost, opportunity cost; standard cost; concept of iso-quant; Price of products, Break Even Analysis, Nature and Functions of Money, National Income, GNP and Savings, Inflation and Deflation, Business Cycles.Types and principles of management, Elements of management; planning, organising, staffing, co-ordinating etc, types of (ownership) of a firm.

UNIT – II

Production Management & Marketing Management: Types of Production; process of planning, scheduling, Routing, material control; product concept concepts of productivity, Core concepts of Marketing- Needs, Wants, Demand- arketing Vs Selling- Products and Markets- Pricing and its related factors- Channels of Distribution- Promotion- Advertising- Market Research- Sales Forecasting.

UNIT – III

Financial Management: Sources of finance, internal and external-preparation of balance sheet and profit and loss statements, Types of accounting and significance of each type, interest formulas and their applications.

UNIT – IV

Methods of Depreciation: Straight line method of Depreciation- Declining Balance Method of Depreciation-Sum of the Years Digits Method of Depreciation-Sinking Fund Method of Depreciation- Service-output Method of Depreciation.

UNIT – V

Methods of Comparison of Alternatives : Present worth method (Revenue and Cost Dominated Cash flow Diagram), Future Worth method (Revenue and Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue and Cost Dominated Cash Flow Diagram) Rate of Return Method (Revenue and Cost Dominated Cash flow Diagram) Examples in all methods.

TOTAL PERIODS: 60

Text Books:

1. O.P. Khanna, 'Industrial Engineering and Management', Dhanpat Rai and Sons, 1989.
2. R. Pannerselvam, 'Engineering Economics', Prentice Hall of India Pvt. Ltd, 2001.

Reference Books:

1. Mote Paul, Gupta, "Managerial Economics" Tata Mc Graw Hill, 1987.
2. Joseph Massie L "Essentials of Management" 3rd Edition PHI 1995.
3. Paul A Samuelson "Economics" Tata Mc Graw Hill 1987.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS T83	**INFORMATION SECURITY**	3	1	-

Course Objectives:

1. To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
2. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
3. Gain familiarity with prevalent network and distributed system attacks, defenses against them and forensics to investigate the aftermath.
4. Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today.
5. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Course Outcomes:

On successful completion of the module students will be able to:

1. To master information security governance, and related legal and regulatory issues
2. To be familiar with how threats to an organization are discovered, analyzed, and dealt with
3. To be familiar with network security threats and countermeasures
4. To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)
5. To be familiar with advanced security issues and technologies (such as DDoS attack detection and containment, and anonymous communications,)

UNIT – I

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

UNIT – II

SECURITY INVESTIGATION: Need for Security - Business Needs - Threats - Attacks - Legal, Ethical and Professional Issues.

UNIT – III

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

UNIT – IV

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

UNIT – V

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

TOTAL PERIODS: 60

Text Books:

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.

Reference Books:

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

Website:

1. http://www.cryptography.com/
2. https://www.schneier.com/cryptography.html
3. http://www.information-security-policies-and-standards.com/
4. www.jhuapl.edu/ourwork/nsa/

Electives for Sixth Semester

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E61	**OBJECT ORIENTED ANALYSIS AND DESIGN**	3	1	-

Course Objectives:

1. To learn the concept of Object Oriented Software Development Process
2. To get acquainted with UML Diagrams
3. To understand Object Oriented Analysis Processes

Course Outcomes:

1. Understand Object Oriented Software Development Process
2. Gain exposure to Object Oriented Methodologies & UML Diagrams
3. To apply Object Oriented Analysis Processes for projects

UNIT – I

Object Oriented Methodologies: Software System Life Cycle – Traditional cycle models – Object Oriented approach – Rambaugh et al Object Modeling Technique – Booch Methodology – Jacobsonet al methodology –Rational Unified Process (RUP) – Unified Modeling Language (UML) – UML Models.

UNIT – II

UML Diagrams: Use case diagram – UML class diagram – interaction diagram – state diagram – activity diagram – Requirements for ATM banking system – case study.

UNIT – III

Object Oriented Analysis : Use case driven Object analysis – approaches for identifying classes – identifying objects, relationships attributes, methods for ATM banking system –Object oriented design process – design axioms.

UNIT – IV

Object Oriented Design: Designing Classes, methods – access layer object storage and object interoperability –access layer for the ATM banking system. View layer – designing interface objects – prototyping User interface – view layer for the ATM banking system

UNIT – V

Design Patterns: Design Patterns – Describing design patterns - catalog of design patterns – organizing the catalog – How design patterns solve design problems – How to select a design pattern – How to use a design pattern – creational pattern : Abstract factory – structural pattern : Adapter – behavioral pattern : chain of responsibility .

TOTAL PERIODS: 60

Text Books:

1. Ali Bahrami, Object Oriented systems development, Tata Mcgraw Hill Education Private Ltd, 1999.
2. Carol Britton and Jill Doake, A student Gide to Object Oriented Development, Elsevier, Butterworth – Heinemann, Eighth Edition, 2007.
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns – elements of reusable object oriented software, Addition Wesley, 1994

Reference Books:

1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
2. Mike O'Docherty "Object-Oriented Analysis & design – understanding system development with UML 2.0", John Wiley, 2005.
3. Grady Booch, James Rumbagh, Ivar Jacobson, "The UML user Guide", Pearson Education, 2005
4. Timothy C. Lethbridge, Robert Laganiere " Object-Oriented Software Engineering – A practical software development using UML and Java", Tata McGraw-Hill, New Delhi, March 2003.
5. David William Brown, "An Introduction to Object Oriented Analysis Objects and UML in Plain English", 2nd Edition, Wiley, 2001

Websites:

1. www.omg.org
2. http://www.ibm.com/developerworks/rational/products/rose/
3. http://www.smartdraw.com/resources/tutorials/jacobson-oose-diagrams/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E62	**NETWORK DESIGN AND MANAGEMENT**	3	1	-

Course Objectives:

1. Studentswillhaveanunderstandingofnetworkmanagementarchitecturesandprotocols.
2. StudentswillbecomecomfortablewithusingthedifferentTCP/IPProtocols.
3. Analyzenetworktrafficflowandevaluateitsperformance.
4. Demonstrateunderstandingofnetworkmanagementstandards,e.g.,SNMP.
5. Students will be familiar with a variety of computer network security issues.

Course Outcomes:

On successful completion of the module students will be able to:

1. Ability to use techniques, skills, and modern networking tools necessary for network analysis, design and management.
2. Ability to identify, formulate and solve network design problems
3. Ability to analyze and design an enterprise network that meets desired requirements.
4. Design a network for a small business.
5. Evaluate a large network and determine potential problems.

UNIT - I

INTRODUCTION TO NETWORK MANAGEMENT: Overview of Analysis, Architecture and Design Process-System Methodology, Service methodology, Service Description - Service characteristics - Performance Characteristics - Network supportability - Requirement analysis – User Requirements – Application Requirements – Device Requirements – Network Requirements – Other Requirements - Requirement specification and map.

UNIT – II

REQUIREMENTS ANALYSIS: Requirement Analysis Process – Gathering and Listing Requirements- Developing service metrics – Characterizing behavior – Developing RMA requirements – Developing delay Requirements - Developing capacity Requirements - Developing supplemental performance Requirements – Requirements mapping – Developing the requirements specification.

UNIT - III

FLOW ANALYSIS: Individual and Composite Flows – Critical Flows - Identifying and developing flows – Data sources and sinks – Flow models- Flow prioritization – Flow specification algorithms – Example Applications of Flow Analysis.

UNIT – IV

NETWORK ARCHITECTURE: Architecture and design – Component Architectures – Reference Architecture – Architecture Models – System and Network Architecture – Addressing and Routing Architecture – Addressing and Routing Fundamentals – Addressing Mechanisms – Addressing Strategies – Routing Strategies – Network Management Architecture – Network Management Mechanisms Performance Architecture – Performance Mechanisms – Security and Privacy Architecture – Planning security and privacy Mechanisms.

UNIT – V

NETWORK DESIGN: Design Concepts – Design Process - Network Layout – Design Traceability – Design Metrics – Logical Network Design – Topology Design – Bridging, Switching and Routing Protocols- Physical Network Design – Selecting Technologies and Devices for Campus and Enterprise Networks – Optimizing Network Design

TOTAL PERIODS: 60

Text Books:

1. Network Analysis, Architecture, and Design By James D. McCabe, Morgan Kaufmann, Third Edition, 2007.ISBN-13: 978-0123704801
2. Integrated Management of Networked Systems: Concepts, Architectures, and Their Operational Application (The Morgan Kaufmann Series in Networking), Heinz-Gerd Hegering, Sebastian Abeck, and Bernhard Neumair, 1999.
3. Network Design and Management – by Steven T.Karris, Orchard publications, Second edition, 2009.
4. Ethernet Networks-Design, Implementation, Operation and Management by Gilbert Held, John Wiley and sons, Fourth Edition

Reference Books:

1. Mani Subramanian, "Network Management Principles and practice ", Addison Wesly New York, 2000.
2. Salah Aiidarous, Thomas Plevayk, "Telecommunications Network Management Technologies and Implementations", eastern Economy Edition IEEE press, New Delhi, 1998.
3. Lakshmi G. Raman, "Fundamentals of Telecommunication Network Management", Eastern Economy Edition IEEE Press, New Delhi, 1999.

Website:

1. http://www.bitpipe.com/netmgmt/netmgmt_overview.jsp
2. http://www.ndmg.com/
3. http://www.cisco.com/en/US/docs/solutions/Verticals/EttF/ch7_EttF.html
4. http://www.cisco.com/web/IN/products/networkmgmt/index.html

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E63	**E-BUSINESS**	3	1	-

Course Objectives:

1. To explore both the technical and business-related implications of electronically mediated commerce.
2. To enables the student to trace the development of electronic business from its origins in electronic data interchange to its current growing importance.
3. To explore the potential of electronic business for future development and the development of the 'Information Society'
4. To introduce the strategic, cultural, legal and ethical issues facing business organizations in their daily use of the Internet.

Course Outcomes:

On successful completion of the module, students will be able to:

1. Understand the concepts of e-business, its infrastructure and strategy
2. Appreciate business models for Business to Business (B2B) and Business to Consumer (B2C) e-commerce.
3. Evaluate e-business scenarios and propose appropriate e-business investment strategies
4. Appreciate and understand topics related to e-business such as supply chain management, customer relationship management change management, E-procurement, and e-marketing.
5. Understand sectoral and regional differences in e-business applications.

UNIT – I

Electronic Commerce Environment and Opportunities: Background – The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce: Overview – Electronic Data Interchange – Migration to Open EDI – Electronic Commerce with WWW/Internet – Commerce Net Advocacy – Web Commerce going forward.

UNIT – II

Approaches to Safe Electronic Commerce: Overview – Secure Transport Protocols – SecureTransactions – Secure Electronic Payment Protocol(SEPP) – Secure Electronic Transaction (SET)- Certificates for Authentication – Security on Web Servers and Enterprise Networks – Electronic cash and Electronic payment schemes: Internet Monetary payment and security requirements – payment and purchase order process - Online Electronic cash.

UNIT – III

Internet/Intranet Security Issues and Solutions: The need for Computer Security – Specific Intruder Approaches – Security strategies – Security tools – Encryption – Enterprise Networking and Access to the Internet – Antivirus programs – Security Teams.

UNIT – IV

MasterCard/Visa Secure Electronic Transaction: Introduction – Business Requirements – Concepts – Payment processing – E-mail and secure e-mail technologies for electronic commerce. Introduction – The Mean of Distribution – A model for message handling – Working of Email - MIME: Multipurpose Internet Mail Extensions – S/MIME: Secure Multipurpose Internet Mail Extensions – MOSS: Message Object Security Services.

UNIT – V

Internet and Website Establishment: Introduction – Technologies for web servers – Internettools relevant to Commerce – Internet Applications for Commerce – Internet charges – InternetAccess and Architecture – Searching the Internet- Case study.

TOTAL PERIODS: 60

Text Books:

1. Daniel Minoli and Emma Minoli, "Web Commerce Technology Handbook", Tata McGraw-Hill, 2005.

Reference Books:

1. Andrew B. Whinston, Ravi Kalakota, K. Bajaj and D. Nag, "Frontiers of Electronic Commerce", Tata McGraw-Hill, 2004.
2. Bruce C. Brown, "How to Use the Internet to Advertise, Promote and Market Your Business or Website with Little or No Money", Atlantic Publishing Company, 2006.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E64	**PRINCIPLES OF PROGRAMMING LANGUAGES**	3	1	-

Course Objectives:

1. To understand the constructs of programming language
2. To know the different programming paradigms
3. To associate the specific paradigm and language to solve a problem
4. To learn new programming techniques

Course Outcomes: The student should able to

1. Able to design a programming language
2. Able to write a better programming code by using modern programming technique.
3. Able to choose the programming language for a given problem
4. Able to compare the programming languages on different aspects

UNIT - I

Introduction: The art of Language design – Programming language spectrum - Compilation and Interpretation – Evaluation of Programming languages – Syntax and Semantics of language C-lite – Names – Types – Type Systems - Binding – Scope – Static – Dynamic – Abstract Data types

UNIT – II

Semantics: Expression – Assignment - Control flow – Input/output – exception handling – state transformation – partial functions – semantics with dynamic typing – Formal treatment of semantics

UNIT – III

FUNCTIONS: Call and Return – Parameter passing – function declaration – semantics of call and return – formal treatment of types and semantics – memory management – dynamic arrays – garbage collection

UNIT – IV

Programming techniques: Imperative programming – C – ADA – Perl – Object Oriented Programming – Small Talk- Java – Python – Functional Programming – Scheme – Haskell

UNIT - V

Modern programming techniques: Logic programming – prolog – Event-Driven programming – Concurrent Programming – Concepts – Synchronization strategies – Language level mechanism - Interprocess communication – Scripting languages.

TOTAL PERIODS: 60

Text Books:

1. Allen B. Tucker and Robert E. Noonan, Programming Languages - Principles and Paradigms, Second Edition, Tata McGraw Hill, 2009

Reference Books:

1. Robert W. Sebesta, Concepts of Programming Languages, Sixth Edition, Addison Wesley, July 24,2003.
2. 2. Michael L Scott, Programming Language Pragmatics, Third Edition, Morgan Kauffman, 2009

Websites:

1. http://en.wikipedia.org/wiki/Programming_language
2. http://www.dmoz.org/Computers/Programming/Languages/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E65	**INFORMATION THEORY & CODING TECHNIQUES**	3	1	-

Course Objectives:

1. To introduce basic concepts of information theory.
2. To study the coding schemes.
3. To design and evaluate encoders and decoders for communication and security.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the basics of information theory.
2. Understand the concepts of various coding schemes.
3. Correlate the theory of coding and decoding to the real-life applications.

UNIT – I

INFORMATION THEORY: Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding – Joint and conditional entropies, Mutual information – Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT - II

Block Codes: Error Control Coding – Error Detection and Correction – Parameters – Algebraic Structures – Groups, Rings and Finite Fields - Vector spaces – Binary Fields – Linear Block Codes – Syndrome Error Detection – Minimum Distance – Hamming Codes – FEC – ARQ.

UNIT – III

Cyclic Codes: Polynomial representation – Generator Polynomial – Cyclic codes in systematic form – Generator matrix – Syndrome calculation - Error Detection – Decoding – Cyclic Redundancy Codes. **BCH Codes:** Minimal Polynomial – Vandermonde Determinant – Decoding – Error location – Error Evaluation polynomials – Euclidian Algorithm.

UNIT - IV

Reed-Solomon Codes: Error Correction capability – RS codes in systematic form – Syndrome Decoding – Euclidean Algorithm – Berlekamp–Massey Algorithm – Error Control Code for Compact Disks – Encoding and Decoding of RS codes – Interleaving. **Convolutional Codes**: D-transform domain – Linear Sequential Circuits – FIR and IIR FSSMs - Distance Properties – Maximum likelyhood detection – Trellis Diagram - Viterbi Algorithm – Hard and Soft Decisions.

UNIT - V

Turbo Codes: Encoder – Decoder – Markov sources of discrete channels – BCJR algorithm – Iterative Coefficient – Construction Methods of Turbo Codes – EXIT charts. **Low Density Parity Check Codes:** Construction – Sum-Product Algorithm – Logarithmic LDPC decoder – EXIT Charts for LDPC – Fountain and LT codes.

TOTAL PERIODS: 60

Text Books:

1. Andre Neubauer, Jurgen Freudenberger, Volker Kuhn, "Coding Theory: Algorithms, Architectures and Applications" John Wiley, 2007
2. Ranjan Bose, "Information Theory, Coding and Cryptography", PHI, 2007.

Reference Books:

1. Jorge Castiñeira Moreira, Patrick Guy Farrell, "Essentials of Error-Control Coding", John Wiley, 2006.
2. Viterbi, "Information Theory and Coding", TMH, 1982.

Websites:

1. NPTEL lecture on Information Theory and Coding. Available at http://www.nptel.iitm.ac.in/courses/117101053/
2. An Introduction to Reed Solomon Codes. Available at http://www.ece.tamu.edu/~hpfister/courses/ecen604/rspoly.pdf
3. Forward Error Correction Codes available at http://www.princeton.edu/~achaney/tmve/.../Forward_error_correction.html

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E66	LANGUAGE TECHNOLOGIES	3	1	-

Course Objectives:

1. To introduce the primary processes of Natural language and the associated applications
2. To understand the NLP processes involved in information retrieval
3. To familiarize the generic issues of Natural language processing.

Course Outcomes:

On successful completion of this course students will be able to:

1. Use appropriate process in application involved Language technologies.
2. Ability to implement the NLP.

UNIT – I

Introduction: Natural Language Processing – Linguistic Background – Spoken Language Input and Output Technologies – Written Language Input – Mathematical Methods – Statistical Modeling and Classification Finite State Methods Grammar For Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.

UNIT – II

Information Retrieval : Information Retrieval Architecture – Indexing– Storage – Compression Techniques – Retrieval Approaches – Evaluation – Search Engines – Commercial Search Engine Features– Comparison– Performance Measures – Document Processing – NLP Based Information Retrieval – Information Extraction.

UNIT – III

Text Mining: Categorization – Extraction Based Categorization – Clustering – Hierarchical Clustering – Document Classification and Routing – Finding and Organizing Answers From Text Search – Use Of Categories and Clusters For Organizing Retrieval Results – Text Categorization and Efficient Summarization Using Lexical Chains – Pattern Extraction.

UNIT – IV

Generic Issues : Multilinguality – Multilingual Information Retrieval and Speech Processing – Multimodality – Text and Images – Modality Integration – Transmission and Storage – Speech Coding – Evaluation Of Systems – Human Factors and User Acceptability.

UNIT – V

Applications: Machine Translation – Transfer Metaphor – Interlingua and Statistical Approaches – Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.

TOTAL PERIODS: 60

Text Books :

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Prentice Hall, Second edition, 2008.
2. Christopher D. Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", MIT Press, Sixth edition, 2003.

Reference Books:

1. James Allen, "Natural Language Understanding", Benjamin/Cummings Publishing Company, 1995.
2. Gerald J. Kowalski and Mark T. Maybury, "Information Storage and Retrieval Systems", Kluwer Academic Publishers, 2000.
3. TomekStrzalkowski, "Natural Language Information Retrieval", Kluwer Academic publishers, 1999.

Website:

1. http:// clt.gu.se/page/natural-language-processing-lecture-notes
2. http://ltrc.iiit.ac.in/
3. www.morganclaypool.com/toc/hlt/1/1

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E67	**UNIX INTERNALS**	3	1	-

Course Objectives:

1. To understand the concepts of multi user operating system implementation.
2. Given the requirement one should able to design the necessary file system.
3. If an environment demands a multi process system, one should able to design a proper communication among the various processes.
4. For a multi processor system, one should able to design the necessary modules.

Course Outcomes:

On successful completion of the module students will be able to:

1. Understand the implementation details of a multi user operating system.
2. Write system level programs such as file recover, process interaction etc.

UNIT – I

Introduction to the Kernel: Architecture of the UNIX operating system – Introduction to the system concepts – Kernel Data Structures; The Buffer Cache: Buffer Headers – Structure –Retrieval of a buffer – Reading and writing disk blocks – Advantages and Disadvantages; Internal Representation of Files: Inode – Structure of a regular file – Directories – Conversion of a pathname to an Inode – Super Block – Inode Assignment – Allocation of disk blocks

UNIT – II

System Calls for the file system: Open – Read – Write – lseek – Close – file creation – creation of special files – change directory and change root – change owner and change mode – Pipes – Dup – Mounting and unmounting file systems; **The Structure of Processes:** Process states and transitions – Layout of system memory – The context – saving the context – manipulation of the process address space – sleep.

UNIT – III

Process Control: Process creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – The user ID of a process – The shell – System Boot and the INIT Process; **Process Scheduling and Time:** Process scheduling – System calls for Time – Clock – Scheduler goals – Process priorities – Scheduler Implementation – Run Queue Manipulation.

UNIT – IV

Memory Management Policies: Swapping – Demand Paging – A Hybrid System with swapping and demand paging; **The I/O Subsystem:** Driver Interfaces, Disk Drivers, Terminal Drivers, Streams.

UNIT – V

Inter Process Communication: Process Tracing – System V IPC – Network Communications –Sockets – Messages – Ports – Message Passing –Port Operations.**Multiprocessing:** Multiprocessor Systems – Semaphores – Read-Write Locks – Deadlock Avoidance – Recursive Locks.

TOTAL PERIODS : 60

Text Books:

1. Maurice J. Bach, "The Design of the UNIX Operating System", Prentice-Hall of India, 2004.
2. Uresh Vahalia, "UNIX Internals: The New Frontiers", Pearson Education Asia, 2002.

Reference Books:

1. William Stallings, "Operating Systems – Internals and Design Principles", Pearson Education, Sixth Edition, 2009.
2. Silberschatz, Galvin and Gagne, "Operating System Concepts", Wiley, Sixth edition, 2003.
3. Graham Glass and King Ables, "The New Frontiers", Pearson Education, 2001.
4. Daniel P. Bovet and Marco Cesati, "Understanding the LINUX kernel", O'Reilly Publication, Third edition, 2005.

Website:

1. http://www.ee.surrey.ac.uk/Teaching/Unix/
2. http://www.ccse.kfupm.edu.sa/~akbar/ICS431_031/IndexPages/MainIndex.htm

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E68	**DATA MINING AND WAREHOUSING**	3	1	-

Course Objectives:

1. Learn to gather and analyze large data sets to gain useful business understanding
2. Describing and demonstrating basic data mining algorithms, methods, and tools. Identifying business applications of data mining.
3. To understand the overall architecture of a data warehouse techniques and methods for data gathering and data pre-processing.

Course Outcomes:

The student should have the ability to:

1. Plan, acquire, maintain and analyze information system.
2. Learn data mining techniques and methods in integrating & interpreting data sets
3. Improve effectiveness, efficiency and quality for techniques and methods.

UNIT - I

Data Preprocessing, Language, Architectures, Concept Description: Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT - II

Association Rule: Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules –association mining to correlation analysis-constraint based association mining.

UNIT - III

Classification and Prediction: Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT - IV

Cluster Analysis: Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods - Outlier Analysis. Recent trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

UNIT - V

Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining -Data warehousing components-building a data warehouse – mapping the data warehouse to an architecture – dataextraction - cleanup- transformation tools- metadata – OLAP - Patterns and models - Data visualization principles.

TOTAL PERIODS: 60

Text Books:

1. J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Harcourt India Morgan Kauffman, 2012.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data mining and OLAP", Tata McGraw-Hill, 2004.

Reference Books:

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2004.
2. Sam Anahory and Dennis Murry, "Data Warehousing in the Real World", Pearson Education, 2003.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E69	**SOA AND WEB SERVICES**	3	1	-

Course Objectives:

1. To understand the advantages of using XML technology family
2. To analyze the problems associated with tightly coupled distributed software architecture
3. To use Web services as building block in distributed application development
4. To design e-business solutions using SOA and XML based web services

Course Outcomes:

1. Student will able to write programs using XML families
2. Student will able to develop e-business solutions using SOA approach
3. Students will able to model the business situation using BPEL

UNIT – I

XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based standards – Structuring with schemas - DTD – XML Schemas – XML processing – DOM –SAX – presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT – XLINK – XPATH – XQuery

UNIT – II

Roots of Service Oriented Architecture (SOA) – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT – III

Business motivations for web services – B2B – B2C – Technical motivations – limitations of Component Technologies – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

UNIT – IV

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT – V

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS-Security**.**

TOTAL PERIODS : 60

Text Books:

1. Atul Kahate," XML and Related technologies", Pearson Education, 2008.
2. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.
3. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education,2005.
4. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.

Reference Books:

1. Keith Ballinger, ". NET Web Services Architecture and Implementation", Pearson Education, 2003.
2. David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.
3. Kennard Scibner and Mark C.Stiver, "Understanding SOAP", SAMS publishing.
4. B. V. Kumar, S. V. Subrahmanya ,"**Web Services**: An Introduction", 2nd Edition, TMH India 2012

Websites:

1. http://docs.oracle.com/cd/E17802_01/webservices/webservices/docs/1.6/tutorial/doc/JavaWSTutorial.pdf
2. http://www.w3schools.com/xml/
3. www.soa.com

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E610	**DISTRIBUTED COMPUTING**	3	1	-

Course Objectives:

1. To make the students to understand the collaborative operations of collections of computer systems.
2. To learn design of fault tolerant distributed systems.
3. Learn to provide synchronization primitives.

Course Outcomes:

1. Students acquire the skills to develop industry recommended projects as well group as research oriented projects
2. Capable of designing a fault tolerant distributed system.
3. Develop novel synchronization algorithms.

UNIT – I

Introduction: Goals – Types of Distributed systems – Architecture styles – System Architecture.Architectures Versus Middleware – Self Management in distributed systems - Processes – Threads– Virtualization – Clients – Servers – Code Migration

UNIT – II

Communication: Fundamentals - Remote Procedure Call – Stream oriented communication –Message oriented communication – Multicast communication.

Naming – Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute basedNaming.

UNIT – III

Synchronization: Clock Synchronization – Logical clocks - Mutual Exclusion – Global positioning of nodes - Election Algorithms.

Consistency and Replication: Introduction – Data centric consistency models – Client centricconsistency models – Replica management – Consistency protocols.

UNIT – IV

Fault Tolerance: Introduction – Process resilience – Reliable client server communication – Reliable group communication – Distributed commit - Recovery Security – Introduction – Securechannels – Access control – Security management.

UNIT – V

Distributed File Systems – Distributed web based systems – Distributed object based systems

TOTAL PERIODS: 60

Text Books:

1. Andrew S. Tanenbaum and Maarten Van Steen, "Distributed Systems – Principles andParadigms", Prentice- Hall of India, Pvt. Ltd, Second edition, 2008.Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns – elements of reusable object oriented software, Addition Wesley, 1994

Reference Books:

1. Pradeep K Sinha, "Distributed Operating Systems, Prentice-Hall of India, NewDelhi, 2001.
2. Jean Dollimore, Tim Kindberg, George Coulouris, "Distributed Systems - Concepts andDesign", Pearson Education, Fourth edition, 2005.
3. M.L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.
4. Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley, 2004.

Websites:

1. http://www.ida.liu.se
2. http://www.cis.upenn.edu
3. http://simgrid.gforge.inria.fr/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E611	**AGILE METHODOLOIGES**	**3**	**1**	**-**

Course Objectives:

1. To understand the key ideas of agile development, and evidence for its value.
2. To learn the fundamental principles and practices associated with each of the agile development methods: Scrum, eXtreme Programming (XP)
3. To apply the principles and practices of agile software development on a project of interest and relevance to the student

Course Outcomes:

On successful completion of the module students will be able to:

1. Describe several agile methods for software development
2. Compare and contrast plan-driven versus agile methods
3. Create and review user stories for system requirements
4. Refactor code and tests to meet changing needs
5. Construct tailored agile processes that best fit the technical and market demands of a modern software project

UNIT – I

Iterative and Evolutionary: Definition – comparison - major activities.Agile: Basic concepts - Major activities - available agile methods.Story: Overview-estimated hours remaining.

UNIT – II

Motivation: Change on software projects – key motivation-requirement challenge – problems ofwater fall.Evidence: Research and early historical – standard and though leader-business case -water fallvalidity.

UNIT – III

Scrum: Concepts – deliverable and methods.Extreme Programming: Concepts – deliverable – methods.

UNIT – IV

Unified Process: Concepts – deliverable - methods.Evo: Concepts – methods – deliverable.

UNIT – V

Practice Tips: Project – management – environment – requirements – tests.Case Study : Bomb Shelter Studios

TOTAL PERIODS: 60

Text Books:

1. Craig Larman, “Agile and Iterative Development A Manger’s Guide” Pearson Education,First Edition, India, 2004.
2. Mike Cohn, “Agile Estimating and Planning”, First Edition, Pearson, 2006.

Reference Books:

1. Shore, “Art of Agile Development”, Shroff Publishers & Distributors, 2007.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E612	**APPLICATION OUTSOURCING SERVICES**	3	1	-

Course Objectives:

1. To explore the knowledge about the ITeS services provided by the outsourcing industries.
2. To learn the objectives of business process outsourcing and its methodologies.
3. To learn to develop intelligent business applications.

Course Outcomes:

On successful completion of the subject students will be able to :

1. Familiar with various outsourcing services and applications of IT industries.
2. Develop application for outsourcing services.
3. Capable to design intelligent applications for enterprises.

UNIT – I

Business Consulting: Introduction – What a Business consultant does?, Developing Consulting Skills and Knowledge, Getting Clients, types of consulting-Human Resources consulting, e-business consulting, Technology consulting (IT consulting), Small Business consulting, any other areas / organizations need professional advice and ways to learn business consulting.

UNIT – II

Business Process Outsourcing: Overview, Reasons for outsourcing of Business Processes, BPO categories, Planning stage, Selecting the vendor, BPO contracts, Transformational outsourcing, International considerations, key issues in BPO agreements, Information privacy and security issues, negotiations, Renegotiation and terminations. Call centers: telemarketing and telesales.

UNIT – III

Enterprise Integration : Setting Enterprise Integration design objects, Assessing the technology Landscape- legacy systems, Web enabled applications, XML, UML, Agent Technology, Model Driven Architecture, creating business system domain, Integrating with XML, DOM, simple API for XML (SAX), Component based Technology and Enterprise Intelligence**. Softwares supports Enterprise Integration: Vitria, TIBCO, MQ Series, Web Sphere and etc.**

UNIT – IV

Business Intelligence : Business Intelligence foundation, Bridging the analysis gap, BI case studies, Microsoft Data warehousing framework: SQL server, Data Analyser, Microsoft Business Intelligence accelerator, ETL tooland OLAP: Data Mining techniques and tools, Applications.

UNIT – V

Web-Computing: Introduction, Web – centric architecture, Building Interactive and non –interactive web applications: Web-computing softwares: HTML, CGI, PERL, Servelets, CSS, J2EE, AJAX, JNI, JFC, Web logic and PHP.

TOTAL PERIODS: 60

Text Books:

1. "Become a Business Consultant (2012)" by Craig Coolahan, Marg Archibald, Tag Goulet
2. Business Process Outsourcing: Process Strategies and Contracts, John K Halvey and Barbara M. Melby, John Wiley & sons Inc, Second Edition, April-2007.
3. Enterprise Integration: An Architecture for Enterprise application and Systems Integration by Fred A. Cummins, OMG Press, 2002.
4. Business Intelligence: Making better decisions faster by Elizabeth Vitt, Michael Luckevich and Stacia Misner. Microsoft press, 2002.
5. Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX. 2012- Dreamtech Press.

Reference Books:

1. Business intelligence: A managerial approach - Efraim Turban, Ramesh Sharda, Jay E. Aronson and David King. 2007.
2. Webcentric Local Business Marketing: How to Market Your Business on the Web and Beyond by David Sandy.
3. HTML and CSS: Design and Build Websites by Jon duckett.

Website:

1. http://www.fabjob.com/businessconsultant.asp
2. http://en.wikibooks.org/wiki/Business_Intelligence
3. http://en.wikipedia.org/wiki/Data_mining
4. http://web.cs.dal.ca/~jamie/CS3172/Resources/readings/ref-books.htm

Electives for Seventh Semester

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E71	**SOFTWARE TESTING AND QUALITY ASSURANCE**	3	1	-

Course Objectives:

1. Understand the theoretical aspects of software testing
2. Demonstrate the knowledge of the existing testing methods
3. Demonstrate the knowledge of applying testing and analysis methods in software development and maintenance
4. To emphasis on software quality measurement, and quality standards

Course Outcomes:

On successful completion of the module, students will be able to:

1. Understand how to detect, classify, prevent and remove defects
2. Understand how to conduct formal inspections, record and evaluate results of inspections
3. Understand the effectively strategies of testing, the methods and technologies of software testing;
4. Choose appropriate testing strategies and develop test cases
5. Understand about software quality and software quality standards.

UNIT - I

Software Testing Fundamentals: Need for Testing - SDLC and Testing – Functional and Non-Functional Testing – Verification and Validation - Testing levels - Unit, Integration, System and Acceptance Testing – Testing and Debugging – Test Case Design – Test Management (Planning, Monitoring and Reporting) –Weyuker's Adequacy Axioms – Metrics and SDLC.

UNIT – II

Testing Types – White Box, Black Box and Grey Box – White box testing techniques - Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage, Multiple condition coverage, Dataflow coverage, Mutation testing – Black box testing techniques – Boundary value analysis, Equivalence partitioning, Syntax testing, Finite state testing.

UNIT – III

Testing Object Oriented (OO) Software: Challenges – Differences from Testing non-OO Software – Testing and SDLC – Testing Strategies – Test Case Design –- Testing Methods – Class testing strategies - Class Modality - State-based Testing - Message Sequence Specification.

UNIT – IV

Software Quality: Introduction – Quality and SDLC – Software Quality Assurance (SQA) – SQA Plan, Team, Characteristics, Documentation, Review and Audits –

Software Quality Models (McCall, FURBS and GQM) – Software Quality Measurement Metrics – Product quality, Process quality and Maintenance metrics – Quality Cost – Quality Control.

UNIT – V

Software Quality Standard – CMM Model, ISO 9000 Series, Introduction to PCMM, CMMI and Six Sigma concept. Testing Specialized Environment – Testing Client-Server applications, Testing GUI, Testing compilers and language processors, Testing Real-time Systems. Testing Tools – Automated Tools for Testing – WinRunner, LoadRunner – Static code analyzers - Test case generators - GUI Capture/Playback.

TOTAL PERIODS: 60

Text Books:

1. Roger S. Pressman, "Software Engineering. A Practitioners Approach", McGraw-HillInternational Edition, Seventh edition, 2009.
2. William E.Perry, " Effective Methods for Software Testing (2nd Edition) ",John Wiley & Sons, 2000.
3. Glenford J. Myers, Tom Badgett, Corey Sandler, and Todd M. Thomas, "The Art ofSoftware Testing", John Wiley & Sons, Second edition, 2004.
4. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003.

Reference Books:

1. William E. Perry, "Effective Methods for Software Testing", John Wiley & Sons, Secondedition, 2000.
2. Boris Beizer, "Software Testing Techniques", Van Nostrand Reinhold, Second edition,1990.
3. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pte Ltd., 2002.
4. Robert V.Binder, "Testing Object-Oriented Systems: Models Patterns and Tools",Addison Wesley, 2000

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E72	ADVANCED DATABASES	3	1	-

Course Objectives:

1. To know advanced concepts of database in large scale analytics, derive data maintenance, change schema, and database update.
2. Benchmark Object Databases, deals with uncertainties in advanced concepts of database
3. To explore open issues in database technologies.

Course Outcomes:

On successful completion of the module, students will be able to:

1. Understand the advanced concepts in designing of large scale databases.
2. Perform analytics in large scale databases.
3. Pursue research in advanced database concepts.

UNIT – I

PARALLEL AND DISTRIBUTED DATABASES: Inter and Intra Query Parallelism – Architecture – Query evaluation – Optimization – DistributedArchitecture – Storage – Catalog Management – Query Processing - Transactions – Recovery – Large-scale Data Analytics in the Internet Context - MapReduce Paradigm - run-time systemfor supporting scalable and fault-tolerant execution - paradigms: PigLatin and Hive and paralleldatabases versus MapReduce.

UNIT – II

ACTIVE DATABASES: Syntax and Sematics (Starburst, Oracle, DB2) – Taxonomy – Applications – IntegrityManagement – Workflow Management – Business Rules – Design Principles – Properties –Rule Modularization – Rule Debugging – IDEA methodology – Open Problems.

UNIT – III

TEMPORAL AND OBJECT DATABASES: Overview – Data types – Associating Facts – Temporal Query Language – TSQL2 – TimeOntology – Language Constructs – Architecture – Temporal Support – Object Databaseand Change Management – Change of Schema – Implementing Database Updates in O2 –Benchmark Database Updates – Performance Evaluation.

UNIT – IV

COMPLEX QUERIES AND REASONING: Logic of Query Languages – Relational Calculi – Recursive rules – Syntax and semantics ofDatalog – Fixpoint semantics – Implementation Rules and Recursion – Rule rewriting methods– Compilation and Optimization – Recursive Queries in SQL – Open issues.

UNIT – V

SPATIAL, TEXT AND MULTIMEDIA DATABASES: Traditional Indexing Methods (Secondary Keys, Spatial Access Methods) – Text Retrieval– Multimedia Indexing – 1D

Time Series – 2d Color images – Subpattern Matching – OpenIssues – Uncertainties.

TOTAL PERIODS: 60

Text Books:

1. Ramakrishnan, Gehrke, "Database Management System", Tata Mc Graw Hill Publications, Third Edition.
2. Carlo Zaniolo, Stefano Ceri "Advanced Database Systems", Morgan KauffmannPublishers.

Reference Books:

1. Rajesh Narang, "Object Oriented Interfaces and Databases", Prentice-Hall of India, Pvt. Ltd., 2004.
2. Jeffrey A. Hoffer, Mary B. Prescottand Fred R. McFadden, "Modern Database Management", Prentice Hall, 2007.
3. Ramez Elmasri, Sham Navathe, "Fundamentals of database Systems", Addison-Wesley, 2000.
4. C.S.R. Prabhu, "Data Warehousing – Concepts, Techniques, Products and Applications", Prentice-Hall of India, Pvt. Ltd., 2004.

Websites:

1. http://nptel.ac.in/courses/106106093/
2. https://www.coursera.org/course/bigdata

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E73	**CLIENT SERVER COMPUTING**	3	1	-

Course Objectives:

1. To examine the computing environment that satisfies the organizational needs of processing between workstations and server processes.
2. To expose terminology, concepts and client/server programming techniques.
3. To create an awareness of client server distributed objects.

Course Outcomes:

On successful completion of the module students will be able to:

1. Be familiar with the universal client and client server operating systems.
2. Implement the current client/server standards.
3. Identify the role of network administrator and use of SNMP and CMIP.

UNIT - I

Basic Concepts: Characteristics - File Server - Database Server - Transaction Server- GroupwareServer - Object Server – Middleware - Building Blocks.**Client Server Operating System:** Anatomy of server program - Server needs from OS – Server Scalability - Client Anatomy - Client need from OS - Client OS trends - Server OS trends.

UNIT – II

Client Server Middleware: NOS Middleware – Transparency - Global Directory Services - Distributed Time Service - Distributed Security Service - RPC, Messaging and Peer to Peer – Peerto Peer Communication - RPC-Messaging and Queuing (MOM)- MOM Vs RPC-NOS trends.

UNIT – III

SQL Database Server: Stored Procedure, Triggers and Rules - Database Connectivity Solutions -ODBC – Architecture – Components of ODBC.**Data Warehouse:** Elements- Warehouse Hierarchies- Replication Vs Direct Access –Mechanics of Data Replication – Cleansing and Transforming the Raw Data - EIS/DSS.**Client Server Groupware:** Groupware - Component of Groupware.

UNIT – IV

Client Server Transaction Processing: ACID properties - Transaction Model - TP Monitor and Operating System - TP Monitor and Transaction Management - TP Monitor Client Server interaction types - Transactional RPCs, Queues and Conversations - TP lite or TP Heavy - TP lite Vs TP Heavy.

UNIT – V

Client Server with Distributed Objects: Distributed Objects and Components – From - DistributedObjects to Components - CORBA-Distributed objects CORBA style – ObjectManagementArchitecture - Intergalactic ORB - Object Services - Common

Facilities – Business Objects - NextGeneration - COM+ - Other Component bus – COMhistory - COM 101 - OLE/DCOM. **Client Server and Internet:** Web Client Server interaction – 3 Tier client Server web style – CGI– Server side of the web.

TOTAL PERIODS: 60

Text Books:

1. Robert Orfali, Dan Harkey and Jerri Edwards, "Essential Client Server Survival Guide", John Wiley & Sons, Third edition, 2007

Reference Books:

1. Goldman, James E Rawles, Philip T Mariga and Julie R, "Client ServerInformation Systems: A Business Oriented Approach", Wiley, 1999.
2. Eric Johnson, Susan McDermott, "The Complete Guide to Client Server Computing", Prentice Hall, 2001.
3. Smith and Steven L Guengerich, "Client Server Computing", Prentice-Hall of India, 2002.

Website:

1 .http://www.infomotions.com/musings/waves/clientservercomputing.html
2. http://www.slideshare.net/jayasreep3/client-servercomputing
3. http://www.studentshangout.com/topic/142825-client-server-computing-notes/
4. http://www.networkcomputing.com/netdesign/1005part1a.html
5. http://www.ehow.com/list_6706533_benefits-client-server-computing_.html

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E74	**REAL-TIME COMPUTING AND COMMUNICATION**	3	1	-

Course Objectives:

1. Introducing the concept of real time and designing the scheduling algorithms for real time systems.
2. Visualizing the real time constraint in designing Operating system.
3. Designing the networks using real time constraint.

Course Outcomes:

On successful completion of the module students will be able to:

1. Get depth knowledge of the Real Time Systems.
2. Gain knowledge about various protocols in Real Time Systems.
3. Handle concurrency control systems.
4. Identify the various issues in RTOS.

UNIT – I

Introduction to Real-Time System: Characteristics – Types of Real-Time tasks – Timing constraints –Real-Time Scheduling - Basic concepts and classification of Algorithms – Clock- Driven Scheduling – Event-Driven Scheduling – Hybrid schedulers – EDF Scheduling – RM Scheduling and its Issues.

UNIT – II

Resource Sharing and Dependencies among Real-Time Tasks: Resource sharing in Real Time tasks, Priority Inversion, Priority Inheritance Protocol, Highest Locker Protocol, Priority Ceiling Protocol, Handling Task dependencies – Scheduling Real-Time Tasks in Multiprocessor and Distributed Systems – Resource Reclaiming in Multiprocessor Real-Time Systems – Fault- Tolerant Task Scheduling in Multiprocessor Real-Time Systems.

UNIT - III

Real-Time Operating System (RTOS): Features of RTOS, Commercial Real-Time Operating Systems, Real-Time Databases - Applications, Design issues, Characteristics of Temporal Data, Concurrency control, Commercial Real-Time Databases.

UNIT – IV

Real-Time Communication in Wide Area Networks: Introduction, Service and Traffic Models and Performance Requirements, Resource Management, Switching Subsystem, Route Selection in Real-Time Wide Area Networks - Basic Routing Algorithms, Routing during Real-Time Channel Establishment, Route Selection Approaches, Dependable Real-Time Channels

UNIT – V

Real-Time Communication in a LAN: Soft Real-Time Communication in a LAN – Hard Real- Time Communication in a LAN – Bounded Access Protocols for LANs – Real-Time Communications over Packet Switched Networks – QoS requirements – Routing and Multicasting.

TOTAL PERIODS: 60

Text Books:

1. C. Siva Ram Murthy and G. Manimaran, "Resource Management in Real-Time Systems and Networks", Prentice-Hall of India, 2005. (UNITs I, II, IV & V)
2. Jane W.S. Liu, "Real-Time Systems", Prentice Hall, USA, 2000. (UNIT III)

Reference Books:

1. Rajib Mall, "Real-Time Systems Theory and Practice", Pearson Education, India, 2007.
2. C.M. Krishna and Kang G. Shin, "Real-Time Systems", McGraw-Hill InternationalEditions, 1997.

Website:

1. http://www.ics.uci.edu/~eli/courses/cs244-w12/lecture4-244.ppt
2. http://engineeringppt.net/wp-content/uploads/2012/08/Lecture_21.ppt
3. http://www.cs.virginia.edu/~son/cs851/rtdb.ppt
4. http://cse.spsu.edu/pbobbie/Embsysfiles/chp6.ppt
5. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Real%20time%20system/pdf/module6.pdf

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E75	SOFTWARE ARCHITECTURE	3	1	-

Course Objectives:

1. To introduce the fundamentals of software architecture.
2. To learn the Software architecture and quality requirements of a software system
3. To know the fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
4. To understand the methods, techniques, and tools for describing software architecture and documenting design rationale.
5. To know the software architecture design, styles and evaluation processes.

Course Outcomes:

On successful completion of the module students will be able to:

1. Analyze Software Engineering problems in terms of architectural thinking
2. Generate architectural alternatives for a problem and select among them
3. Know how to do an assessment of an architecture
4. Describe a software architecture using various documentation approaches and architectural description languages
5. To design and motivate software architecture for large scale software systems

UNIT – I

Concepts of Design: Characteristics of design activities – Elements of design – Software quality models and their effects – Quality Attributes – Basic rules of software design – Design process.

UNIT - II

Software Architecture: Architecture – Software Architecture – Architectural styles – Visual Notation- Active and passive elements – Data, control and relationships – composition and decompositions – Data Flow Style – Call and Return – Independent components – Data centered and virtual machine.

UNIT – III

Styles in design and design space: Choices of styles and their combination – Hierarchical styles – Simultaneously heterogeneous style – Locationally heterogeneous style– Theory of design spaces – Design Space of elements – Design Space of Styles.

UNIT – IV

Architecture Evaluation: Concept of Scenario – Evaluating modifiability – Evaluating Performance – SAAM Method – The process : Analysis and Evaluationof modifiability

UNIT – V

Architecture Evaluation Methods: ATAM – Analysis Process – Analysis Activities – Quality Models – Construction of quality models – Derivation of quality features.

TOTAL PERIODS: 60

Text Books:

1. Hong Zhu, "Software Design Methodology: From Principles to Architectural Styles.", Butterworth-Heinemann Elsevier Publishers, 2013.

Reference Books:

1. Ian Gorton, "Essential Software Architecture", Springer – Verlag, Berlin Heidelberg, 2008.
2. Paul Clements, Rick Kazman and Mark Klein, "Evaluating Software Architectures – Methods and Case Studies", Pearson Low Price Edition, India, 2008.
3. Mary Shaw and David Garlan, "Software Architecture – Perspectives of an Emerging Discipline", Prentice-Hall of India, 2008.
4. Mahesh P. Matha, "Object Oriented Analysis and Design using UML", Prentice-Hall of India, 2008.

Websites:

1. http://www.sci.cmu.edu/architecture
2. http://www.softwarearchitectureportal.org

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E76	**HIGH SPEED NETWORKS**	3	1	-

Course Objectives:

1. To provide the skills and knowledge to understand the various networking technologies that attribute to high speed networks.
2. To make them understand various physical layer implementations required for high speed data transfer.
3. To understand the fundamentals of optical networks and differentiate it from rest of the technologies.

Course Outcomes:

On successful completion of the module students will be able to:

1. Students will able to design and analyze various network technologies
2. Enable the students to know physical layer techniques like WDM and high speed network technologies.
3. Efficiently design a high speed netoworks and evaluate its performance.

UNIT – I

Introduction to computer networks - Review of OSI/ISO model – Introduction to high speed networks - High speed LANs – Fast Ethernet - Switched Fast Ethernet - Gigabit Ethernet – ISDN: Conceptual view – Standards – Transmission structure, FDDI, Frame relay - operations and layers.

UNIT – II

Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories – AAL - Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control – ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management.

UNIT – III

TCP/IP protocol Suite – IP Packet Header – TCP packet header – User services – Protocol Operation – Connection Establishment – The Need for Flow and Error Control – Link Control Mechanisms – ARQ Performance – TCP Flow Control – TCP Congestion Control – Performance of TCP Over ATM – Integrated Services Architecture – Queuing Discipline – Random Early Detection – Differentiated Services. Resource

UNIT – IV

RSVP – Multi protocol Label Switching – Real Time Transport Protocol. Introduction to SONET – Layers – Frames – STS multiplexing – SONET networks – Virtual tributaries - Payload mappings – Packet over SONET – Generic Framing Procedure – Transport services – SONET over WDM – Traffic Grooming.

UNIT – V

Introduction to Optical Networks – Wavelength Division Multiplexing (WDM) – Introduction to broadcast and select networks – switch architectures – channel accessing – Wavelength routed networks – switch architectures – Routing and wavelength assignment – Virtual topology design – IP over ATM over WDM – IP over WDM.

TOTAL PERIODS: 60

Text Books:

1. William Stallings, "High Speed Networks and Internets", Pearson Education, Second edition, 2002.
2. C. Siva Ram Murthy and Mohan Gurusamy, "WDM Optical Networks: Concepts, Design and Algorithms", Prentice-Hall of India, 2002.

Reference Books:

1. Behrouz A Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth edition, 2006.
2. Behrouz A. Forouzan and Sophia Chung Fegan, "Local Area Networks", Tata McGraw- Hill, 2001.
3. Uless Black, "Optical Networks - Third Generation Transport Systems", Pearson Education, 2002.

Websites:

1. http://www.cse.wustl.edu/~jain

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E77	**NETWORK PROTOCOLS**	3	1	-

Course Objective:

1. To ensure that students have better understanding of various Internet protocols..
2. Various standards and protocols will be covered.
3. Able to design, implement, and analyze communication network protocols.

Course Outcomes:

1. Understand the fundamentals of network architecture and protocols.
2. Have the capability of designing and analyzing data transmission protocols and data link control protocols.
3. Have knowledge of various network protocols including TCP/IP, and demonstrate the skills to design and evaluate network protocols.

UNIT – I

Network Architectures: Introduction – OSI Model – TCP/IP Model – ATM Model. **Application Layer Protocols**: BOOTP – DHCP – DHCP – DNS – FTP – HTTP – SMTP – NNTP – Telnet – RMON – SNMP.

UNIT – II

Presentation Layer Protocol: LPP. **Session Layer protocols**: RPC, SDP. **Transport Layer protocols**: TCP, UDP, RDP, and RUDP.

UNIT – III

Network Layer Protocols: IP, IPv6, ICMP, ICMPv6, MobileIP, OSPF, RIP, Multicasting protocols – BGMP, DVMRP, IGMP, and MPLS protocols.

UNIT – IV

Data Link Layer Protocols: ARP, IPCP, RARP, SLIP, IEEE 802.3, IEEE 802.5, IEEE 802.11, FDDI, ISDN, PPP, LCP, HDLC – SONET/SDH Protocols.

UNIT – V

Network Security Protocols: SSH, RADIUS SSL/TLS, Kerberos, IPSec, Voice over IP

TOTAL PERIODS: 60

Text Books:

1. Douglas Comer, "Internetworking with TCP/IP Vol. I: Principles, Protocols and Architecture, Prentice Hall, Fourth edition, 2000.
2. Behrouz A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw-Hill, Second edition, 2004

Reference Books:

1. A. Leon-Garcia and Indra Widjaja, "Communication Networks", Tata McGraw-Hill, 2000.
2. Charles M. Kozierok, "The TCP/IP Guide: A Comprehensive, Illustrated Internet Protocols Reference", No Starch Press, 2005.

Website:

1. http://www.cse.wustl.edu/~jain

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E78	**MODELING AND SIMULATION**	3	1	-

Course Objectives:

1. To learn, develop, design and implement state-of-the-art, and technically correct Simulation models.
2. To learn various simulation languages and program using the simulation languages.
3. Todevelop and execute Simulation models in known computer high level languages.
4. To learn the differences in Simulation approaches.

Course Outcomes:

On successful completion of this course

1. The students will get acquainted with simulation domains.
2. They will understand the major intricacies of of simulation and testing domains.
3. They will be able to convert verbal descriptions to models and programs

UNIT –I

Introduction to Simulation: Need for Simulation – System and its terminologies – Types of simulation – Advantages and Limitations of Simulation – Discrete event simulation – Monte Carlo Simulation – Areas of Application – Components of System – System and its Environment – Models of a System – Continuous Systems – Discrete Systems – Modeling approaches.

UNIT - II

Random Numbers: Desirable attributes of Random Numbers – Random Number generation – Mid-square Method – Congruential Methods - Recursive generator – Testing Randomness – Chi-square test – Kolmogorov Smirnov test – Bartels Ratio test – Runs up and down test – Run test.

Probability distributions and Random Variates: Probability distributions– Discrete and Continuous distributions **–** Uniform distribution – Exponential distribution – Poisson distribution – Normal distribution – Gamma distribution – Erlang distribution – Inverse Transform Technique –Weibull distribution – Empirical continuous distribution – Generating approximate normal variates –Discrete uniform distribution –Geometric distribution – Acceptance Technique for Poisson distribution – Rejection Technique for Poisson distribution.

Queueing Theory: Terminologies of Queueing system – Empirical Queueing Models.

UNIT – III

Simulation Languages and Simulation Models: Simulation language requirements – Evolution of Simulation languages – General Activity Simulation Programme – Single server Queueing system with single, two queues – Multiple server Queueing system – Balking – Reneging – Bulk arrivals – simple simulation problems.

UNIT - IV

General Purpose Simulation System Language: GPSS blocks for creation, queue, print, transfer, conditional transfer, Priority, Select, Table, Test, Tabulate Loop, Logic, Gate, etc – Standard Numerical Attributes in GPSS – Transaction parameter – Equivalence declaration – Transaction times – single and matrix Variables in GPSS – Programming in GPSS for simple simulation problems.

UNIT – V

Other Simulation Languages: SIMULALanguage – SIMULA language structures – file operations – Object oriented concepts in SIMULA – array structures in SIMULA.

SIMSCRIPT – SIMSCRIPT language notations – SIMSCRIPT language structures – Object oriented Programming and simulation in SIMSCRIPT.

NS3 - Events and Simulator- Callbacks - Implementation details- Object modeln NS3 - Exmaples – Attributes

MATLAB - MATLAB Constructs - Variables - Arithmetic Operations -mathematical and Graphical Functions - Structures - Cell Arrays - MATLAB Programming - MATLAB Editor and Debugger - Projects - Simple Menu - Files - Sorting - Sub-image - Multiple Images

TOTAL PERIODS: 60

TEXT BOOKS:

1. R. Panneerselvam and P. Senthilkumar, "System Simulation, Modelling and Languages", PHI Learning Private Limited, 2013

Reference Books:

1. Averill M Law, "Simulation Modeling and Analysis", Fourth Edition, McGraw-Hill Education, 2008.
2. Jerry Banks, John Carson, Barry L. Nelson and David Nicol, "Discrete - Event SystemSimulation", Prentice Hall, Fourth edition, 2005.
3. Narasing Deo, "System Simulation with Digital Computer", Prentice-Hall of India, 2004.
4. Averill. M. Law and W. David Kelton, "Simulation Modeling and Analysis", McGraw-HillInc., 2000

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E79	**BUSINESS PROCESS DOMAINS**	3	1	-

Course Objectives:

1. To familiarise with the various Business processes domains
2. To learn how to audit energy usages in various business domains.
3. To learn the security issues in various business domains.

Course Outcomes:

On successful completion of the subject students will be able to

1. Understand the concepts and applications of various domains
2. Perform energy audit
3. Provide solutions for secure transactions

UNIT – I

Telecommunications: The Future - Organizations Involved in Telecommunications - Terminals and Codes - Systems that use Data Transmission - Human-Computer Dialog - Telecommunications Standards - Communications Network Architectures - The Structure of Telecommunications Networks.

Media: Print Media – Electronic Media(Radio and Television) – Film Media – Advt.

Technology: Engineering and Management - Functions of Technology Management - Managing Technology through the Product Life Cycle

UNIT – II

Financial Services: Financial System – E-Banking: Transactions(Inter and Intra Banking, Electronic payments) – Securities in E-banking(SSL, digital signatures) – Services provided(ATM, Smart card, ECS) – Insurance - Capital Market Services - Mutual Funds - Leasing and Hire Purchase

UNIT - III

Health and Public Services: Information Technology in Healthcare and Telemedicine - Professional Health Service Organisations - Organisational & Professional Commitment & its Influence on Health Service Management – Biometric Technologies(RFID, Retina scanning, Facial recognization, Finger print scanning, Hand geometry, Working principles of DNA).

UNIT – IV

Manufacturing: Manufacturing Operations - Manufacturing Models and Metrics - Introduction to Automation - Industrial Control Systems - Hardware Components for Automation and Process Control - Industrial Robotics - Product Design and CAD/CAM in the Production System

UNIT – V

Energy and Utilities: Introduction to Global Energy Scenario - Technology and Considerations for Electrical and Fuel Energy - Energy Analysis of Real Industrial Systems: Factories - Principles and Objectives of Energy Management - Procedures for Energy Analysis and Audit.

TOTAL PERIODS: 60

Text Books:

1. Telecommunications and the Computer by Martin, James, PHI, Third Edition, ISBN: 978-81-203-0771-2.
2. Media Law And Ethics by Neelamalar M, PHI, 2010, ISBN: 978-81-203-3974-3
3. Managing Engineering and Technology by Morse, Lucy C., Babcock, Daniel L. PHI, Fourth Edition, PHI, ISBN: 978-81-203-3825-8
4. Financial Services by Sandeep Kumar Goel, PHI learning, 2011, ISBN: 978-81-203-4445-7
5. E-Commerce: AnIndian Perspective by S. J. Joseph, P. T., PHI learning, Fourth Edition, 2012, ISBN: 978-81-203-4505-8

Reference Books:

1. Information Technology: Principles And Applications by Ajoy K. Ray Tinku Acharya PHI, 2004, ISBN: 978-81-203-2184-7
2. Health Service Management: Culture, Consensus & The Middle Manager by Carney, Marie PHI, ISBN: 978-81-203-3176-1.
3. Biometric Technologies and Verification Systems by John R. Vacca Butterworth-Heinemann/Elsevier, 978-0-7506-7967-1
4. Automation, Production Systems, And Computer-Integrated Manufacturing by Groover, Mikell P. PHI, Third Edition, 2007, ISBN: 978-81-203-3418-2
5. Energy Engineering And Management by Chakrabarti, Amlan, PHI,2011,ISBN:978-81-203-4233-0
6. Essentials of E-Commerce Technology by Rajaraman, V PHI learning, ISBN:978-81-203-3937-8
7. Effective Public Relations and Media Strategy by Reddi, C.V. Narasimha P, PHI, 2010, ISBN: 978-81-203-3646-9
8. Bringing New Technology To Market by Allen Kathleen R. PHI,ISBN:81-203-2209-6
9. Financial Services Tripathy, Nalini Prava PHI,ISBN:978-81-203-3245-4
10. IT Services Business Management : Concepts, Processes And Practices Dubey, Sanjiva Shankar,PHI, ISBN:978-81-203-4531-7.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E710	**SOFTWARE PROJECT MANAGEMENT**	3	1	-

Course Objective:

1. To learn all process involved during the software development phase
2. To familiarize various software process models.
3. To properly estimate cost, effort and risk factors.

Course Outcomes:

1. Students knowing the all activity of the software development process.
2. Able to estimate cost and risk of software development.
3. Manage software development effectively.

UNIT – I

Convetional Software Management: The Waterfall Model,Conventional software Management Performance. Evolution of Software Economics: Software Economics, Pragmatic Software CostEstimation. Improving Software Economics: Reducing Software Product Size,Improving software Processes, Improving Team Effectiveness,Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT – II

Conventional and Modern Software Management: Principles ofConventional Software Engineering, Principles of Modern SoftwareManagement, Transitioning to an Iterative Process. Life Cycle Phases: Engineering and Production Stages, Inception. Elaboration, Construction, Transition Phases.

Artifacts of The Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based SoftwareArchitectures: A Management Perspective and Technical Perspective.

UNIT – III

Flows of The Process: Software Process Workflows. Inter Trans Workflows. Checkpoints of the Process: Major Mile Stones, MinorMilestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and ScheduleEstimating.Interaction Planning Process.Pragmatic Planning.

UNIT – IV

Project Organizations and Responsibilities: Line-of-BusinessOrganizations, Project Organizations, and Evolution of Organizations.Process Automation: Automation Building Blocks, The ProjectEnvironment.

UNIT – V

Project Control and Process Instrumention: Server Care Metrics, Management Indicators, Quality Indicators, Life Cycle ExpectationsPragmatic Software Metrics, Metrics Automation. Tailoring theprocess: Process Discriminates, Example.Modern Project Profiles Next Generation Software economics, ModernProcess Transitions. Case Study: The Command Center Processing andDisplay System –Replacement (CCPDS-R)

TOTAL PERIODS: 60

Text Books:

1. Software Project Management, Walker Rayce, 2010, PEA.
2. Bob Hughes and Mike Cotterell , "Software Project Management", Tata McGraw-Hill, Third Edition, 2004.

Reference Books:

1. "A Guide to Distributed Development, Projects, and Outsourcing", Christof EbertNovember 2011, Paperback.
2. Software Engineering and Management, Shere K. D, 1998, PHI.
3. Software Project Management: A Concise Study, S. A. Kelkar, PHI.

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E711	**NATURAL LANGUAGE PROCESSING**	3	1	-

Course Objectives:

1. To tag a given text with basic Language processing features**,** design an innovative application using NLP components,
2. Implement a rule based system to tackle morphology/syntax of a Language, design a tag set to be used for statistical processing keeping an application in mind
3. Design a Statistical technique for a new application
4. Compare and contrast use of different statistical approaches for different types of applications

Course Outcomes:

On successful completion of this course

1. The students will get acquainted with natural language processing and learn how to apply basic algorithms in this field.
2. They will understand the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data - corpora.
3. They will also grasp basics of knowledge representation, inference, and relations to the artificial intelligence.

UNIT - I

Introduction –Regular Expressions -Finite State Automata -Morphology –Finite state transducers-Probabilistic models - N-grams models.

UNIT - II

Syntax analysis: Word classes and Part-of-Speech - Context Free Grammars for English – parsing with context free grammar- Syntax-Features and Unification- Lexicalized and Probabilistic Parsing- Language and Complexity.

UNIT - III

Semantic Analysis: Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus - Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis -Semantic Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation -Information Retrieval.

UNIT - IV

Pragmatics: Discourse- Reference Resolution - Text Coherence -Discourse Structure - Dialog and Conversational Agents - Natural Language Generation- Machine Translation - Transfer Metaphor – Interlingua – Statistical Approaches.

UNIT - V

Information Extraction: Entity recognition- relation detection- temporal expression analysis and template-filling.

Question Answering and Summarization: Information retrieval-factoid question answering, single document summarization,- generic multiple document summarization- query-focused summarization.

TOTAL PERIODS: 60

Text Books :

1. Daniel Jurafsky and James, H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing Computational Linguistics, and Speech Recognition, 2nd edition Prentice-Hall, 2009.
2. Tanveer Siddiqui and U.S.Tiwary, "Natural Languge Processing and Information Retreival", Oxford University Press, 2008.
3. James Allen "Natural Language Understanding", Benjamin / Cummings Publishing Co.,1995.

Reference Books:

1. Gros, Jones and Webber, "Readings in Natural Language Processing", Morgan Konfmann publishers, 1986.
2. Popov, "talking with computers in Natural Language"- Springer – Verlag – 1986.
3. E.Reiter and Robert Date "Building Natural Language Generation Systems" Cambridge University Press, 2000.
4. Christopher Manning and Hinrich Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

Website:

1. www.cs.berkeley.edu/~klein/cs294-5/index.html
2. http://www.cse.unt.edu/~rada/CSCE5290/
3. http://www.cl.cam.ac.uk/teaching/1213/L100/materials.html

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E712	OPTICAL NETWORKS	3	1	-

Course Objectives:

1. To convey the basics of Optical Networks, and limitations in designing the optical networks.
2. Designing network with optical networks.
3. To develop methodologies for designing with Wavelength routed networks.
4. Designing the existing networks like IP, ATM, SONET using the backbone of wavelength routed networks.

Course Outcomes:

On successful completion of the module students will be able to:

1. Gain Basic Knowledge about the Optical networks.
2. Understand the concepts of topology and routing algorithms.
3. Get knowledge about the various protection mechanisms of optical layers.
4. Study the next generation optical networks.

UNIT – I

Introduction to optical networks – Principles of optical transmission – Evolution of optical networks – Components and enabling technologies – Wavelength division multiplexing (WDM) – WDM network architectures, broadcast-and-select networks, linear lightwave networks, and wavelength routed networks – Issues in broadcast-and-select networks.

UNIT – II

Static traffic routing in wavelength routed networks – Virtual topology design – problem formulation and algorithms - design of multi-fiber networks – Virtual topology reconfiguration – problem formulation - reconfiguration due to traffic changes - reconfiguration for fault restoration – Network provisioning.

UNIT – III

Dynamic traffic routing in wavelength routed networks – Routing and wavelength assignment algorithms – Centralized and distributed control – Introduction to Wavelength convertible networks – Wavelength rerouting.

UNIT – IV

Control and Management – Functions – Framework – Information Model – Protocols – Optical layer Services and Interfacing – Network Survivability – Protection in SONET / SDH – Protection in IP Networks – Optical Layer Protection – Schemes.

UNIT – V

Next generation optical Internets – burst switching – packet switching (IP-over-WDM) – Multicast traffic routing – source rooted trees - Access Networks – PON, FTTC, FTTH – Traffic Grooming – Optical Burst Switching.

TOTAL PERIODS: 60

Text Books:

1. C. Siva Ram Murthy and Mohan Gurusamy, "WDM Optical Networks: Concepts, Design, and Algorithms", Prentice-Hall of India, 2002.
2. B. Mukherjee, "Optical WDM Networks", Springer, 2006.
3. Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks: A Practical Perspective, Morgan Kaufmann (Elsevier Indian Edition), Second edition, 2004.

Reference Books:

1. Greg Bemstein, Bala Rajagopalan and Debanjan Saha, "Optical Network Control – Architecture, Protocols and Standards", Pearson Education, 2004.
2. Uless Black, "Optical Networks - Third Generation Transport Systems", Pearson Education, 2002.

Website:

1. http://www.cse.wustl.edu/~jain/cis788-99/ftp/dwdm.pdf
2. http://www.cse.buffalo.edu/~qiao/cse620/wdm_reconfig.ppt
3. http://grail.cba.csuohio.edu/~arndt/optical%20network.ppt
4. http://sit.iitkgp.ernet.in/research/aut05vol/topic4.ppt
5. http://www.cambridge.org/resources/0521868009/5963_OSN_chapter9.ppt

Electives for Eighth Semester

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E81	**INTELLIGENT INFORMATION RETRIEVAL**	3	1	-

Course Objectives:

1. To learn concepts of knowledge representation methods, reasoning processes, ontology concepts
2. To understand the ontology representation languages
3. To understand the basic components of information retrieval systems
4. To understand the indexing and querying mechanisms in information retrieval
5. To understand how to discover knowledge using artificial intelligence concepts

Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to incorporate artificial intelligence concepts in Information retrieval models
2. An ability to design ontology and understand the role of ontologies in Information retrieval system
3. An ability to understand the indexing mechanisms
4. An ability to understand the characteristics of Web search engines

UNIT – I

Knowledge Representation: Knowledge representation - Basics of Prepositional logic – Predicate logic - reasoning using first order logic-unification - forward chaining - backward chaining –resolution - Production rules – frames - semantic networks - scripts.

UNIT – II

Ontology Development: Description logic-taxonomies -Topic maps – Ontology - Definition expressing ontology logically - ontology representations – XML – RDF – RDFS – OWL – OIL –ontology development for specific domain - ontology engineering - Semantic web services.

UNIT – III

Information Retrieval Modeling: Information retrieval – taxonomy-formal characterization –classic information retrieval - Set theoretic model - Algebraic model - Probabilistic model -structured text retrieval models - models for browsing -.retrieval performance evaluation –keyword based querying - pattern matching - structural queries - query operations.

UNIT – IV

Text and Multimedia Languages and Properties: Introduction – metadata - markup languages –multimedia. **Text operations**: document preprocessing - document clustering - text Compression –basic concepts - statistical methods. **Indexing and searching**: inverted files - suffix trees -signature files - boolean queries - sequential searching - pattern matching.

UNIT – V

Recent Trends in IR: Parallel and distributed IR - multimedia IR - data modeling – querylanguages - A generic Multimedia indexing Approach - one dimensional time series – twoDimensional colour images - Automatic feature extraction. Web Searching - Characterizing theWeb - Search Engines – Browsing – Meta searchers - Searching using hyperlinks.

TOTAL PERIODS: 60

Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education, Second edition, 2003.
2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith,"Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management", Wiley Publishers, 2003.
3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, "Modern Information Retrieval", Addison Wesley, 1999.

Reference Books:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition,2003.
2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.

Website:

1. http://www.searchtools.com/info/info-retrieval.html
2. http://trec.nist.gov/
3. http://www-nlp.stanford.edu/IR-book/
4. http://www.csee.umbc.edu/csee/research/cadip/readings/IR.report.120600.book.pdf
5. http://www.obitko.com/tutorials/ontologies-semantic-web/resource-description-framework.html

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E82	**SOFT COMPUTING**	3	1	-

Course Objectives:

1. To introduce neural networks, explain the process of their construction, training and inferencing from them.
2. To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
3. To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
4. To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

Course Outcomes:

On successful completion of the module students will be able to:

1. Construct neural networks and use them for learning and inferencing for suitable problems.
2. Use fuzzy logic and implement the fuzzy sets and operations in fuzzy systems.
3. Make use of genetic algorithms for optimization problems.

UNIT – I

Introduction: Introduction to Artificial Neural Networks, Fundamentals of biological neural networks, Basic principles of ANNs, The Perceptron, single layer and many layer perceptrons, Madaline.

UNIT- II

Machine Learning Using Neural Network: Adaptive Networks – Feed forward Networks –Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures.

UNIT – III

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT – IV

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms –Case studies.

UNIT – V

Genetic Algorithms, Survival of the fittest, initialization and selection, fitness computation, Cross over, Mutation, Rank Operations – Fitness Scaling – Inversion - Applications of Genetic Algorithms.

TOTAL PERIODS: 60

Text Books:

1. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Education, 2003.
2. Timothy J Ross, "Fuzzy Logic: With Engineering Applications", 2 Edition, Wiley India Private Ltd, 2007.
3. Juan Ramon Rabunal, Julian Dorado, "Artificial Neural Networks in Real Life Application", Idea Group Inc, 2006.
4. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2007.
5. David E Goldberg," Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, India, 2013.

Reference Books:

1. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", Prentice-Hall of India, 2003.
2. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
3. S.N.Sivanandam · S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007.
4. Randy L. Haupt, Sue Ellen Haupt, "Practical Genetic Algorithms", 2 Edition, Wiley and Sons, 2004

Website:

1. www.csse.monash.edu.au/courseware/cse5301/2006/Lnts/LaD.pdf
2. www.lancet.mit.edu/mbwall/presentations/IntroToGAs
3. www.iitk.ac.in/kangal/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E83	**BIO- INSPIRED COMPUTING**	3	1	-

Course Objectives:

1. To learn fundamental topics in bio-inspired computing;
2. To understand collective systems such as ACO, PSO, and BCO;
3. To develop skills in biologically inspired algorithm design with an emphasis on solving real world problems;
4. To understand the most appropriate types of algorithms for different data analysis problems and to introduce some of the most appropriate implementation strategies.

Course Outcomes:

On successful completion of the module students will be able to:

1. Familiarity with the basics of several biologically inspired computing paradigms.
2. Exposure to examples of problems that can be addressed by bio-inspired paradigms.
3. Ability to select an appropriate bio-inspired computing method and implement for any application and data set.
4. Theoretical understanding of the differences between the major bio-inspired computing methods.

UNIT – I

Optimization Techniques: Introduction to Optimization Problems – Single and Muti-objective Optimization – Classical Techniques – Overview of various Optimization methods –**Evolutionary Computing**: Genetic Algorithm and Genetic Programming: Basic concept – encoding – representation – fitness function – Reproduction – differences between GA and Traditional optimization methods – Applications – **Bio-inspired Computing** (BIC): Motivation – Overview of BIC – usage of BIC – merits and demerits of BIC.

UNIT – II

Natural to Artificial Systems: Biological Nervous Systems – artificial neural networks – architecture – Learning Paradigms – unsupervised learning – supervised learning – reinforcement learning – evolution of neural networks – hybrid neural systems – Biological Inspirations in problem solving – **Behavior of Social Insects:** Foraging –Division of Labor – Task Allocation – Cemetery Organization and Brood Sorting – Nest Building – Cooperative transport.

UNIT – III

Swarm Intelligence: Introduction – Biological foundations of Swarm Intelligence – Swarm Intelligence in Optimization – **Ant Colonies:**Ant Foraging Behavior– Towards Artificial Ants – Ant Colony Optimization (ACO) – S-ACO– Ant Colony Optimization Metaheuristic: Combinatorial Optimization – ACO Metaheuristic – Problem solving using ACO – Other Metaheuristics – Simulated annealing – Tabu Search – Local search methods – Scope of ACO algorithms.

UNIT – IV

Swarm Robotics: Foraging for food – Clustering of objects – Collective Prey retrieval – Scope of Swarm Robotics – **Social Adaptation of Knowledge:** Particle Swarm – Particle Swarm Optimization (PSO) – Particle Swarms for Dynamic Optimization Problems– Artificial Bee Colony (ABC)Optimization–**Other Swarm Intelligence algorithms:** Fish Swarm – Bacteria foraging – Intelligent Water Drop Algorithms – Applications of biologically inspired algorithms in engineering.

UNIT – V

Case Studies: ACO and PSO for NP-hard problems – Routing problems – Assignment problems – Scheduling problems – Subset problems – Machine Learning Problems – Travelling Salesman problem.

TOTAL PERIODS: 60

Text Books:

1. A. E. Elben and J. E. Smith, "Introduction to Evolutionary Computing", Springer, 2010.
2. Floreano D. and Mattiussi C., "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", MIT Press, Cambridge, MA, 2008.
3. Leandro Nunes de Castro, " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007
4. Marco Dorigo, Thomas Stutzle, "Ant Colony Optimization", MIT Press, 2004.

Reference Books:

1. Christian Blum, Daniel Merkle (Eds.), "Swarm Intelligence: Introduction and Applications", Springer Verlag, 2008.
2. Eric Bonabeau, Marco Dorigo, Guy Theraulaz, "Swarm Intelligence: From Natural to Artificial Systems", Oxford University press, 2000.
3. Leandro N De Castro, Fernando J Von Zuben, "Recent Developments in Biologically Inspired Computing", Idea Group Inc., 2005.
4. M. Dorigo and T. Stutzle, "Ant Colony Optimization", A Bradford Book, 2004.
5. R. C. Ebelhart et al., "Swarm Intelligence", Morgan Kaufmann, 2001.
6. Albert Y.Zomaya, "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006.

Website:

1. http://www.isna3ha.com/books/english/AI/2008-Bio-inspired%20Artificial%20Intelligence,%20Theories,%20Methods%20&%20Technologies.pdf
2. http://econ.ubbcluj.ro/~rodica.lung/taco/literatura/aco/Ant%20Colony%20Optimization%20Dorigo%20carte.pdf
3. http://www.cs.vu.nl/~gusz/ecbook/Eiben-Smith-Intro2EC-Ch2.pdf

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E84	**Mobile Computing**	3	1	-

Course Objectives:

1. To teach the basics of mobile computing ideas and best practices.
2. To teach the emerging wireless network standards.
3. To introduce the various models and data management concepts of mobile computing.
4. To learn the routing and secure protocols of mobile networking.

Course Outcomes:

On successful completion of the module students will be able to:

1. Gain basic knowledge in mobile computing.
2. Should have a broader knowledge on 3G.
3. Gain the knowledge on emerging wireless network standards.

Syllabus:

UNIT I

INTRODUCTION: Wireless and Mobile Computing Architecture – Limitations of wireless and mobile communication – Wireless Telecommunication Networks: Digital cellular Systems, TDMA - CDMA – Wireless Networking Techniques – Mobility Bandwidth Tradeoffs – Portable Information Appliances.

UNIT II

EMERGING WIRELESS NETWORK STANDARDS : 3 G Wireless Networks – State of Industry – Mobility support Software – End User Client Application – Mobility Middleware –Middleware for Application Development - Adaptation and Agents - Service Discovery Middleware – Finding Needed Services - Interoperability and Standardization.

UNIT III

MOBILE NETWORKING : Virtual IP Protocols - Loose Source Routing Protocols - Mobile IP – CDPD – GPRS – UMTS Security and Authentication – Quality of Service – Mobile Access to the World Wide Web.

UNIT IV

MOBILE DATA MANAGEMENT: Mobile Transactions - Reporting and Co Transactions –Kangaroo Transaction Model – Clustering Model –Isolation only transaction – 2 Tier Transaction Model – Semantic based nomadic transaction processing.

UNIT V

MOBILE COMPUTING MODELS: Client Server model – Client/Proxy/Server Model – Disconnected Operation Model – Mobile Agent Model – Thin Client Model – Tools: Java, Brew, Windows CE, WAP, Sybian, and EPOC.

TOTAL PERIODS: 60

Text Books:

1. Reza B Fat and Roy.T. Fielding, "Mobile Computing Principles", Cambridge University
Press, 2005.
2. Abdelsalam A Helal, Richard Brice, Bert Haskel, MarekRusinkiewicz, Jeffery L Caster and DarellWoelk, "Anytime, Anywhere Computing, Mobile Computing Concepts and Technology", Springer International Series in Engineering and Computer Science, 2000.

Reference Books:

1. Golden Richard, Frank Adelstein, Sandeep KS Gupta, Golden Richard and LorenSchwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional Publishing", 2005.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.

Website:

1. http://www.faadooengineers.com/threads/394-MOBILE-COMPUTING-E-book presentation-and-lecture-notes-covering-full-semester-syllabus
2. http://www.dsc.ufcg.edu.br/~sampaio/cursos/2005.1/BancoDeDados/Artigos/BDMoveis/MobileTransactions/an-overview-of-transaction.pdf

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E85	**GRID COMPUTING**	3	1	-

Course Objectives:

1. To understand Grid Architecture
2. To understand different types of grids
3. To know Grid standards
4. To apply grid computing in various areas

Course Outcomes:

The student will be able to

1. Create a Grid Middleware architecture
2. Explain the services offered by grid
3. To utilize grid for various applications

UNIT I INTRODUCTION

Parallel and Distributed Computing - Cluster Computing - Grid Computing Anatomy and Physiology of Grid - Web and Grid Services.

UNIT II FRAMEWORK Architecture – Implementation of Grid Architecture – Grid Services OGSI, OGSA, WSRF – Grid Resource and Service Management –Resource Management Framework – Service Negotiation and Acquisition Protocol – Layers of Grid Computing – Building Reliable Services - Grid Monitoring – Sensors and Sensor Management - Grid Security – WS Security – GSI.

UNIT III DATA AND KNOWLEDGE GRID

Data Source – Collective Data Services - Data Management – Collective Data Management – Federation Services – Representing Knowledge – Processing Knowledge - Knowledge Oriented Grid.

UNIT IV GRID MIDDLEWARE

List of Globally Available Toolkits – GT3 – Architecture Details – Grid Service Container – OGSI Implementation – Security Infrastructure - System Level Services – Hosting Environments- Programming Model.

UNIT V APPLICATIONS

Scientific – Medical – Bioinformatics – Federated Computing – ERM – Multiplayer Games - Collaborative Science – Case Study.

TOTAL PERIODS = 60

Text Books:

1. Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, Second edition, 2009.

Reference Books:

1. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2010.

2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a Reality", Wiley, 2010.
3. Maozhen Li, Mark Baker, "The Grid: Core Technologies", Wiley, 2009.

Website:

1. http://forge.gridforum.org/
2. http://gridgroup.tic.hefr.ch/
3. http://digitalcommons.unl.edu/cseconfwork/83
4. http://www.globus.org/
5. http://www.ggf.org/
6. http://www.unicore.org/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E86	**AGENT TECHNOLOGIES**	3	1	-

Course Objectives:

1. To have comprehensive understanding on software agents
2. To introduce the concepts, techniques and applications of software agents.
3. To enables the student to understand the characteristics of the agents, their design and implementation.
4. To introduce about agent communication and negotiation

Course Outcomes:

On successful completion of the module, students will be able to:

1. Describe what an intelligent software agent is and its main characteristics
2. Describe what a multi-agent system is and how it differs from a single agent-based system.
3. Describe agent knowledge representation, and agent communication and coordination mechanisms
4. Describe several different agent architecture tools and frameworks.
5. Describe multi-agent learning, and mobile agent characteristics and applications.

UNIT – I

Agents Overview: Software Agent definition – Agents Vs objects – Intelligent Agent – Agent characteristics – Agent Types – Agent Applications – Agent Oriented Software Engineering (AOSE) - Aglets – Mobile agents – Agent frame works – Agent reasoning.

UNIT – II

Agents Implementation: Processes – Threads – Daemons – Components – Java Beans – ActiveX –Sockets, RPCs – Distributed computing – Aglets programming – JINI architecture – Actors andagents – Typed and proactive messages.

UNIT – III

Multi Agent Systems: Interaction between agents – Reactive agents – Cognitive agents – Interaction protocols – Agent coordination – agent negotiation – Agent cooperation – Agentorganization – Self-interested agents in electronic commerce applications.

UNIT – IV

Intelligent Software Agents: Interface Agents – Agent Communication Languages – AgentKnowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile AgentApplications.

UNIT – V

Agents and Security: Agent Security Issues – Mobile Agents Security – Protecting AgentsMalicious Hosts – Untrusted Agents – Black box Security – Authentication for Agents – Securityissues for Aglets.

TOTAL PERIODS: 60

TEXT BOOKS

1. Joseph P. Bigus and Jennifer Bigus, "Constructing Intelligent Agents Using Java: Professional Developer's Guide", Wiley, Second edition, 2001.
2. Bradshaw, "Software Agents", MIT Press, 2000

REFERENCES

1. Stuart Jonathan Russell, Peter Norvig, John F. Canny Contributor, Peter Norvig and John
2. F. Canny, "Artificial Intelligence: A Modern Approach", Prentice Hall, Second edition, 2003.
3. Richard Murch and Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E87	**BIOINFORMATICS**	3	1	-

Course Objectives:

1. To introduce the fundamental concepts in bioinformatics and computational biology.
2. To introduce the computational methods that can be used for querying and manipulating biological data.

Course Outcomes:

On successful completion of the module students will be able to:

1. Extract information from different types of bioinformatics data and perform text- and sequence-based searches.
2. Master computational techniques and diversified bioinformatics tools for processing data using statistical, machine learning and data mining techniques.
3. Analyze processed data with the support of analytical and visualization tools.

UNIT- I

Introduction: Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy

UNIT – II

Protein Information Resources -Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases -Genome Information Resources - DNA sequence databases, specialized genomic resources.

UNIT – III

DNA Sequence analysis - Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases

UNIT - IV

Pair wise alignment techniques - Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching - Multiple sequence alignment, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching

UNIT – V

Analysis packages -Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

TOTAL PERIODS: 60

Text Books:

1. T.K.Attwood & D.J.Parry-Smith, "Introduction to Bioinformatics", Addison Wesley Longman, 2007.
2. Jean Michel Claverie, Cedric Notre dame, "Bioinformatics- A Beginner's Guide", Wiley India Pvt. Ltd, 2003.
3. Bryan Bergeron, "Bio Informatics Computing", Pearson Education, Second edition, 2003.

Reference Book:

1. Arthur M.Lesk, "Introduction to Bioinformatics", Oxford University Press, 2008.

Website:

1. http://bioinformaticsweb.net/
2. http://www.med.nyu.edu/rcr/rcr/btr/complete.html
3. http://mybio.wikia.com/wiki/Tutorials_in_bioinformatics

Subject Code	Subject Name	Lectures (Periods)	Tutorials (Periods)	Practical (Periods)
CS E88	**HIGH PERFORMANCE COMPUTING**	3	1	-

Course Objectives:

1. To understand the architecture of parallel systems and identify the scope for parallelism in present day's processors.
2. To understand the various parallel programming models and the challenges involved in parallel programming and learn the parallel programming techniques with OpenMP and MPI
3. To learn high performance search algorithms.

Course Outcomes:

1. Students acquire the skills to implement software effectively and efficiently on parallel hardware platforms such as multi-core processors and processors that use multithreading techniques.
2. Capable to write parallel programs with OpenMP and MPI.
3. Devise new search algorithms.

UNIT – I

Introduction : Need of high speed computing – increase the speed of computers – history of parallel computers and recent parallel computers; solving problems in parallel – temporal parallelism – data parallelism – comparison of temporal and data parallel processing – data parallel processing with specialized processors – inter-task dependency.

The need for parallel computers - models of computation - analyzing algorithms –expressing algorithms.

UNIT – II

Parallel Programming Platforms: Trends in microprocessor architectures - limitations of memory system performance – parallel computing platforms – communication costs in parallel machines – routing mechanisms for interconnection networks.

Principles of Parallel Algorithm Design: Preliminaries – decomposition techniques – characteristics of tasks and interactions – mapping techniques for load balancing – methods forcontaining interaction overheads – parallel algorithm models.

Basic Communication Operations: One-to-all broadcast and all-to-one reduction – all-to-all broadcast reduction – all-reduce and prefix-sum operations – scatter and gather – all-to-all personalized communication – circular shift – improving the speed of some communication operations.

UNIT – III

Analytical Modeling of Parallel Programs: Sources of overhead in parallel programs – performance metrics for parallel systems – scalability of parallel systems – minimum execution time and minimum cost-optimal execution time.

Programming using the Message-Passing Paradigm: principles of message-passing programming – the building blocks – MPI – topologies and embedding – overlapping communication with computation – collective communication and computation operations – groups and communicators.

Programming Shared Address Space Platforms: Thread basics – synchronization primitives in Pthreads – controlling thread and synchronization attributes – composite synchronization constructs – tips for designing asynchronous programs – OpenMP.

UNIT – IV

Dense Matrix Algorithms: Matrix-vector multiplication – matrix-matrix multiplication – solving a system of linear equations – FFT.

Sorting: Issues in sorting on parallel computers – sorting networks – bubble sort and its variants –Quicksort – bucket and sample sort – other sorting algorithms.

Graph Algorithms: Definitions and representation – minimum spanning tree – single-source shortest paths – all-pairs shortest paths.

UNIT – V

Search Algorithms for Discrete for Discrete Optimization Problems: Definitions and examples, sequential search algorithms, search overhead factor, parallel depth-first search, parallel best-first search, speedup anomalies in parallel search algorithms.

Dynamic Programming: Overview.

TOTAL PERIODS: 60

Text Books:

1. V. Rajaraman and C. Siva Ram Murthy, "Parallel Computers – Architecture and Programming", Prentice-Hall of India, 2003.
2. Ananth Grama, Anshul gupta, George Karypis and Vipin Kumar, "Introduction to Parallel Computing", Pearson Education, Second edition, 2004.

Reference Books:

1. Selim G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice-Hall of India, 1999.
2. M.J. Quinn, "Parallel Computing – Theory and Practice", McGraw-Hill, 1994.
3. Michael Jay Quinn, "Parallel Programming in C with MPI and OpenMP", McGraw-Hill, 2003.
4. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.
5. OpenMP Programmer's Manual.
6. MPI Programmer's Manual

Websites:

1. http://www.openmp.org/
2. http://www.open-mpi/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E89	WIRELESS COMMUNICATION NETWORKS	3	1	-

Course Objectives:

1. Learn to model radio signal propagation issues and analyze their impact on communication system performance
2. Understand how the various signal processing and coding techniques combat channel uncertainties
3. Understand the techniques of radio spectrum allocation in multi-user systems and their impact on networks capacity
4. Introduce various wireless systems and standards and basic operation cases
5. Learn to simulate wireless networks and analyze the simulation results

Course Outcomes:

On successful completion of the module students will be able to:

1. Become familiar with the regulatory environment in which the wireless industry operates.
2. Understand functions and operational principles of the various components of wireless networks, and how the connections are setup and maintained.
3. Understand the concept of frequency reuse, and be able to apply it in design of simple frequency reuse patterns.
4. Realize the complicated nature of wireless propagation and be able to apply simple models to calculate link budget.
5. Understand different modulation schemes and multiple access techniques used in wireless communications.

UNIT – I

Communication Systems: Medium access control-Motivation for a specialized MAC-SDMA-FDMA –TDMA –CDMA -comparison of S/T/F/CDMA. Telecommunication Systems –GSM – DECT – TETRA - UMTS and IMT - 2000, Satellite Systems – GEO – LEO – MEO - Routing –Localization –Handover –Broadcast systems- Overview –Cyclic Repetition of Data. Digital Audio Broadcasting –Digital Video Broadcasting.

UNIT – II

Wireless Communication: Wireless LAN-Infrared vs Radio transmission – Infrastructure and ad hoc networks –IEEE802.11-HIPERLAN –Bluetooth. Wireless ATM-Motivation for WATM –Wireless ATM working group –WATM Services-Reference Model-Functions-Radio Access Layer –Handover –Location Management – Addressing –Mobile quality of service – Access point control protocol.

UNIT – III

Mobile Network Layer: Mobile IP-Dynamic host configuration protocol-Ad hoc networks. Mobile transport layer-Traditional TCP292-Indirect TCP Snooping TCP, Mobile TCP-Fast Retransmit/Fast recovery-transmission/Timeout Freezing ,Selective Retransmission – Transaction oriented TCPU.

UNIT – IV

Support for Mobility: File Systems-Consistency –World wide Web –Hyper Text mark up language –approaches that might help wireless access-System architecture –Wireless Application Protocol.

UNIT – V

Infrastructure-Based/Cellular Networks Introduction to Mobile Networks, GSM System, GPRS, EDGE, and CDMA based standard, IMT-2000, WLL, Mobile Satellite Communication, 3G and 4G, Cognitive Radio Network (5G). Ad Hoc Network, WLAN and WMAN (10) Introduction, Bluetooth, Wi-Fi Standard, WiMAX Standard, Wireless Sensor Networks, IEEE 802.15.4 and Zigbee, Ultra-wideband(UWB), IEEE 802.20.

TOTAL PERIODS: 60

Text Books:

1. Johchen schiller, Mobile Communication, Addison Wesley, 2000
2. UpenaDalal, "Wireless Communication", Oxford Higher Education.

Reference Books:

1. Willium C. Y. Lee, "Mobile communication Design and fundamentals"
2. D. R. KamiloFehar, "Wireless digital communication"
3. Haykin S & Moher M. , "Modern wireless communication", Pearson, 2005.
4. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson

Website:

1. http://compnetworking.about.com/od/wireless/WiFi_Wireless_Networks_and_Technology.htm
2. http://www.brunel.ac.uk/sed/ece/research/wncc
3. http://elsevier.com/Wireless-Communications-and-Networking
4. http://williamstallings.com

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E810	**BIG DATA MANAGEMENT**	3	1	-

Course Objectives:

1. Understand big data for business intelligence
2. Learn business case studies for big data analytics
3. Understand NoSQL big data management
4. Perform map-reduce analytics using Hadoop and related tools

Course Outcomes:

On successful completion of the module students will be able to:

1. Describe big data and use cases from selected business domains
2. Explain NoSQL big data management
3. Install, configure, and run Hadoop and HDFS
4. Perform map-reduce analytics using Hadoop
5. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

UNIT – I

Introduction to Big Data: Big Data overview- convergence of key trends-industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading, big data technologies-introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.

UNIT – II

NOSQL Data management : Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication – consistency – relaxing consistency – version stamps – mapreduce – partitioning and combining – composing map-reduce calculations.

UNIT – III

Basic of Hadoop: Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression.

UNIT – IV

MapReduce Applications: MapReduce workflows – unit tests with MR Unit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN.

UNIT – V

Hadoop Related Tools: Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

TOTAL PERIODS: 60

Text Books:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Reference Books:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

Website:

1. http://www.johndcook.com/R_language_for_programmers.html
2. http://bigdatauniversity.com/
3. http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E811	**CLOUD COMPUTING**	3	1	-

Course Objectives:

1. To impart the principles and paradigm of Cloud Computing
2. To understand the Service Model with reference to Cloud Computing
3. To comprehend the Cloud Computing architecture and implementation
4. To realize the role of Virtualization Technologies
5. To have knowledge on Cloud Computing management and security

Course Outcomes:

On successful completion of the module students will be able to:

1. Describe the concept, evolution, architecture ,pros and cons of Cloud Computing.
2. Have knowledge of how hypervisors are used in Virtual Machines.
3. To secure and perform identity management in the Cloud.
4. To access and use the services in the Cloud.

UNIT – I

Introduction to Cloud Computing: Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks, Assessing the role of Open Standards.

UNIT – II

Cloud Architecture, Services and Applications: Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service, Identity as a Service, Compliance as a Service.

UNIT – III

Abstraction and Virtualization: Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context

UNIT – IV

Managing & Securing the Cloud: Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards, Securing the Cloud, Securing Data, Establishing Identity and Presence

UNIT – V

Case-Studies: Using Google Web Services, Using Amazon Web Services, Using Microsoft Cloud Services

TOTAL PERIODS: 60

Text Books:

1. Buyya R., Broberg J., Goscinski A., "Cloud Computing: Principles and Paradigm", First Edition, John Wiley & Sons,2011.
2. Sosinsky B., "Cloud Computing Bible", First Edition,Wiley Edition, 2011.

Reference Books:

1. Miller Michael, "Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India
2. Smooth S., Tan N., "Private Cloud Computing", Morgan Kauffman , First Edition, 2011.
3. Linthicium D., "Cloud Computing and SOA Convergence in Enterprise", Pearson Education India.

Website:

1. www.ibm.com/cloud-computing/
2. www.microsoft.com/enterprise/it-trends/cloud-computing/

Subject Code	Subject Name	Lectures (Periods)	Tutorial (Periods)	Practical (Periods)
CS E812	**MOBILE APPLICATION DEVELOPMENT**	3	1	-

Course Objective:

1. To use the Objective-C and Java languages (and associated frameworks) for creating mobile apps on iOS and Android platforms, respectively
2. To learn new mobile app development tools independently
3. Harness Internet service in support of mobile apps, create effective user interfaces for mobile apps and store/retrieve data in support of mobile apps
4. Take advantage of common mobile extras such as GPS, sensors (e.g., accelerometers), etc.

Course Outcomes:

1. Articulate the differences between desktop and mobile applications.
2. Compare and contrast some popular mobile app development tools.

UNIT - I

Introduction to Mobile Telephony – Mobile device – communication standards : GSM, CDMA, UMTS, Introduction to 1G/2G/3G/4G – LTE – Mobile applications – categories – Factors in Developing Mobile Applications - Mobile application development – software architecture – application models – Framework and tools - HTML 5 - Java script - AJAX

UNIT – II

Introduction to Android – Installation - Android Architecture - Application Fundamentals - SDK features – Development framework – Android Applications and Activities – creating user interfaces – layouts – views – resources – menu – graphics – animation – intents

UNIT – III

Android File management tool – database storage – working with SQLite – GPS functionality – location based API – creating map based activities - geocoding – location-based services – handling audio and video services - networking : using Bluetooth – managing connectivity – telephony – SMS

UNIT – IV

iOS programming – introduction to Objective C: class-objects-methods – interface – inheritance – Introduction to Foundation Framework Classes - File Handling - Property Lists, NSCopy, and Archiving - Selectors and Targets - Dynamic Typing and Dynamic Binding. Introduction to iPhone Architecture - Introduction to Development IDE - XCODE, Interface Builder - Creating and building simple applications - Handling Basic Interaction - Creating basic view controllers - Monitoring events and actions - Creating advanced view controllers

UNIT – V

Storyboarding Integration - Programmatic Interface creation - Integrating with core services – Email, Contacts - Data actions – preferences - files and addresses - Camera, WebKit - database with iPhone app - Core Data Integration - Advanced controllers – Navigation controller - Integrating with Core Services – Core Audio - Video - Even Handling - Gesture Recognition - Maps and location - Protocols and Categories - Communication with the Services - Using the Accelerometer - Bluetooth Programming.

TOTAL PERIODS: 60

Text Books:

1. Reto Meier, Professional Android 2 Application Development, Wiley publications, 2011
2. J. F. DiMarzio , Android – A programmer's Guide, Mc Graw Hill, 2010
3. James A. Brannan, Blake Ward, iOS SDK Programming, Tata McGraw Hill, 2011

Reference Books:

1. Jeff McWherter, Scott Gowell , Professional Mobile Application Development, John Wiley & sons , Inc, 2012

Website:

1. www.android.com
2. www.apple.com