VASAVI COLLEGE OF ENGINEERING

(Autonomous)

Ibrahimbagh, Hyderabad-31, Telangana State

(Aproved by AICTE and Affiliated to Osmania University)

Established in 1981

VASAVI COLLEGE OF ENGINEERING (Autonomous)

STUDENT HAND BOOK 2014-2015

Sponsored by

VASAVI ACADEMY OF EDUCATION, Hyderabad

Phone : 91-40-23146002
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www.vce.ac.in

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Ibrahimbagh, Hyderabad-31

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Hyderabad

College Vision

Striving for a symbiosis of technological excellence and human values

College Mission

To arm the young brains with competitive technology and nurture the holistic development of the individuals for a better tomorrow

Quality Policy

Education without quality is like a flower without fragrance. It is our earnest resolve to strive towards imparting highstandards of teaching, training and developing human resources

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)

Ibrahimbagh, Hyderabad-31

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

HAND BOOK
2014 - 2015

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ABOUT THE COLLEGE

Vision

Striving for a symbiosis of technological excellence and human values

Established in 1981 by Vasavi Academy of Education under the stewardship of Late Sri Pendekanti Venkata Subbaiah, a veteran statesman of independent India and by a few eminent people from different walks of life Vasavi College of Engineering represents a rich tradition of excellence in technology based education in a stimulating environment. From a modest beginning with just three undergraduate programs, viz., B.E. degree programs in Civil, Mechanical and Electronics & Communication Engineering, with dedicated efforts for over **33** years, it has now grown into a mighty center of learning with excellent and well-developed infrastructural facilities, offering 6 undergraduate programs, viz., B.E. in Civil, Mechanical, Electrical & Electronics, Electronics & Communication Engineering, Computer Science & Engineering, and Information Technology, in addition to a 3-year postgraduate program in Computer Applications (MCA), and 2-Year Postgraduate Programmes in CSE, ECE, EEE and Mechanical Engineering.

All the undergraduate (B.E) programs were accredited by National Board of Accreditation (NBA) for the academic years 2013-2015. The college sought fresh approval for NBA accreditation for two eligible PG programs and MCA program.
The college has been recognized under 12(B) and 2(f) sections of the University Grants Commission (UGC).

The College has **189** highly qualified and experienced faculty members consisting of Professors, Associate Professors and Assistant Professors and around **155** technical and supporting staff. The college has very good infrastructural facilities which go beyond the curriculum requirements. The college offers value-

added courses in GIS, CAD/CAM, DSP, VLSI, Networking, J2EE and communication skills to bridge the gap between the curriculum and the requirements of the Industry. Finishing school has been made part of curriculum from the second year onwards to improve the skills of the students.

MISSION

To arm the young brains with competitive technology and nurture the holistic development of the individuals for a better tomorrow

A Research & Development (R&D) Cell is established by personnel from industry / research organization to encourage the faculty and the students in acquiring additional qualifications and knowledge. This Cell also facilitates the faculty for interaction with industry/research organizations in getting sponsored research projects. In addition, the college extends consultancy in various fields of engineering and technology. The Center for Counseling and Placement at Vasavi College of Engineering provides personal and career-related support to its students. The educational experience at the college is enlivened and enriched by an array of extra-curricular activities to fulfill the cultural and emotional needs of students.

A good number of ranks in university examinations are secured by our students every year.

QUALITY POLICY

Education without quality is like a flower without fragrance. It is our earnest resolve to strive towards high standards of teaching, training and developing human resources.

The all round development of a student is achieved by exposing him/her to the outside world in a systematic and well planned manner. Just not marks and ranks, but also ethics and morals are incorporated into psyche of a student at Vasavi in a cautious way. This unification of tradition and technology makes Vasavi a place for paradise of learning.

VASAVI ACADEMY OF EDUCATION (VAE)

GOVERNING BODY MEMBERS

Sri P. Ramamohan Rao	:	President
Prof. T.V. Subba Rao	:	Vice-President
Sri M. Krishna Murthy	:	Secretary
Sri K. Vasudeva Gupta	:	Joint-Secretary
Sri P.V. Ratnam	:	Treasurer
Sri P. Balaji	:	Member
Sri K.V. Rangaiah	:	Member
Sri K. Ashok Kumar	:	Member
Smt. P. Indrani	:	Member
Sri Gouri Prasad	:	Member
Sri V.M. Parthasarathi	:	Member
Sri Lagisetty Subbagurumurthi	:	Member
Prof. V. Srinivasulu	:	Special Invitee

INSTITUTIONS SPONSORED BY VASAVI ACADEMY OF EDUCATION

INSTITUTION	ESTABLISHED
Vasavi College of Engineering	**1981**
Vasavi Public School	**1983**
Vasavi Polytechnic	**1984**
Pendekanti Law College	**1990**
Pendekanti Institute of Management	**1991**
Vasavi College of Music & Dance	**1996**

VASAVI COLLEGE OF ENGINEERING
MANAGEMENT COMMITTEE

NAME	DESIGNATION
Sri P Ramamohan Rao	President
Prof. T.V. Subba Rao	Vice President
Sri M Krishna Murthy	Secretary
Sri K. Vasudeva Gupta	Joint Secretary
Sri P V Ratnam	Treasurer
Sri D.B. Ramanatha Gupta	Member
Dr. G.V. Ramana Murty	Principal & Ex-Officio Member

Principal **:** Dr. G.V. Ramana Murty

Telephone No: +91-40-23146002

Fax : +91-40-23146090

Website : www.vce.ac.in

E-mail : principal@staff.vce.ac.in

STUDENT PERSONAL DATA

Name :
Hall Ticket No :
Class :
Branch:
Address :

PHOTO

Phone Nos. :
Home :
Mobile :
E-mail ID :
Bank A/c. No. :
Credit Card No. :
Passport No. :
Driving License :
Vehicle No :

Medical Information

Height :
Weight :
Blood Group :

In case of Emergency, Contact

Name :
Phone No. :

Name :
Phone No. :

COLLEGE PROFILE

Vasavi College of Engineering, established in 1981, is a self-financed institution, approved by AICTE, New Delhi and affiliated to Osmania University, Hyderabad and offers the following courses:

Branch	Starting Year	Intake (2014-15)
4-Year Undergraduate Programmes		
Civil Engineering	1981	60
Electronics & Communication Engineering	1981	120
Mechanical Engineering	1981	120
Computer Science & Engineering	1994	120
Electrical & Electronics Engineering	1999	60
Information Technology	2000	120
2-Year PG Programmes (Full-time 4 semesters)		
Embedded Systems & VLSI Design (ECE)	2003	18
Communication Engineering & Signal Processing (ECE)	2011	18
Advanced Design & Manufacturing (Mechanical)	2003	18
Computer Science & Engineering (CSE)	2011	18
Power Systems and Power Electronics (EEE)	2012	24
3-Year Postgraduate Programmes		
Master in Computer Applications (MCA)	1994	60

All the U.G programmes of accredited by National Board of Accreditation (NBA) for two years with effect from September 2013.

The following departments have been recognized by the Osmania University, Hyderabad as Research Centers and are offering Ph.D.

RESEARCH CENTRE DEPARTMENTS
Computer Science & Engineering
Electronics & Communication Engineering
Mechanical Engineering

Some of the Faculty members have been recognised as research supervisor/guides by the Osmania University and JNTU-Hyderabad in the above departments.

INFRASTRUCTURE

VASAVI, in its constant pursuit of offering quality education, has created excellent infrastructural facilities for all the programmes and established certain advanced laboratories such as, CISCO Networking Lab, VLSI Design Centre, Embedded Systems, DSP, CAD/CAM and GIS dealing with contemporary technologies. Common facilities for the academic support, the Basic Science Laboratories, Central Computing Laboratory, Manufacturing Practice Laboratory and Language Laboratory were established for the first year courses. The Phonetics Laboratory, Interactive Communication Laboratory and reading room were set up, much before it was made mandatory by the university, to improve the communication skills of the students. Recently, the English Language Laboratory is upgraded to Multi-Media Laboratory. There are a total of 963 computer systems in the college with latest configuration. The College main computer centre houses 64 latest computer systems and 14 servers. All the systems in the college campus are networked through LAN. Well established intranet supports the faculty and the administration for online data retrieval of student details, marks, attendance, faculty publications etc.

FACULTY

The college has 189 highly qualified and experienced faculty members including 21 Professor, 30 Associate and professionals from Industry and Research Organizations.

With a view to strengthen in the teaching-learning process and quality improvement, the College conducts staff development program. All well ventilated, spacious and luminous classrooms located in architecturally style

fine buildings amidst lush green lawns provide a pleasant stay to the students at campus of Vasavi College of Engineering.

Supporting facilities such as buses for comfortable and safe transport, campus wide EPBAX telephone systems, 24X7 internet connectivity, Generators (500 KVA, 120 KVA) for uninterrupted power supply, bank and subsidized canteen are provided to the students and staff. The college has installed roof top solar power plant of 200KWp capacity.

COMPUTER CENTER

The College has established a high-speed campus-wide network that connects all the computer systems located in the college campus. A fully distributed computing environment based on clusters of workstations and PC's provides the staff and students ready access to computing resources, services, software and applications. The environment is tailored to the specific teaching/learning needs of each Department. Full access is provided to email, the Internet, on-line journals, e-content, QEEE facilities, departmental Intranets and other online sources of services and information through BSNL leased line Internet connectivity of 30 mbps and a separate line of 10MBPS from Beam Fiber.

The Server room houses the various servers - Windows Server, LINUX Server, Oracle Database Server are connected to the LAN, thereby providing diverse computing platforms to the students, across the campus. The Internet Gateway comprises a Web Server, Symantec Protection Suite Enterprise 3.0, Fortigate 310B UTM, Fortianalyzer 100C, CISCO Router 2800, CISCO Switch and the other networking components required for an efficient LAN. There are 64 computer systems in the center.

FACILITIES

SNo	Particulars	Availability
1	No. of Servers	14
2	No. of Computers	963
3	No. of Learning Resources	NPTEL Courses (192 Web + 212 Video Courses)

SOFTWARE

SNo	Name of the Software	Make
1	MATLAB Image Processing Tool Box Computer vision tool box Image acquition tool box Neural Network tool box Optimization tool box Fuzz logic tool box Parallel computing tool box	Mathworks
2	Aneka, NET cloud computing software Enterprize edition 3.0	MANJRA Soft
3	Oracle 11G Standard Edition	Oracle
4	Services IBM Rational Seed Suit Enterprise Software	IBM
5	Adobe Acrobat 10.0 Professional	Adobe
6	Symantec Protection Suite Enterprise Edition 3.0	Symantec
7	IT Academy MSDN Academic Alliance OS: XP, Vista, Windows 7, Windows Server 2003 & 2008, 2012 Developer Tools: Visual studio 2003/2005/2008 and 2010, 2013 Designer Tools: Expression Studio 1/2/3/4 RDBMS : SQL Server 2000/2005/2008 MSDN Library: 2001 -10 MSDN Library	Microsoft
8	Informatica Power center 8 standards edition on windows	Informatica
11	MS Office 2007 suite	Microsoft
12	VxWorks 5.5 OEM Development License, includes one Board Support Package and BSP Developers kit for X86 Or PPCXX Host PC Turnado 2.2.1 Standard IDE Package includes Core Tools.Code.Documentation – 5 Users Node Locked. Licenses	Mistral
	Oracle 9i Developer, Internet Suite	Oracle
	Borland C Suite	Borland & Turbo
13	Developer 2000	Oracle
14	Red Hat Enterprise Linux 6.0	Red Hat

DR. SARVEPALLI RADHAKRISHNAN LEARNING RESOURCE CENTRE: CENTRAL LIBRARY

Dr. Sarvepalli Radhakrishnan Learning Resources Centre, the central library has a total built up area of 44,503.36 Sq. ft. It houses 11336 titles and 94031 volumes. The college subscribes to **66** and **39** National and International Journals and magazines respectively in print form and a total of 3359 online journals are at the disposal of the students published by Professional Bodies like Institute of Electrical & Electronics Engineers (IEEE), American Society for Mechanical Engineers (ASME) and American Society for Civil Engineers (ASCE). The College is a member of Delhi Library Network (DELNET). Digital library is provided to the students in 415 sq.ft space.

E - JOURNALS & E-BOOKS SUBSCRIBED

	No. of E-Journals/ E-Books
ASCE	34
ASME	26
IEEE ASPP	145
ACM Digital Library	1136
Springer Mechanical	49
Total GIST E-Journals	1390
DELNET CONSORTIUM (IESTC E-Journals -2014)	1152
DELNET E-Journals	817
Total e-journals	3359
DELNET MEMBERSHIP E-Books	335
TOTAL E-JOURNALS/E-BOOKS & COST	3694

The college provides a book-lending scheme to the students with a full set of textbooks for a nominal annual payment in addition to the provision of issuing **4** library cards per student. The Library is fully computerized and availability of any book in the library can be checked just by a click of mouse.

NPTEL Courses: To reinforce the technical knowledge of the students, college has purchased courseware from National Program on Technology Enabled Learning (NPTEL) developed by IITs and IISc and given free access through Intranet to all the students and faculty.

CO-CURRICULAR & EXTRA – CURRICULAR ACTIVITIES

Vasavi campus is a place of extravaganza of co-curricular and extra activities. Students' brains are sharpened by conducting various workshops, seminars, quizzes, debates, essay writings, presentation of technical papers, working model exhibitions etc.

Every year college hosts National Technical Symposium on the banner ***ACUMEN*** for which students throughout India are invited to the campus to compete and present the best technical papers. The college annual day is celebrated in a big way on the name of ***EUPHORIA*** in which students can show their hidden talents in cultural and other events.

To improve the oral and writing skills, Department of H&SS conducts events and competitions through ***Speak Easy Club*** and ***Vasavi Talkies.*** To bring the hidden talents and nurture the culture innovative dreams of the students Vasavi has Mahathi – '***Music Club'***, Kirdaar–the '***Dramatics Club',*** Kriti – the '***Painting and Art Club',*** Abhinay, ***Eco Club Quiz club and Sports Club. The*** College publishes '***Voices***', the college news letter, '***In-touch'***, the Alumni News letter, ***Reminiscences*** and ***Technocrats***, the Annual College Magazine etc.

The Physical Education Department encourages and provides practice to the students to participate in sports & games at Inter Collegiate, Intra-University and National level Tournaments. The college has facilities for indoor and outdoor games & sports.

NATIONAL SERVICE SCHEME (NSS)

The College has an NSS unit and the student volunteers take up socially useful activities. The unit has organized blood donation camps, service camps to orphanages, tree plantation camps, flood relief camps etc.

CAREER GUIDANCE, TRAINING AND PLACEMENT CELL

Human Resources (HR) Department provides career guidance and counselling to the budding engineers. It prepares students to meet industry's requirements technically and enrich them to suit the corporate world with excellent soft skills.

The department arranges personality development programmes for the students and takes care of the pre-placement training & placements. It explores the various career options in the fields of All India Civil Services, All India Engineering Services, Scientific, Research

and Industrial Organizations, Defence Services in addition to arranging counselling sessions on higher education avenues in India and abroad.

SWAYAM – THE ENTREPRENEURSHIP CELL

Swayam – The Entrepreneurship Cell of the College is established to develop and nourish the latent entrepreneurial spirit inherent in students, and help them to become Entrepreneurs. The vision of the cell is to develop entrepreneurs by creating an ecosystem that encourages and supports the entrepreneurial potential of students. The mission of the cell is to inculcate the spirit of entrepreneurship among students and to provide them with all necessary support and mentoring including equipping them with the right skills and attitude to convert an idea into a business venture.

INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE (IEDC)

The Government of India recognized that young technocrats are looking for opportunities to exploit their full potential by setting up their own ventures thus becoming "job generators". As part of this strategy **National Science & Technology Entrepreneurship Development Board (NSTEDB),** Department of Science & Technology, Government of India, had set up Entrepreneurship Development Cells (EDCs) in educational institutions. The main objective of creating such cells is to *"Develop institutional mechanism to create entrepreneurial culture in academic institutions to foster growth of innovation and entrepreneurship amongst the faculty and students".*

Vasavi College of Engineering is selected as part of this scheme and NSTEDB had sanctioned Rs.48.5 lacs to carry out innovative projects by the students. The Project will continue for five years with an annual funding by NSTEDB from 2011.

TEQIP PHASE-II

The college is a participating institution of TEQIP phase-II subcomponent 1.1. (Private Institution)

SAFETY NORMS & CHECKS

The safety measures and checks are followed in buildings, laboratories and in other critical installations as per the standard norms. The entire campus is equipped with a modern fire fighting system. In addition all the buildings are fitted with fire extinguishers

EMERGENCY MEDICAL CARE AND FIRST-AID

The college provides First-Aid and medical help at the centralized place with trained staff. The health center is equipped with four beds and common medicines. To meet the emergency medical attention, college has appointed a doctor and a staff nurse. A special ambulance has been provided to meet critical medical care needs.

TEACHING-LEARNING PROCESS

The members of faculty maintain course files, lesson plan and lesson record to conduct the classes and laboratory courses as per the curriculum requirement. The quality of assignments tests and semester examinations is maintained to meet the program education objectives. The tutorial classes/remedial classes are conducted as per the schedule in the timetable.

To monitor the academic progress and holistic development of students intimately, **proctor system** (mentoring system) has been introduced in the college. In this system, each student is kept under the care and guidance of a faculty member who acts as a ***loco parentis.*** For every faculty member twenty students are allotted. Proctor continuously monitors the progress and welfare throughout the stay of the student in the college. The Class Coordinator of each class monitors classwork schedule, discipline of students coming in time, etc.

The college has introduced **Professional Practice School** to associate second year B.E. students with an industry during their summer vacation. The college has been building purposive partnership with the industry to provide practical learning experience and to expose the students to the emerging trends and contemporary technologies; the College has signed **Memorandum of Understandings (MOUs)** with various corporate houses and Industries.

ALUMNI

The College has been interacting with the Alumni regularly with a view to providing career guidance to their juniors and facilitate connectivity with industry in areas of students' visits, projects, placements, consultancy etc. Alumni Meet 'REFLECTIONS' is organized every year.

ACADEMIC RULES AND REGULATIONS
FOR FOUR YEAR B.E DEGREE COURSE
Under Autonomous Status with effect from 2014-15 Academic Year

DURATION OF STUDY

1. The duration of the course is four years. The every academic year shall comprise of two semesters, each of 16 weeks (minimum) of instruction. The two semesters hereinafter referred to as the First semester and second semester in chronological order.

   No readmission/admission/promotions can be made after 4 weeks of the commencement of instruction of semester in I, II, III and IV years. In case there is any court cases consequent to which the Convener of Admissions/Principal is compelled to admit a student after the announced last date of admissions, the admission (seat) of such a student be reserved for the subsequent year on a supernumerary basis.

   No make-up/supplementary or any other examinations except the internal tests shall be conducted during the instruction period of the semester course, except for the IV year II semester course.

2. a) Candidates of four year degree program, who fail to fulfill all the requirements for the award of the degree as specified hereinafter within eight academic years from the time of admission, will forfeit their seat in the course and their admission will stand cancelled.

   b)

   Diploma candidates admitted to the second year under lateral entry scheme shall fulfill all the requirements for the award of the degree as specified hereinafter within six academic years from the time of admission failing which they will forfeit their seat in the course and their admission will stand cancelled.

AWARD OF DEGREE

1. The degree of Bachelor of Engineering will be conferred on a candidate who has pursued a "Regular Course of Study" for four academic years (three academic years for candidates admitted in II-Year under lateral entry scheme), as hereinafter prescribed in the scheme of instruction and has passed all the examinations prescribed in the scheme of examination.

2. i) A regular course of study for eligibility to appear at the BE Examination of any semester shall mean putting in attendance of not less than 75% aggregate in lectures, practicals, drawing, workshops, field work, project, seminars extension etc., in the subjects listed in the scheme of instruction. The cumulative monthly attendance in each subject and the aggregate attendance shall be displayed on the notice board.

   ii) Attendance at N.C.C. Camps or Inter Collegiate or Inter University or Inter State or International matches or debates or Educational excursion or such other Inter University activities as approved by the authorities, involving journeys outside the city in which the college is situated will not be counted as absence. However, such absence should not exceed (4) weeks of the period of instruction, in a semester. Students participating in the above events shall take prior permission from the authorities.

   iii) In any semester of the course if a candidate fails to secure the minimum percentage of attendance, he/she shall not be eligible to appear in the end semester examinations of that semester and he/she shall have to enroll himself/herself to undergo afresh a "Regular Course of Study" of the corresponding semester in subsequent academic session, in order to become eligible to appear for end semester examinations.

   iv) Provided that in special cases and for sufficient causes shown, the Principal/Academic Council on the recommendation of the concerned HOD, may condone the deficiency of attendance not exceeding 10% for ill-health when application made for such a condonation is supported by a Medical Certificate issued by an authorized Medical Officer and approved by the Principal of the college. Absence not exceeding two weeks, for activities like N.S.S., Inter-University Competitions and debates will be condoned if the candidate is sponsored by the University for such activities.

   v) The attendance shall be calculated from the date of admission into the course.

vi) The candidates of the First Year , I semester, course who have detained can seek readmission to fulfill the attendance requirements, without appearing for the Entrance Test during subsequent year, and such admissions shall be treated as supernumerary.

3. If a candidate who has pursued a Regular Course of Study of any semester wishes to undergo the same course again, he/she may be permitted to enroll again as a regular student for the course of the semester, when next time offered, depending on the availability of seats, provided that he/she undertakes to forgo his/her attendance secured by him/her for that semester previously and provided further that he/she has not pursued a "Regular Course of Study" in any higher semester. For the award of division, however, he/she shall have the benefit of the higher of the aggregate marks secured in that semester.

SCHEME OF INSTRUCTION AND EXAMINATION

1. Instruction in the various subjects in each semester shall be provided by the college as per the scheme of instruction and syllabus prescribed.
2. All the courses shall be on the semester pattern.
3. The distribution of marks of sessional examinations based on the internal assessment and end semester Examination shall be as follows:

Subject	Marks	
	Sessional Exams	End Semester Exams
i) Each theory subject	30*	70** Except English (50)
ii) Each practical or drawing subject	25*	50

* 5 Marks will be allotted for assignments and 5 marks for quiz tests. Three assignments and three quizzes shall be conducted in a semester and average marks will be considered for computing internal marks. In addition, there shall be two internal examinations of 20 marks each in every subject in a semester. The total sessional marks 30 will be computed by considering 20 (average) marks from internal examinations and 10 (average) marks from assignments and quizzes.

** The end semester question paper will be of two parts, Part A and Part B. Part A is compulsory and should cover the entire syllabus, and carries 20 marks. The marks awarded to each question may be 1, 2 or 3 with a minimum number of questions as 8. Part B will comprise seven (7) questions and it carries 50 marks for all the subjects offered in I and II semesters except in English. The English question paper shall be of similar pattern, but set only for 50 marks. There has to be one question

in each unit of the syllabus and the remaining two questions may be drawn from the total syllabus of all 5 units. However, there should not be more than 2 questions from any unit.

4. The program of instruction, examination and vacations shall be notified by the Director (Academic).
5. The medium of instruction and examination shall be English.
   Note: To enable the B.E final year students to complete the course requirements in time, there shall be make-up exams for IV-Year II-Semester only, within one month of publication of results of IV-Year II-Semester main examinations.
6. The semester examinations prescribed may be conducted by means of written papers, practicals and oral tests, inspection of certified sessional work in drawing and laboratories and workshop or by means of any combination of these methods as may be deemed necessary.
7. All the general rules for examinations shall be adhered to.
8. A candidate shall be deemed to have fully passed the examination of any semester, if he/she secures all the credits of that program as prescribed. Minimum Pass Marks in each subject of any semester end Examinations shall be

Each theory subject	:	40%
Each practical subjects/project	:	50%
Overall aggregate of end examinations & sessional examinations of a semester	:	50%

   A student shall secure a minimum of 40% aggregate marks in the sessional examinations of all the subjects put together in any semester to eligible for appearing semester end exams. Those students who fail to secure minimum of 40% aggregate will not be allowed to appear for the end semester examinations.
9. If a student fails to secure 'F' of GPA in end ***semester exam and sessional put together*** he/she will be declared failed in that particular semester.
   Each course is normally assigned a certain number of credits as follows:
   1 credit per lecture period per week as decided in Academic Council.
   2 credits per 2 or 3 periods of laboratory practice per week and 6 credits for project work. However The number of credits for a course may vary depending on the decision of Academic Council.

   (a) The curriculum for any program of study shall be designed with a total credits between 200 and 210.

   (b) At least five e lective courses shall be offered during VI-VIII semesters. For the entire program, a student will be permitted to take a maximum of 4 electives from allied and other department elective courses (global electives).

RULES OF PROMOTION

ATTENDANCE: The minimum aggregate attendance percentage for UG course is 75%. On medical grounds 65% attendance with valid medical certificate will be considered.

SEMESTER SYSTEM: Semester system will be followed in B.E course from the first year onwards.

ASSESSMENT AND EVALUATION SYSTEM:
There will be continuous and comprehensive evaluation of students. At least two internal examinations per semester and one semester end examination will be conducted in each subect.

Internal exams Marks	Semester End exams Marks
30 Marks (Theory) • 20 Marks each for two internal examinations in a semester and 10 marks for assignments /quizzes etc together. • **Average of two tests** will be considered for calculating internal exams marks to which assignment/quiz marks will be added for obtaining total sessional marks. • Every student should secure a **minimum of 40% aggregate marks in the internal exams.** **25 Marks (Laboratory)** • 10 marks for day-to-day laboratory class work which will be awarded based on the average of all experiments. • 15 marks for the internal examination.	**70 Marks (Theory)*** End semester examinations will be conducted for 70 marks. A student should secure a minimum of 40% marks in each subject for a pass. **50 Marks (Laboratory)** End semester laboratory examinations will be conducted for 50 marks. A student should secure a minimum of 50% marks for a pass. *50 marks for English In addition, a student should secure a minimum of 40% marks in a subject from sessionals and end semester examinations put together.

Backlogs: A minimum of 50% credits prescribed for any year (put together I & II semesters) must be earned to become eligible for promotion from one class to next higher class.

Credits and Grades:
Credit system will be implemented in each semester. The credit hours for each theory subject, laboratory sessions, finishing school and project work are clearly mentioned in the course structure and scheme of valuation.

A Relative grading system will be implemented for computing semester grade point average (SGPA) and Cumulative grade point average (CGPA). The college will follow relative grading with flexibility given of ranges for grades.

The Semester Grade Point Average (**SGP**A) and Cumulative Grade Point Average (**CGPA**) shall be **computed considering the credits and marks secured by a student in sessional and semester end examinations marks put together.** Assessment of a course will be done on the basis of marks.

PROMOTION:

Semester	Conditions to be fulfilled
I-SEM to II-SEM	Regular course of study of I-SEM and 40% aggregate CIE marks in I-SEM
II-SEM to III SEM	a. Regular course of study of II SEM and
	b. 40% aggregate CIE marks in II- SEM
	c. Must have secured at least 50% of total credits prescribed for I and II SEMs together
III-SEM to IV-SEM	a. Regular course of study of III-SEM and
	b. 40% aggregate CIE marks in III- SEM
IV-SEM to V- SEM	a. Regular course of study of IV SEM
	b. 40% aggregate CIE marks in IV- SEM
	c. Passed in all the courses of I and II SEMs
	d. Must have secured at least 50% of total credits prescribed for III and IV SEMs put together
V-SEM to VI-SEM	Regular course of study V-SEM, and 40% aggregate CIE marks in V- SEM
VI-SEM to VII-SEM	a. Regular course of study of VI-SEM
	b. 40% aggregate CIE marks in VI- SEM
	c. Passed in all the courses of III and IV SEMs.
	d. Must have secured at least 50% of total credits prescribed for V and VI SEMs put together
VII-SEM to VIII-SEM	Regular course of study of VII-SEM and 40% aggregate CIE marks in VII-SEM

Grades: Theory and Laboratory subjects

Academic Performance (%)	Letter Grade		Grade Points
90 to 100	A+	Outstanding	10
80 to 89.99	A	Excellent	09
70 to 79.99	B+	Very Good	08
60 to 69.99	B	Good	07
50 to 59.99	C	Average	06
40 to 49.99	D	Pass	05
0.00	Ab	Absent	Ab
Below 40 (Theory).	F	Fail	0
Below 50(Laboratory)	F	Fail	0

The final grades in a semester will be computed based on aggregate marks of sessional and end semester examinations in a subject put together. A student who earns a minimum of 5 grade points and above in a course is declared to have successfully completed the course in theory and 6 grade points in lab course.

AWARD OF DEGREE

CGPA SCORE	DIVISON AWARDED
7.50 and above (10.00-7.50)	First Division with distinction
6.50 and below **7.50**	First Division
5.50 and below **6.50**	Second Division
4.50 and below **5.50**	Pass division
Below **4.50**	Fail

To obtain degree, the student must pass in all the subjects and secured the number of credits as prescribed in the course structure of department concerned and should obtain a CGPA of at least 4.

GENERAL RULES OF EXAMINATION

1. All examinations of shall be held at such places as if may be decided and at such other centers of such dates as may be notified.
2. Application for permission to appear at every examination shall be made on the prescribed form accompanied by three passport size full face photographs (not profile) which along with the necessary certificates regarding attendance, practical work, etc., and the prescribed fee, should be sent to the Controller of Examinations on or before the date fixed for this purpose.
3. When a candidate's application is found in order and he/she is eligible to appear at an examination, the Controller of Examinations, shall

furnish him with a Hall -Ticket with the photographs attached to it, enabling the candidate to appear in the examination, and this Hall-Ticket shall have to be produced by the candidates before he/she can be admitted to the premises where the examination is being held or to a part of the said premises as well as to the Examination Hall.

4. A candidate who fails to present himself/herself for the examination for any reason whatsoever, excepting shortage of attendance or who fails to pass the examinations, shall not be entitled to claim refund of the whole or any part of the examination fee, nor for the reservation of the examination fee for a subsequent examination or examinations.
5. A candidate after he/she was declared successful in the whole examination shall be given certificate setting forth the year of examination, the subjects in which he/she was examined and, the division in which he/she was placed.
6. No candidate shall be allowed to put in attendance for or appear at examinations for different degrees and different faculties at one and the same time.
7. Students, who have appeared once at any examination of the course, need not put in fresh attendance, if they want to reappear at the corresponding examination, notwithstanding the fact that new subjects may have been introduced by the college. They will however, have to appear at the examinations according to the scheme of examination and syllabus in force.

TRANSITORY REGULATIONS

Whenever, course or scheme of instruction is changed in a particular year, two more examinations immediately following thereafter, shall be conducted according to the old syllabi/regulations. Candidates not appearing at the examinations or failing in them shall take the examination subsequently according to the changed syllabi/regulations.

IMPROVEMENT OF DIVISION

1. A candidate who wishes to improve his/her division may do so within one academic year immediately after having passed all the examinations of BE Degree Program by reappearing at not more than two semesters (All subjects pertaining to the semester taken together) examinations. For the award of the division, he/she will have the benefit of the higher of the two aggregates of marks secured in the corresponding semesters).
2. In case of candidates who have secured less than 40% of total aggregate (of I, II, III and IV-Years) needed for a pass division, the candidate can appear for improvement in individual subjects to become eligible for a PASS Division.

(a) The duration of M.E/M.Tech (Full-Time) Program is 4 semesters, consisting of two semesters of course work (6 Cores + 6 Electives + 2 Labs + 2 Seminars) and two semester of Project/Dissertation work. The third semester comprises Project seminar and Dissertation. The total period of study for the purpose of drawing the fellowship amount (if eligible) shall not exceed 24 months. Each semester shall have 16 weeks of instruction.

b) *On admission to a program of study, each student will be allotted a specialized area of study in that course. No change of specialization is permitted after the admission is over.

AWARD OF DEGREE

a) The degree of M.E/M.Tech. will be conferred on a candidate who has: (i) pursued a regular course of study of not less than two semesters of course work as prescribed hereunder and has passed all examinations and earned requisite number of credits in the subjects as prescribed in the scheme of examination and (ii) submitted and successfully defended his Project/Dissertation at the end of the fourth semester as prescribed in the scheme of examination.

b) A regular course of study for eligibility to appear for any subject for which an examination is conducted at the end of the semester shall mean putting in an attendance of not less than 75% in each of the subjects registered during that semester.

c) Provided that in special cases and for sufficient causes shown, the Principal on the recommendation of the Head of the department concerned may condone the deficiency of not exceeding 10% attendance for ill-health when and application made for such a condonation is supported by a Medical Certificate issued by an authorized Medical Officer and approved by the Principal of the college. Absence not exceeding two weeks, for activities like N.S.S., Inter-University Competitions and debates will be condoned if the candidate is sponsored by the University for such activities.

d) If a candidate fails to secure the minimum of 75% attendance required in a subject then he/she shall not be eligible to appear for the University Examination at the end of the semester in the subject. He/She shall be required to prosecute a “Regular Course of Study” in the subject again before appearing for the end semester examination in that subject.

COURSE REQUIREMENTS

a) The program requirements comprise of successful completion of a minimum of twelve theory subjects (6 cores + 6 electives), two practicals, two seminars, one project seminar (3rd semester) and dissertation (3rd and 4th semester).

b) Instruction in each theory subject shall be three periods per week practicals and seminars shall be as per the approved scheme of instructions.

c) A student, on being admitted to the M.E/M.Tech, Degree Program shall be assigned to a faculty adviser, with the approval of the adviser, the student shall draw up a study plan to satisfy all the requirements, keeping in view the area of specialization and then register for the subjects/courses.

d) A student is permitted to register for a maximum of six theory subjects, a practical and seminar in a semester. It is necessary to pursue a regular course of study in a minimum of three subjects in the semester for eligibility to draw the fellowship amount. Project/Dissertation shall be considered as equivalent to three theory subjects for the purpose of this. However, he/she shall not register for more than three subjects along with project.

e) The Registration of the candidates should be made within one week from the date of admission for the I-Semester and within one week from the date of commencement of classes for subsequent semesters. For the benefit of those who are unsuccessful in the main examination or for those who wish to reappear in a subject/subjects a make-up examination will be conducted. A candidate must register for the main examination at the end of the semester. Failure to register for the main examination makes the candidate ineligible to register for the make-up examination.

f) A student is permitted to register for Project/Dissertation only if there are not more than three subjects as backlog from the previous semesters. Backlog for this purpose shall mean theory/practicals seminars. A student who has successfully completed all the course requirements except Project/Dissertation may be permitted to work on his project/Dissertation at the place of employment, any recognized institution/R & D Organization with the approval of the Head of the Department concerned and Head of the Organization.

g) A student shall submit five copies of the Project Report/Dissertation prepared as per the format prescribed by the Faculty and approved by his/her guide on or before the date indicated in the Almanac.

h) The maximum duration for completing all requirements for obtaining the

M.E / M.Tech, Degree shall be double the period of study from the date of admission.

Note: For such of those candidates who have completed the course requirements but could not either clear backlog papers or submit the Project Report / Dissertation within the stipulated period, an additional period of one year will be given to complete the same on application duly recommended by the Head of Dept. / Principal concerned.

GENRAL GUIDELINES FOR EXAMINATION

a) All the end semester examinations shall be held at Hyderabad and/or at such places and on such dates as may be notified.

b) Applications for permission to appear at a end semester Examination shall be made on the prescribed form along with the necessary certificates regarding attendance, practical work, etc., and prescribed fee. The form and the enclosures shall be sent to the Controller of Examinations on or before the date of prescribed for this purpose.

c) When a candidate's application is found in order and he/she is found eligible to appear at end semester examination, the Controller of Examinations shall furnish him/her with a Hall-Ticket for the Examination and this Hall-Ticket shall be produced by the candidate before he/she can be admitted into the Examination Hall.

d) A candidate who fails to present himself/herself for the Examination for any reason whatsoever excepting shortage of attendance or who fails to pass the examination shall not be entitled to claim refund of the whole or part of the Examination fee nor for the reservation of the same for a subsequent Examination or Examinations.

e) The semester end (main) examinations shall be held at the end of the each semester only in the subjects offered during that semester.

f) A student shall appear for the semester end at the end of each semester only in the subjects registered during that semester.

g) A candidate who has been allowed to appear for the Main Examination may be permitted to re-appear in the subject at the subsequent Make-up Examination which shall be conducted within one month from the declaration of the result of the Main Examination.

h) A candidate who is unsuccessful at both the Main and Make-up Examinations or has not appeared at these Examinations in subject(s) shall register for the subject(s) again and pass the subject(s) elective (or) core as the case may be. Irrespective of whether the syllabus has changed or not, the candidate must undergo a regular course of study and secure a minimum 75% attendance for eligibility to appear at the examination. The sessional marks obtained earlier stands cancelled. If the subject in which the candidate has failed is an elective a new elective may be chosen if required. If a core subject has been dropped in

the curriculum then the core subject to be taken in place of the core subject in which the candidate has failed will be specified by the Faculty Adviser in consultation with the Chairperson, BOS.

i) The distribution of Marks/Grade for the sessional work and the end semester examinations shall be as under:

j) If a candidate appears of both the main and make-up examinations in the same subject, then the better of the two scores will be taken on record.

SCHEME OF INSTRUCTION & EXAMINATION
M.E/M.TECH. FOUR SEMESTER COURSE (FULL-TIME)

1.. Instruction in the various subjects in each semester shall be provided by the College as per the scheme of instruction and syllabus prescribed.
2. The courses shall be on the semester pattern as specified earlier.
3. The distribution of marks shall be as specified in the course structure and scheme of instruction.
4. The program of instruction, examination and Vacations shall be notified by the Director (Academic) of the college in consultation with the concerned Heads.
5 The medium of instruction in English.
6. The examination prescribed may be conducted by means of written papers, practicals and oral tests, project reports, inspection of certified sessional work in laboratories or by means of any combination of these methods as may be deemed necessary.
7. All the general rules of examinations shall be adhered to.
8. A candidate shall be deemed to have fully passed the examination of any semester, if he/she secured not less than the minimum marks as hereinafter prescribed.

Note: Six core subjects and six elective subjects should be completed by the end of Semester-II.

* One Project Seminar presentation

** 50 marks to be awarded by guide and 50 marks to be awarded by Viva committee comprising guide and two internal faculty members.

*** Excellent/Very Good/Good/Satisfactory/Unsatisfactory

i) 5 Marks will be allotted for assignments and 5 marks for quiz tests. Three assignments and three quizzes shall be conducted in a semester and average marks will be considered for computing internal marks. In addition, there shall be two internal examinations of 20 marks each in every subject in a semester. The total sessional marks 30 will be

computed by considering 20 (average) marks from internal examinations and 10 (average) marks from assignments and quizzes.

ii) The syllabus consists of five units. The semester end examination will conducted for 70 marks. The question paper consists of Part-A and Part-B. The part-A is compulsory and cover entire syllabus. It caries a total of 20 marks with maximum number of 10 questions. Part-B will have 7 questions out of which the candidate has to answer 5 questions. There will be one question from each unit of syllabus.Part-B is for 50marks.

iii) A student shall successfully complete all the course requirements to be eligible to submit the M.E./M.Tech. Project Report/Dissertation and to take pre-submission viva-voce M.E/M.Tech. Dissertation can be inter-disciplinary relevant to the Department concerned.

The Project Report/Dissertation shall be scrutinized by the viva-voce committee consisting of the Head of Department, Supervisor of the candidate and two other Expert Members in the subject to be nominated by the Chairman, Board of Studies. The expert members could be either from the Department or from outside. The Chairman, Board of studies is the Chairman of the Viva-voce Committee. The Viva Voce will be conducted as per the Almanac given by the Director Academic, and will normally be twice in an academic year.

The Viva-Voce committee will give a comprehensive report indicating the adequacy or otherwise of the Project Report/Dissertation. If candidate's work/dissertation is found inadequate by the viva committee, he/she has to appear once again for the viva-voce examination as per almanac. The candidate will revise the thesis as per recommendations of the viva-voce committee and submit the corrected copy along with point by point reply to the examiners' report which should be duly verified and certified by the Supervisor and Head of the Department before forwarding it for evaluation by the external examiner to the Exam Branch. The Controller of Examinations will arrange to get the Project Report/Dissertation valued by an External Examiner. Report of the External Examiner will be final for declaration of result without again referring to the Department, unless the External Examiner suggests that the dissertation be revised.

The thesis of a candidate awaiting the result of any backlog subject shall not be sent for evaluation to the external examiner. After successfully completing the backlog subjects the M.E / M.Tech. Project Report / Dissertation will be sent for evaluation. In the case of any revision suggested by the external examiner, the candidate will submit the revised Project Report/Dissertation, incorporating the suggestions made by the External

Examiner, through the Head of the Department and Supervisor to the Controller of Examinations for taking necessary action.

RULES OF PROMOTION

Minimum Attendance: The required percentage of attendance is **75%** in each subject, but on medical grounds it should be **65%** in each subject.

Credits and Grades:

Credits and grades of (both sessional and semester end marks put together) will be considered for computing SGPA and CGPA.

ASSESSMENT AND EVALUATION SYSTEM:

There will be continuous and comprehensive evaluation of students. At least two internal examinations per semester and one semester end examination will be conducted in each subect.

Internal exams Marks	End Semester exams Marks
Theory: 30 Marks • Two internal examinations of 20 Marks each and 10 marks for assignments and quizzes will be conducted. • Three assignments and three quizzes shall be conducted. The total sessional marks 30 will be computed by considering 20 (average) marks from internal examinations and 10 (average) marks from assignments and quizzes.	**Theory : 70 Marks** End examinations will be conducted for 70 marks A student should obtain 50% aggregate of internal and semester end examinations put together in each subject to be declared as passed.

a) A candidate shall be deemed to have fully passed in the subjects he/she has registered during the semester if he/she secures not less than the minimum marks as herein prescribed.

Subject	Minimum Marks/Grade
Each Theory Subject	50%
Sessional Marks for Practical / Seminar / Project Seminar	50%
Project / Dissertation	Satisfactory Grade

b) A pass in a theory subject shall mean 50% of the total of sessional marks and the end smester examination marks taken together. The candidate has to pass 12 theory subjects, dissertation and Departmental requirements (Seminars, Project Seminar, Practicals) for the award of degree.

The marks obtained in the sessional work and the end semester examination shall be shown separately in the memorandum of Marks. Distinction and Gold Medal (if any) will be awarded subject to the condition that the candidate passes all the subjects and departmental requirements in the first attempt.

Grades: Theory and Laboratory subjects

Academic Performance	Letter Grade	Grade Points
90 % and above	A+	10
80 % and above	A	09
70 % and above	B+	08
60 % and above	B	07
50 % and above	C	06
40 % and above (Theory)	D	05
Below 50 % (Practical)	F (Fail)	0

Under Autonomy also, the existing Academic rules and regulation for affiliated colleges of Osmania University are applicable, with regard to subject wise attendance, registration & re-registration of subjects and eligibility for project registration etc..

TRANSITORY REGULATIONS

Whenever the schemes of instruction and/or syllabi are changed for a course, candidates shall satisfy the unfulfilled requirements of passing the number of core subjects and electives choosing subjects from the revised schemes, with the approval of the Head of the Department.

ACADEMIC RULES AND REGULATIONS FOR MASTER OF COMPUTER APPLICATIONS (MCA)

Under Autonomous Status with effect from 2014-15 Academic Year

DURATION OF STUDY

1.	The duration of the Course of Master of Computer Applications (MCA) is three academic years. Each of the academic year shall be divided into two semesters hereinafter referred to as the First semester and Second semester in chronological order. Each semester shall comprise of 15 weeks instruction.
2.	No admissions/readmissions/promotions are to be made after the expiry of four weeks from the date of commencement of instruction. In case there are any court cases consequent on which the convener of admissions is compelled to admit any candidate after the last date of admissions, the admission (seat) for such a student be reserved for the subsequent year on supernumerary basis.
3.	No supplementary or any other, examinations (except internal tests) shall be conducted during the instruction period of the semester.
4.	Candidates will be allotted to one of the courses at the time of admission, strictly depending on the merit secured at the Entrance Examination, and subject to the rules and regulations in force from time to time including reservations.
5.	A candidate admitted to the Master of Computer Applications course will forfeit his/her seat and admission stands cancelled if: He/She fails to fulfill all the requirements for the award of the degree as specified, within six academic years from the time of admission.

AWARD OF DEGREE

6. The degree of Master of Computer Applications will be conferred on a candidate who has pursued a "Regular Course of Study" for three academic years as hereinafter prescribed in the scheme of instruction and has passed all the examinations and acquired credits as prescribed in the scheme of examination.

7. i) A regular course of study for eligibility to appear the examination of any semester shall mean putting in attendance of not less than 75% aggregate in lectures, practical, projects. Seminars, extension, etc., in subjects listed in the scheme of instruction. Provided that, in special cases and for sufficient cause shown, the Principal, on the recommendation of the Head of the department may condone the deficiency not exceeding 10% in attendance on medical grounds when the application submitted at the time of the actual illness is supported by

a certificate from a Authorized Medical Officer, and approved by the Principal. In case condonation in attendance on medical grounds is sought, the applicant shall pay the prescribed fee.

ii) Attendance at NCC/NSS camps or Inter-Collegiate or Inter-University or Inter-State or National or International Matches or debates or Youth Festivals or Educational excursions if they from part of the curriculum or such other Inter-University, Inter-College activities as approved by the University will not be counted as absence. However, such absence should not exceed four weeks in a semester.

iii) In any semester of the course, if a candidate fails to secure the minimum percentage of attendance, he/she shall not be eligible to appear in the examination of that semester and he/she shall have to enroll himself/herself to undergo afresh a "Regular Course of Study" of the corresponding semester in subsequent academic session, in order to become eligible to appear for the examination.

iv) The attendance shall be reckoned from the date of commencement of instruction as per the almanac communicated by the University.

v) To enable students to know their attendance, at the end of each month, concerned Principals shall display cumulative attendance for information.

8. If the candidate who has pursued a Regular Course of Study of any semester wishes to undergo the same course again, he/she may be permitted to enroll again as a regular student for the course of the semester, when next offered, depending on the availability of seats, provided that he/she undertakes to forego his/her attendance secured by him/her for that semester previously, and provided further that he/she has not pursued "Regular Course of Study" in any higher semester other than the immediately next higher semester. For the award of division however, he/she shall have the benefit of the higher of the aggregate marks secured in that semester.

RULES UNDER AUTONOMY

Attendance: Minimum aggregate attendance required to eligible to attend semester end exams is 75% and 65% with Medical Condonation respectively.

Sessional Marks: Minimum aggregate of sessional marks required to become eligible for appearing semester end examinations is 40%

Backlogs: A minimum of 50% credits prescribed for any year (I & II semesters put together) must be earned to become eligible for promotion to next higher class. The detailed promotion rules are given separately.

Credits and Grades: Credits and grades of (both sessional and semester end marks) will be considered for computing SGPA and CGPA.

Academic Performance (%)	Letter Grade		Grade Points
90 to 100	A+	Outstanding	10
80 to 89.99	A	Excellent	09
70 to 79.99	B+	Very Good	08
60 to 69.99	B	Good	07
50 to 59.99	C	Average	06
40 to 49.99	D	Pass	05
0.00	Ab	Absent	Ab
Below 40 (Theory).	F	Fail	0
Below 50(Laboratory)	F	Fail	0

Assessment and Evaluation System: There will be continuous and comprehensive evaluation of students. At least 2 internal examinations per semester and 1 semester end examination will be conducted.

CGPA SCORE	DIVISON AWARDED
7.50 and above (10.00-7.50)	First Division with distinction
6.50 and below **7.50**	First Division
5.50 and below **6.50**	Second Division
4.50 and below **5.50**	Pass division
Below **4.50**	Fail

Internal exams Marks	Semester End exams Marks
Theory: 30 Marks • 20Marks each for two internal examinations in a semester and 10 marks for assignments /quizzes etc. • **Average of two tests** will be considered for calculating internal exams marks to which average of 3 assignment and 3 quiz marks will be added for obtaining total sessional marks. • Every student should secure a **minimum of 40% aggregate marks in the internal exams.** **Laboratory: 25 Marks** • 15 marks for day-to-day laboratory class work which will be awarded based on the average of all experiments. • 10 marks for the internal examination.	**Theory: 70 Marks** End examinations will be conducted for 70 marks. A student should secure a minimum of 40% marks for a pass. **Laboratory: 50 Marks** End examinations will be conducted for 50 marks. A student should secure a minimum of 50% marks for a pass.

PROMOTION RULES:

Semester/Class	Conditions to be fulfilled
From 1/3 MCA , I-SEM to 1/3 MCA, II-SEM	Regular course of study of 1/3 MCA, I-SEM, and 40% aggregate sessional marks in 1/3 MCA I –Semester
From 1/3 MCA, II-SEM to 2/3 MCA, I SEM	(a) Regular course of study of 1/3 MCA II SEM and 40% aggregate sessional marks in 1/3 MCA II –Semester (b) Must have secured at least 50% of total credits prescribed for 1/3 MCA.
From 2/3 MCA, I-SEM to 2/3 MCA, II-SEM	Regular course of study of 2/3 MCA, I-SEM, and 40% aggregate sessional marks in 2/3 MCA I-Semester
From 2/3 MCA, II-SEM to 3/3 MCA, I SEM	(a) Regular course of study of 2/3 MCA, II SEM and 40% aggregate sessional marks in 2/3 MCA II-Semester (b) Must have secured at least 50% of total credits prescribed for 2/3 MCA and passed in all the subjects 1/3 MCA.
From 3/3 MCA, I-SEM to 3/3 MCA, II-SEM	Regular course of study of 3/3 MCA, I-SEM, and 40% aggregate sessional marks in 3/3 MCA I- Semester

SCHEME OF INSTRUCTION AND EXAMINATION

1. Instruction in the various subjects in each semester shall be provided by the College as per the scheme of instruction and syllabus prescribed.
2. The distribution of marks shall be as specified in the course structure and scheme of instruction.
3. The program of instruction, examination and vacation shall be notified by the Director (Academic) of the college in consultation with the concerned Head.
4. The medium of instruction in English.
5. The examination prescribed may be conducted by means of written papers, practicals and oral tests, project reports, inspection of certified sessional work in laboratories or by means of any combination of these methods as may be deemed necessary.
6. All the general rules of examinations shall be adhered to.
7. A candidate shall be deemed to have fully passed the examination of any semester, if he/she secured not less than the minimum marks as hereinafter prescribed.
8. If a candidate in any semester/examination of the course fails to secure the minimum marks in any subject, then he/she shall have to appear only in the failed subject of the semester.

TRANSITORY REGULATIONS

Whenever, course or scheme of instruction is changed in a particular year, two more examinations immediately following thereafter, shall be conducted according to the old syllabus/regulations. Candidates not appearing at the examinations or failing in them shall take the examination subsequently according to the changed syllabus/regulations.

AWARDS AND REWARDS

GOLD MEDALS

Vasavi Academy of Education has instituted Gold Medals to the toppers of each branch based on their cumulative performance in the University Examinations from 1st year to final year. Gold Medals have also been instituted by the industry partners, alumni, parents and individuals.

The members of Vasavi Academy, Alumnus of VCE, and reputed software organizations have instituted sixteen gold medals, in various branches of study for the best out going students (toppers) baseed on their performance in the Osmania university examinations.

1. ***Sri.Pendekanti Venkata Subbaiah Memorial Gold Medal*** to the best student amongst all the branches of engineering put together.
2. ***Sri P. Dharma Reddy Gold Medal*** to the best student amongst of all branches.
3. ***Dr.K.V.Subba Rao Gold Medal*** to the best student amongst the outgoing students of all branches put together.
4. ***Smt.Kanakamma Venkata Subbaiah Gold Medal*** to best girl student amongst all branches put together
5. ***Prof. G.Lakshmi Narayana Gold Medal*** to the student of Civil Engineering branch who secures highest marks in that branch.
6. **M*/s SatNav Technologies Ltd Gold Medal*** to the best student of GIS among the Civil Engineering students
7. ***Sri. G.Narayana Chetty, IAS (Retd) Gold Medal*** to the student who secures highest marks in Mechanical Engineering branch.
8. ***Sri. A. Ravi Kiran Memorial Gold Meda***l to the student who scores highest marks in Mechanical Engineering branch.
9. ***Prof. K.Venkataramaiah Memorial Gold Medal*** to the topper in Production Engineering***.***
10. ***Sri.K.R.Krishnaiah Chetty Memorial Gold Medal*** to the academically best student in ECE branch.

11. ***Sri.K.R.Gupta Gold Medal*** to the ***student*** who secures highest marks in CSE branch.
12. ***Dr.T.B.G.Tilak Memorial Gold Medal*** to the student who gets highest marks in EEE branch.
13. ***Sri. Sikakollu Subba Rao Memorial Gold Medal*** to the student who scores highest marks in Information and Technology (IT) branch.
14. ***Sri. K. Rosaiah Gold Medal*** to the top scorer in MCA.
15. ***Sri A. Venkata Ramana Memorial Gold Medal*** to the best student who secures the highest marks in M.E (ES&VLSID) course.
16. ***Smt. & Sri. Eskala Pedda Ratnaiah Memorial Gold Medal*** to the best student who gets the highest marks in M.E (AD&M) course.
17. ***Dr. D. Changal Raju Memorial Gold Medal*** to the best student with highest marks in B.E, ECE branch.

YOUNG LEADER AWARD

In memory of Mr. Harshavardhan Podipireddy, an ex-student of Mechanical (Production) Engineering, his parents have instituted an 'Award for Young Leader' with a cash prize, to be awarded to one student in each branch of engineering, among the final year students.

The students are given an opportunity to apply for the award with their contribution in 5 major areas viz., academic-marks secured, attendance secured, participation in curricular activities, participation in extracurricular activities, leadership activities. After evaluating the applications received and based on the outstanding contributions made by the applicants, the students are selected for the award.

MERIT AWARDS

To encourage meritorious students and to develop competition among *themselves* ***Best Academic Performance Awards*** are given to top 3 students of each section, for all the courses, based on their performance in the University Examination in the preceding year. Students securing first, second and third positions in their sections are awarded with cash prizes. The amount is to be given to the parent of the student in the form of a cheque.

BEST PROJECT AWARDS

Innovative, creative and research oriented projects are awarded suitably. These awards are given to the final year students. To encourage the students to carry out such projects in each branch, the management has decided to give the first and second best project prizes. The best project and second best project receive a cash prize.

BEST ATTENDANCE AWARDS

In order to encourage the regularity among the students, the best Attendance Awards are given based on their percentage of attendance.

B.E. & MCA Students

Students having 100%, 99% and 98% attendance are given cash awards

REWARDS

Cognizant Technology Solutions has instituted anaward for the best outgoing student.

REIMBURSEMENT OF CONFERENCE REGISTRATION FEE

Students are encouraged to participate and present papers in National/International Conferences/ seminars. College reimburses pay back the conference/seminar registration fee to the students who present meritorious papers in the conferences.

MERIT-CUM-MEANS SCHOLARSHIPS

The Management of Vasavi College of Engineering provides Merit-cum-Means Scholarships to the needy students.

FINANCIAL ASSISTANCE

Financial assistance to the economically poor students is available on the basis of merit-cum means. The circulars are issued from time to time inviting the applications in every academic year.

GUIDELINES FOR FINANCIAL ASSISTANCE

1. Students who are economically weak are considered for financial assistance.
2. The financial assistance is be provided to the eligible students with a condition that the assistance received shall be paid back after getting employment in equal installments over a period of two years. The amount received back is credited to a separate fund (financial assistance fund) in the College which is utilized for assistance to subsequent batches of students. This account is operated for any contribution received from the staff and any other philanthropists for this good cause.
3. The needy students are indentified by the “Department Financial Assistance Committee” that comprises the respective HODS, one senior faculty and two students from each branch. The short listed eligible students get the financial assistance.

TRANSPORT FACILITIES- GENERAL MODE

All the students are eligible for the General Bus Pass. The APSRTC buses 120S, 120N, 220J, 220V ply from Mehdipatnam 'X' Roads to the college. For Fresh Bus Passes, students should apply during 21st to 29th of every month and for renewal during 13th to 17th of every month at all APSRTC Bus Pass Centres and e-Seva Centres.

FIRST YEAR STUDENTS - Hired Bus transport

Private buses are under hire exclusively for I year B.E students of the College. More buses can be arranged in other routes, if the strength of the students in that particular route is 60. Presently the buses are operating to the College from

ECIL 'X' Roads	Via Naredmet X Roads, Malkajigiri, Mettuguda, Sangeeth, Patny, Paradise, Tankbund, Secretariat, Lakadikapool Mehdipatnam
Vanasthalipuram	Via L.B. Nagar, Kothapet, Dilsukhnagar, Malakpet, Koti, Abids, Nampally, Public Gardens, Lakadikapool, Mehdipatnam
UPPAL	Via Uppal 'X' Roads, Habsiguda, Tarnaka, OU, Vidyanagar, Shankermutt, Narayanaguda, Himayathnagar, Liberty, Lakadikapool, Mehdipatnam
K.P.H.B. (JNTU)	Via Kukatpally, Balanagar 'X' Roads, Sanathnagar, Erragadda, S.R. Nagar, Punjagutta, Banjara Hills, Masab Tank, Mehdipatnam, Nanalnagar
B.H.E.L.	Via Miyapur, Alwyn 'X' Roads, Kothaguda, Hitec-City, Madhapur, Jubilee Hills Check Post, Gachi Bowli, Outer Ring Road, Narsingi
Chilkalguda (Secunderabad Railway Station)	Via Musheerabad, RTC'X' Roads, VST, Bagh Lingampally, Tourist Hotel, Kachiguda, Ram Koti, Old MLA quarters, Basheerabagh, Lakadikapool, Mehdipatnam
Alwal	Via Tirumalgiri, Lothukunta, Patny, Begumpet, Punjagutta, Erramanjil, Banjara Hills, Masab Tank, NMDC, Mehdipatnam, Langer House

TRANSPORT FACILITY FOR SENIOR STUDENTS

Nine A.P.S.R.T.C exclusive buses are arranged for the senior students in the following routes

RTC 'X' Roads to VCE (Two Buses)	Shanker Mutt, Barkatpura, Narayanaguda, Himayatnagar, Liberty, Lakdi-ka-pool, Mehdipatnam
Secunderabad to VCE (Two Buses)	**First Bus:** Via-Begumpet, Banjara Hills, Masab Tank, Mehdipatnam **Second Bus:** Via-Kingsway, Tankbund, Secretariat, Lakdi-ka-Pool, Mehdipatnam
A.G. Colony to VCE (Two Buses)	ESI, Ameerpet, Khairthabad, Lakdi-ka-pool, Mehdipatnam
Tarnaka to VCE (one Bus)	O.U., Vidyanagar, Shankarmutt, Narayanaguda, Liberty, Lakdi-ka-pool, Mehdipatnam
Dilsukhnagar to VCE (Two Buses)	Malakpet, Koti, Abids, Nampally, Lakdi-ka-pool, Mehdipatnam

RULES OF CONDUCT TO STUDENTS

1. Students are not permitted to resort to strikes and demonstrations within the college. Participation in any such activity shall automatically result in their dismissal from the college.
2. No student unions, except professional associations, are permitted in the college.
3. The college premises and buildings shall be kept clean; writing and sticking posters and notices on the building walls is strictly prohibited
4. Any student responsible for bringing outsiders into the college campus for settling student disputes will be expelled from the college.
5. The students may go on Industrial Tours at their expenses. The college will not defray any expenses of the tour.
6. Smoking, consumption of alcoholic drinks, gambling of any kind is prohibited in the college premises. Any student found in the college

premises in an intoxicated condition at any time will be summarily expelled from the college without any enquiry.

7. The students are expected to be regular in their class work and should conduct themselves in a disciplined manner. They should abide by such rules of discipline and conduct as stipulated by the college from time to time.
8. Fees must be paid in one instalment within two weeks of 1st Semester in the College. Fine at Rs.20/- per day will be levied for delayed payment upto 2 weeks, after which name will be deleted from rolls. Later Readmission fee will be Rs.500/- in addition to fine dues. Fee once paid will not be returned under any circumstances. Non payment of fees will result in forfeiture of his/her seat in the college.
9. The principal of the college is the final authority as regards the discipline in the institution and has full powers to suspend, fine, rusticate and take any other action, which is deemed necessary.
10. The conduct of the students should be exemplary, not only within the premises of the college but also outside.
11. The students are informed that they should furnish the latest addresses of their parents/guardians in the Principal's Office. Any change of address of the parents/guardian should also be informed immediately, in the college office.
12. Ragging is prohibited. Any student participating in ragging is liable to be summarily expelled from the college without any enquiry. Ragging on campus and off campus is strictly prohibited and it is a cognizable offence. The college has constituted Anti-Ragging Committee, vigilance teams, anti ragging squads involving the police officers, senior faculty, etc., as per the Act.

DEPARTMENT'S PROFILES

DEPARTMENT OF CIVIL ENGINEERING

The Civil Engineering Department was established in the year of college inception (1981). It offers B.E. civil engineering course with an annual intake of 60 students.

MISSION

To dedicate ourselves to strive and impart in-depth knowledge of Civil Engineering and prepare the students to meet the challengers of growing construction activity with confidence and competence

FACULTY

Dr. B. Sridhar is Professor and Head of the Department. It has 24 faculty members. The Civil Engineering Department is actively engaged in research and consultancy activities in the areas of cement and concrete technology and concrete structures. Research projects on Blended Cements, Concrete Composites like Fibers Reinforced Concrete with various types of fibers like steel, glass, polypropylene etc., GFRP, H.P.C., Light Weight Concrete, Non-Destructive Testing of Structures etc., are in progress and a few have been completed.

To strengthen the knowledge beyond the curricula and to expose the students to the latest trends in the industry Professional Practice School is being implemented.

INFRASTRUCTURE

The Civil Engineering Department is spread in an area of 2,134 Sq. Mtrs. to cater to the needs of classrooms, laboratories and other common facilities. The department possesses 32 computer systems.

The various Civil Engineering Laboratories - the Concrete Lab, Soil Mechanics Lab, Transportation Engineering Lab, G.I.S Lab, Computer Lab, etc., are equipped with modern equipment. It has ideal facilities for research like concrete compression testing machine (Digital) of 300 KN capacity, permeability testing apparatus, non-destructive testing equipment, loading frame of 400 KN capacity, computerized triaxial testing equipment, standard penetration test apparatus, UV-spectro- photometer etc. The Computer centre of the department has all the modern GIS, structural analysis and Design packages.

The Department has a good interaction with outside agencies and is carrying out consultancy activities for various public and private agencies on

structural design, proof checking, quality testing of structures, cement concrete roads, B.T roads, laboratory material testing of cement, concrete including mix design, highway materials, steel roads etc., Soil Testing of Field samples, Field Surveying GIS mapping, water analysis etc., are also being regularly carried out.

Many of our students have been placed in software, GIS and construction companies. Some of our students are pursuing higher education abroad and in India.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

The Department of Computer Science & Engineering was started in the year 1994 offering, a 4-year B.E. course and the present annual intake is 120 students and a 2-Year M.Tech course in the year 2011 with an annual intake of 18 students.

MISSION

To enable the students to develop logic and problem solving approach to help build their careers in the field of computing and provide creative solutions for the benefit of the society.

FACULTY

Dr. T. Adilakshmi, Professor and Head of the Department, has 27 years of teaching experience. The department has 26 well-qualified & experienced faculty members. Osmania University has recognized the department as a Research Center and two professors are recognized as Research Supervisors. The faculty members have varied academic interests and some of their specialized fields include Data Mining, Artificial Intelligence, Grid Computing, Image Processing, Cloud Computing etc. The department has been associated with eminent industries to carry-out research/consultancy work.

INFRASTRUCTURE

The department has a carpet area of **1585** sq.mtrs. to accommodate the needs of classrooms, laboratories and other common facilities. The laboratories are well equipped computers with latest configuration. There are four UG, one PG and one research labs consisting a total of 164 systems. The various servers in the server room which includes, Oracle 11g Database Server, Intranet Server (TOMCAT), Oracle 11g Database Automation Server, NPTEL Video/Web Server, Mat Lab Server 2011 R2, Proxy Server, Red Hat Linux 5.0 Server, Library Automation Server, Symantec Protection Enterprise Edition 3.02, Rational Rose Server, Informatica Server all connected to the LAN thereby providing diverse computing platforms to the students across the campus. The college has high speed internet connectivity throughout the

campus through a leased line from BSNL with 30Mbps and Beam telecom with 10Mbps. To facilitate research, the department also has

1. Aneka.NET Cloud computing software version 3.0 enterprise edition site user license
2. MATLAB Perpetual concurrent license academic version

PLACEMENTS

The academic performance of the students has been consistently outstanding securing good results and ranks in the university examinations. CSE students are placed through campus recruitment in reputed organizations include Microsoft, Pega Systems, Capital IQ, Netcracker, TIBCO, Deloitte, ADP, Factset, Infosys, Cognizant, Wipro, etc and there has been a consistent improvement year-on-year.

INDUSTRY INSTITUTE INTERACTION

The College has signed MoUs with prominent IT-related organizations: Microsoft, EMC Corporation, Computer Associates, Infosys, Progress Software, CSC, Merxius Software, Ubergrad, Navaratan Technologies, Innfidects Software Development & Marketing Pvt Ltd. These partnerships help the students meet the highly competitive standards of the industry by keeping them abreast with the advances in technology through training programmes, student internship and projects, lectures by professionals/experts from the industry. The department in association with Infosys, conducts Infosys Campus Connect foundation programme for students placed in Infosys from our college. EMC Corporation provides the students to take up certification in the Storage & Cloud domains.

CONTENT BEYOND SYLLABUS

CSE Department also offers content beyond the syllabus in the form of MECR (Massively Empowered Classrooms) in association with Microsoft and QEEE (Quality Enhancement in Engineering Education) under MHRD.

VALUE ADDED COURSES

CISCO Local Academy enables students to meet the contemporary market demands in the area of Computer Networks. The department has a CSI Student chapter to facilitate students for interaction with the industry and academia through seminars/workshops/expert lectures.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Established in **1981,** the department offers 4-year B.E. Degree Programme in Electronics & Communication Engineering, with an annual intake of 120 students. It also offers two M.E. Programmes, Embedded Systems & VLSI Design and Communication Engineering & Signal Processing of two years duration each. There are 167 computers located in various labs of the department.

MISSION

To inculcate a spirit of scientific temper & analytical thinking and train the students in contemporary technologies in Electronics & Communication to meet the needs of the industry

FACULTY

Dr. K Jaya Sankar is Professor and Head of the Department. The Department has 31 experienced faculty members comprising Professors, Associate Professors and Assistant Professors and industry professionals. The faculty has teaching expertise in various specializations like Signal Processing, Communications, Digital Systems, VLSI Design, Microwaves etc.

INFRASTRUCTURE

The ECE Department is spread in an area of 2,701 Sq. Mtrs. in a separate block to cater to the needs of classrooms, laboratories and other common facilities. The Department has 13 laboratories as per the curriculum which includes 4 advanced laboratories. The laboratories are as per the curriculum such as Basic Electronics, Analog Electronics Circuits, Digital & Integrated Circuits, Communication, Microwave Engineering, Signal Processing & Microprocessors and Interfacing.

The advanced labs are

- VLSI Lab with Mentor graphics and Cadence tools.
- Digital Signal Processing Lab with MATLAB
- Communication engineering lab with wireless communications trainers.
- Microprocessor and Microcontroller Lab equipped with X86, ARM & micro controllers like 8051 etc., along with Proteus VSM microcontroller simulation software.

The Department maintains a robust association with the industry for student training, student projects, faculty visits, expert lectures, and for collaboration in research and development in emerging technologies. The department is

associated with the major industries like NVIDIA Graphics, Veda IIT, Cypress, AMS, ANURAG, DLRL, etc. The department has research projects funded by DLRL & RCI

The Department has an IEEE student branch, IETE student Forum and IE(I) chapter to facilitate effective interaction with the industry and academia through seminars / symposia / workshops. The ECE students have been consistently securing top university honours among the affiliated colleges of Osmania University. A good number of ECE students have been offered employment both by IT and Core Electronics Engineering Companies in the campus selections.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

The department of EEE was established in 1999. It offers a 4-year B.E. Degree Programme in Electrical & Electronics Engineering (EEE) with an annual intake of 60 students and one M.E programme in power systems and power electronics.

MISSION

To advance knowledge and educate electrical engineering students so that they have the knowledge and the skills to innovate, excel and lead in their professions. To instill in the students values, attitudes, vision that will prepare them for life times of continued learning and leadership for the benefit of society locally and globally

FACULTY

Sri K.V. Ramamna Murthy is Professor and Head of the Department. The department has 16 qualified and dedicated faculties comprising Professor, Associate Professors and Assistant Professors and also industry professionals. The faculty has teaching expertise in various specializations like Power Electronics & Drives, Power Systems & Electrical Machines, Renewable Energy Sources and Control Systems. The department has 41 computer systems at its disposal.

INFRASTRUCTURE

The EEE Department is spread in an area of 1,967 Sq. Mtrs. to cater to the needs of classrooms, laboratories and other common facilities. The Department is equipped with 8 labs, departmental library, classrooms, tutorial rooms and a seminar hall with modern teaching aids and staff rooms. The laboratories equipped to suit the modern curriculum requirements. Some of laboratories in the department are Electrical Machinery Labs, Power

Systems Lab, Power Electronics Lab and Control Systems Lab, Electrical Circuits & Measurements Lab and Electrical Simulation Lab. The Department has good rapport with the renowned organizations like Bharat Heavy Electricals Limited (BHEL), National Thermal Power Corporation (NTPC), Power Grid Corporation of India Limited, Central Power Research Institute (CPRI), Railway Loco Workshop, Vijay Electricals Limited, Medha Servo Drives, Siemens India Limited, GE Enterprises, etc. These links help the students to better equip with latest trends in electrical and electronic industry.

DEPARTMENT OF INFORMATION TECHNOLOGY

MISSION

To enable the students acquire outstanding competence and skills in latest IT related technologies through practice-oriented teaching and training.

The IT department was established in the year 2000. It offers a 4 year undergraduate programme B.E. in Information Technology with an annual intake of 120 students. The curriculum of I.T. emphasizes the ongoing *Convergence of Computers, Communications and Control Systems*. The programme ensures that the student effectively meets the highest benchmarks of competence required by the industry. The unique feature of IT curriculum is 4 Mini projects (2nd yr. I & II Sem. & 3rd yr. I & II Sem.) included in the curriculum in addition to the Main Project in Final year. The students of our department have been selected by leading domestic and multinational companies like Microsoft, Teradata, CTS, Accenture, Capital IQ, Oracle, Pega systems, TCS, Infosys to name a few in the campus recruitment programmes.

FACULTY:

Dr. N. Vasantha is Professor and Head of the Department. The Department has 20 qualified and experienced faculty. The faculty have teaching expertise in C and Data Structures, Java, Web Technologies, Networking, Soft Engineering, Artificial Intelligence, Software Testing, Compiler Construction, Data and Mobile Communication, Cloud Computing, Data Mining, Microprocessors, VLSI Design, Embedded Systems and Signal Processing.

INFRASTRUCTURE:

The IT Department is spread in an area of 1,072 Sq. mtrs to cater to the needs of class rooms, laboratories and other common facilities. The department has 3 laboratories consisting of 108 computer systems equipped with C, C++, Java,Oracle9i with D2K, Rational Suite software and MSDN subscription

through academic alliance with Microsoft. These computers are networked through central servers with access to internet and various design tools.

With the balanced mix of Electronics, Communication and Computer related subjects, the IT curriculum provides an opportunity for the students to have hands-on experience on specific tools MATLAB, Vx Works, VLSI Simulation & Synthesis tools from Mentor Graphics, Xilinx Foundation series, Rational Rose, PSPICE, Microwind and Microprocessors and Microcontroller kits (8085,8086 & 8051), CPLD/FPGA trainer kits. This is in addition to programming labs like C/C++, DBMS, Data Structures, OOSD, JAVA, Operating Systems, Web Technologies, Compiler Construction, Network Programming, Network Simulation using NS2, Middle Ware Technologies. Also, Cisco Lab is included in the curriculum for the students to improve their Networking knowledge.

The department has an exclusive well-stacked library. Apart from having a large number of books encompassing the entire spectrum of information technology, the library subscribes to several journals and periodicals pertaining to the discipline. The department has forged useful alliances with reputed IT–oriented organizations to facilitate student training, projects, internship and in arranging expert lectures.

DEPARTMENT OF MECHANICAL ENGINEERING

Established in the year 1981, the department offers 4-year B.E. course in Mechanical Engineering, with an annual intake of 120 students and a 2-year M.E. Program in Advanced Design & Manufacturing.

MISSION

To create an environment of research, innovation and knowledge – based society through latest teaching learning best practices in mechanical engineering.

FACULTY

Dr. G.V. Ramana Murty is Professor and Head of the Department. The Department has 27 faculty members. The Department is one of the well-established Mechanical Engineering Departments in the State. Majority of staff have industrial experience. The Department has made a significant progress in research at the Master's and Doctoral levels. The faculty members of the Department are actively engaged in research publication and dissemination of knowledge through guest lectures at various prestigious institutions.

INFRASTRUCTURE

The Mechanical Engineering Department is spread in an area of 3,465 Sq. meters to cater to the needs of classrooms, laboratories and other common facilities. The department has excellent infrastructural resources. The laboratories in the department are Applied Thermodynamics, Thermal Engineering, CAD/CAM, Metallurgy Lab, FMS, CNC, Automation & Robotics, Welding, Metal Forming Technology, Metal Cutting & Machine Tools engineering, Metal Casting and Metrology & Instrumentation.

A Central Workshop with the facilities of Carpentry, House Wiring, Fitting, Plumbing and Smithy imparts necessary skills to the students.

The CAD/CAM Lab is equipped with advanced CAD and CAE software, viz., Unigraphics, ANSYS, Hyperworks, FLUENT, GIBBS-CAM, MATLAB for different tasks of part Modeling & Assembly, Analysis, and Simulation etc. Sophisticated equipment like Fast Fourier Transforming Analyzer (FFT), Vibrations, Sound level meters are also available.

The department has established linkages with various renowned organizations for student interactions, training, internship, faculty visits and consultancy services. Some of the organizations are Mahindra & Mahindra, Castrol India, Rane Engine Valves, DRDL, Bharat Heavy Electricals Limited (BHEL), Designtech Systems, APSRTC, Central Institute of Tool Design and Midhani.

The students of the Department have consistently bagged Gold Medals and University Ranks among the affiliated colleges and won several prizes in design and other contests at various levels. The Department has excellent track record in placements and higher education.

DEPARTMENT OF COMPUTER APPLICATIONS

Department of Computer Applications was established in 1994. The department offers 3 year MCA program and the students are admitted through ICET. The annual intake is 60 students. The program ensures that the students effectively meet highest benchmark of competence required by the industry.

MISSION

To impart knowledge of Computer Applications to enable the graduates to meet the global needs and challenges

FACULTY

Dr. P. Hemagiri Rao is Professor and Head of the Department. The Department has 12 highly qualified and experienced faculty members. The Department is full-fledged with the faculty consisting of a professor, two associate professors, three senior assistant professors and five assistant professors. The average experience of the faculty in the department is nine years. The faculty has specialization in the areas like of Optimization Techniques, Artificial Intelligence, Pattern Recognition, Clustering, Networking, Databases and Data Mining.

INFRASTRUCTURE

The Department of Computer Applications is spread in an area of 872 Sq. meters to cater to the needs of classrooms, laboratories and other common facilities. 99 computer systems located in MCA labs serves various needs of the students and the faculty

The Department is well equipped with the Laboratories having Latest systems and software like Rational Rose, Oracle with Developer 2000, Java, .NET, Windows XP, Fedora, C, C++ etc.

The department has been consistently securing an average pass percentage of 98. The students of the department are being selected by esteemed companies like Infosys, TCS, WIPRO, ORACLE, Deloitte, to name a few. The department is active in organizing various seminars and workshops.

DEPARTMENT OF MATHEMATICS

FACULTY

The Department of Mathematics was established in year 1981. Mr. T.Sudhakar Rao is the Head of the Department. The Department has 7 faculty members and caters the teaching needs of the students in Mathematics. Two of them are doctorates. The department is actively engaged in the promotions of mathematical applications through ***MATHS CLUB***.

MISSION

To impart in-depth knowledge of mathematics and its applications in various fields of engineering so as to enable the students to meet the challenges of the Engineering Problems with courage, confidence, conviction and competence.

DEPARTMENT OF PHYSICS

Department of Physics was established in 1981.

MISSION

To imbibe the spirit of scientific temper and to instill logic and analytical approaching budding engineers.

FACULTY

Dr. A.S. Sai Prasad is professor and Head of the Department. All the 6 faculty members are well qualified and experienced.. The specializations of the faculty members include electron paramagnetic resonance, materials science, condensed matter physics, luminescence, magnetic fluids, atmospheric sciences etc. The members are actively involved in research work.

The faculty members are actively engaged in research work. More than 40 research papers were published by the faculty in International and national journals of high repute.

INFRASTRUCTURE

The Department is spread in an area of 275 Sq. Mtrs to cater to the needs of classrooms, laboratories and other common facilities. It has two laboratories namely Mechanics lab and Optics lab having equipment. The instruments include CROs, Optical fibers, lasers, Hall apparatus etc.

DEPARTMENT OF CHEMISTRY

The department was established in 1981.

MISSION

To infuse knowledge of chemical principles of engineering materials to the prospective engineers

FACULTY

Sri Ch. Gouri Shankar is the Head of the Department. The department has 7 experienced members of faculty. Three of them are doctorates.

INFRASTRUCTURE

The Department of Chemistry has a comprehensive Chemistry Laboratory in an area of 398 Sq. meters with latest equipments such as spectrophotometer etc.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

The Department, at present, offers courses in English and Economics. It has carved a unique niche by offering various value-added courses.

FACULTY

Dr. (Ms). Jacqueline Amaral is the Head of the Department. The department has eight faculty members with strong foundations in communications skills and phonetics.

MISSION

To nurture the budding professionals to face dynamic situations of the business world through training, mentoring, and counseling by creating a 'learning rich' environment."

INFRASTRUCTURE

The Department of English has comprehensive laboratories in an area of 173 Sq. meters. It provides training in communication and interpersonal skills, accent neutralization, soft skills and presentation skills to mention a few. The Department also provides consulting and training services to industry.

The Phonetics & Interactive communication skills laboratories help students develop English skills, enriching their interpersonal skills, enhancing their confidence levels and marginalizing their first language influence. The English Language Lab is upgraded to Multi media Lab with 34 computer systems containing Hi-Class platform from Hi Class Software, Sky pronunciation suite and LETS DO business connected speech from Young India. The total cost of major equipment/instruments in the Department is about Rs.31.00 lakhs.

DEPARTMENT OF PHYSICAL EDUCATION

Department of Physical Education plays a crucial role in encouraging the students to nurture the inherent talents in sports and games. Qualified and experienced faculty serves the needs of the students. The college has good indoor and outdoor sports & games facilities like table tennis, carom, chess, shuttle badminton, cricket, valley ball, basket ball, etc. The college student teams have been consistently winning various prizes/medals at Inter-Collegiate, Inter-University and also at various National Level Tournaments.

DEPARTMENT OF HUMAN RESOURCES

Human Resources (HR) department provides career guidance and counseling to the outgoing budding engineers. It prepares students to meet the industry's requirements technically and enrich them to suit the corporate world with excellent soft skills. The department of HR arranges personality

development programs and looks after campus placements of the students. It takes care of the pre-placement training & placements. It explores the various career options in the fields of All India Civil Services, All India Engineering Services, Scientific, Research and Industrial Organizations, Army, Navy and Air force in addition to arranging counseling sessions on higher education avenues in India and abroad. Human Resources wing is headed by Prof. K. Kishore, Director, Training & Placement. Sri. K. Srinivasa Chakravarthy is Assistant Director.

ACADEMIC AND EXAMINATIONS BRANCH

Academic and Examinations Branch takes care of all the academic requirements of students starting from admissions processes, collection of original certificates at the time of admission, issue of I.D cards, syllabus books, photo copies of original certificates deposited in the college, course completion certificates, custodian forms, and return original certificates at the time of leaving and also issue Transfer and Bona-fide certificates, Migration certificate, Provisional Degree certificate, Consolidate marks memos, etc.

DIRECTOR – STUDENT WELFARE

Sri A.Vishweshwara Rao is the Director Student Welfare (DSW). Sri K. Ramakrishna is the Assistant DSW. This wing of the college looks after the student facilities and addresses the issues and problems of students. The DSW takes care of amenities, proctorial system, transport facilities, financial Assistance, student bus passes, railway concessions, certification of scholarship applications and Student Bonafide certificates.

ACCOUNTS SECTION

The major works of account section are collection of tuition fee, special fee, examination fee, medical condonation fee, process and disbursement of A.P. State Social welfare Scholarships, National Merit Scholarships, AICTE stipends, estimates to obtain Education Loan from Banks, Refund of caution deposits and issue of no due certificates.

STUDENT COUNSELLOR

The student counsellor services are provided to the students to give guidance on personal, social and psychological problems.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ALMANAC FOR THE ACADEMIC YEAR 2014-15

FIRST YEAR B.E

¼ B.E – I SEMESTER

Particulars	Date
Commencement of Instruction	08-09-2014
I Class Test	24-11-2014 to 27-11-2014
Parent - Teachers' Meet	20-12-2014
II Class Test	21-01-2015 to 24-01-2015
Last date of Instruction	24-01-2015
Preparation holidays & Practical Examinations	27-01-2015 to 07-02-2015
Commencement of Theory Examinations	09-02-2015 to 28-02-2015

¼ B.E – II SEMESTER

Commencement of Instruction	02-03-2015
I Class Test	27-04-2015 to 30-04-2015
II Class Test	17-06-2015 to 20-06-2015
Last date of instruction	20-06-2015
Preparation holidays and practical Examinations	22-06-2015 to 04-07-2015
Commencement of Theory Examinations	06-07-2015 to 25-07-2015
Summer vacation	22-06-2015 to 31-07-2015
Commencement of B.E 2/4-I Semester for the Academic year 2015-2016	03-08-2015

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ALMANAC FOR THE ACADEMIC YEAR 2014-15

FIRST YEAR M.E/M.Tech

I-YEAR - I-SEMESTER

Particulars	Date
Registration of subjects and Commencement of Instruction	17-11-2014
I Class Test	05-01-2015 to 08-01-2015
II Class Test	04-03-2015 to 07-03-2015
Last date of Instruction	07-03-2015
Display of Attendance and Sessional Marks	09-03-2015
Theory Examinations	16-03-2015 to 04-04-2015
Declaration of Results	25-04-2015
Make-Up Examinations	04-05-2015 to 23-05-2015

I-YEAR – II SEMESTER

S.No.	Particulars	Date
1	Registration of subjects and Commencement of Instruction	06-04-2015
2	I Class Test	15-06-2015 to 18-06-2015
3	II Class Test	05-08-2015 to 08-08-2015
4	Last date of Instruction	08-08-2015
5	Display of Attendance and Sessional Marks	10-08-2015
6	Theory Examinations	17-08-2015 to 05-09-2015
7	Declaration of Results	26-09-2015
8	Make-Up Examinations	05-10-2015 to 24-10-2015
9	Summer Vacation	18-05-2015 to 30-05-2015

Note: No Winter/Summer vacation for UGC/AICTE stipend holders.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ALMANAC FOR THE ACADEMIC YEAR 2014-15

FIRST YEAR MCA

I-YEAR - I-SEMESTER

Commencement of class work	13-10-2014
First Class Test	15-12-2014 to 17-12-2014
Second Class Test	11-02-2015 to 13-02-2015
Last Date of Instructions	13-02-2015
Preparatory Holidays	14-02-2015 to 01-03-2015
Preparatory Holidays & Supplementary Examinations (I/I)	--
Theory Examinations (Main)	02-03-2015 to 13-03-2015
Practical Examinations	16-03-2015 to 20-03-2015
Commencement of class work of the II semester	23-03-2015

SCHEME OF INSTRUCTION AND EXAMINATION W.E.F. 2014-15

B.E. I YEAR– I SEMESTER Common to All Branches

S. No	Sub reference Code	SUBJECT	Scheme of Instruction				Scheme of Examination			
			Periods per Week (50min each)				Duration in Hrs	Maximum Marks		Credits
			L	T	D	P		Sem. Exam	Sessionals	
THEORY										
1	HS1100	English-I	3	-	-	-	3	50	30	2
2	MA1110	Mathematics-I	3	1	-	-	3	70	30	3
3	PH1120	Engineering Physics-I	3	-	-	-	3	70	30	3
4	CH1130	Engineering Chemistry-I	3	-	-	-	3	70	30	3
5	CS1140	Programming in 'C' &Problem solving	3	1	-	-	3	70	30	3
6	CE1150	Engineering Mechanics-I	3	2	-	-	3	70	30	3
7	CE1160	Engineering Graphics-I	-	2	6	-	3	70	30	3
PRACTICALS										
8	HS1111	English Language Lab-I	-	-	-	3	3	50	25	2
9	PH1121	Physics Lab-I	-	-	-	3	3	50	25	2
10	CH1131	Chemistry Lab-I	-	-	-	3	3	50	25	2
11	CS 1141	'C' Programming Lab	-	-	-	3	3	50	25	2
12	ME1161	Workshop Practice-I	-	-	-	3	3	50	25	2
		TOTAL	18	6	6	15		720	335	30
		GRAND TOTAL	**45**					**1055**		**30**

SCHEME OF INSTRUCTION AND EXAMINATION W.E.F. 2014-15

B.E. I YEAR– II SEMESTER Common to Civil, Mechanical and EEE Branches

S. No	Sub reference Code	SUBJECT	Scheme of Instruction				Scheme of Examination			
			Periods per Week (50min each)				Duration in Hrs	Maximum Marks		Credits
			L	T	D	P		Sem. Exam	Sessionals	
THEORY										
1	HS1200	English-II	3	-	-	-	3	50	30	2
2	MA1210	Mathematics-II	3	1	-	-	3	70	30	3
3	PH1220	Engineering Physics-II	3	-	-	-	3	70	30	3
4	CH1230	Engineering Chemistry-II	3	-	-	-	3	70	30	3
5	CS1240	Object Oriented Programming using C++	3	1	-	-	3	70	30	3
6	CE1250	Engineering Mechanics-II	3	2	-	-	3	70	30	3
7	CE1260	Engineering Graphics-II	-	2	6	-	3	70	30	3
PRACTICALS										
8	HS1211	English Language Lab-II	-	-	-	3	3	50	25	2
9	PH1221	Physics Lab-II	-	-	-	3	3	50	25	2
10	CH1231	Chemistry Lab-II	-	-	-	3	3	50	25	2
11	CS 1241	C++ Programming Lab	-	-	-	3	3	50	25	2
12	ME1251	Workshop Practice-II	-	-	-	3	3	50	25	2
		TOTAL	18	6	6	15		720	335	30
		GRAND TOTAL	**45**					**1055**		**30**

SCHEME OF INSTRUCTION AND EXAMINATION W.E.F. 2014-15

B.E. I YEAR– II SEMESTER common to CSE, ECE and IT Branches

S. No	Sub reference Code	SUBJECT	Scheme of Instruction				Scheme of Examination			
			Periods per Week (50min each)				Duration in Hrs	Maximum Marks		Credits
			L	T	D	P		Sem. Exam	Sessional	
THEORY										
1	HS1200	English-II	3	-	-	-	3	50	30	2
2	MA1210	Mathematics-II	3	1	-	-	3	70	30	3
3	PH1270	Engineering Physics-II	3	-	-	-	3	70	30	3
4	CH1280	Engineering Chemistry-II	3	-	-	-	3	70	30	3
5	CS1240	Object Oriented Programming using C++	3	1	-	-	3	70	30	3
6	EE1260	Basic Electrical Engineering	3	2	-	-	3	70	30	3
7	CE1260	Engineering Graphics-II	-	2	6	-	3	70	30	3
PRACTICALS										
8	HS1211	English Language Lab-II	-	-	-	3	3	50	25	2
9	PH1221	Physics Lab-II	-	-	-	3	3	50	25	2
10	CH1231	Chemistry Lab-II	-	-	-	3	3	50	25	2
11	CS 1241	C++ Programming Lab	-	-	-	3	3	50	25	2
12	EC1261	Electronics Workshop (ECE)	-	-	-	3	3	50	25	2
	CS1271	CS Workshop (CSE)								
	IT 1291	IT Workshop (IT)								
		TOTAL	18	6	6	15		720	335	30
		GRAND TOTAL	**45**					**1055**		**30**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderbad-500031, Telangana State

SYLLABI FOR B.E 1/4 - FIRST SEMESTER

(w.e.f the academic year 2014-15)

ENGLISH-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : Effective communication; Role and Importance of Communication; Features and functions of language and communication; Process of Communication; Types of communication -verbal and non verbal; Channels of communication; Barriers to effective communication.

UNIT – II: Importance of listening in effective communication; Improving listening ability through activities; note-taking, Speaking strategies; Situational dialogues (Basic level)

UNIT– III : Reading different texts; sub-skills of reading; Understanding function, organization and meaning of various texts to develop reading skills; Written Communication: features of writing; Cohesion and Coherence; Descriptive/ Expository writing - describing events, people, places, objects.

UNIT – IV : Remedial English: Parts of speech; Articles, prepositions; Tense and Aspect; Connectives and Correlative conjuncts; Common errors, Direct and Indirect Speech, Punctuation, Word- Formation, Homonyms, Homophones, Synonyms, Antonyms.

UNIT – V : Reading Texts .

Short-stories:

The Road Not Taken - Robert Frost

The Eyes Are Not Here - Ruskin Bond

Learning Resources:

Prescribed textbook:

Technical communication - Principles and Practice (2nd Edition 2014) - Meenakshi Raman and Sangeeta Sharma- Oxford University Press.

Suggested Reading

1. E.Suresh Kumar, P. Sreehari and J. Savithri - Essential English
2. Reading comprehension - Nuttal.J.C - Orient Blackswan
3. Sunitha Mishra,C. Murali Krishna, Communication Skills for Engineers, Pearson, 2004.
4. M. Ashraf Rizvi. Effective Technical Communication. Tata McGraw Hill, 2005.
5. Allen and Waters, How English Works.
6. Willis Jane., English through English.

ENGLISH LANGUAGE LAB-I

(Common to all branches of ¼ B.E-I Semester)
w.e.f the academic year 2014-15

PHONETICS LAB:

Introduction to English Phonetics: Introduction to auditory, acoustic and articulatory phonetics. Organs of speech: the respiratory, articulatory and phonatory systems. Classification and Description of English Phonemic sounds; Minimal pairs: The Syllable: Types of syllables; Consonant clusters.

INTERACTIVE COMMUNICATION SKILLS LAB:

Role Play: - Use of structured and semi-structured dialogues in a variety of situations and settings.

Public Speaking: Participate in public speaking, essentials of an effective speech, types of delivery, planning and delivering a speech.

Debate: Understanding the difference between a debate and a group discussion, essentials of debate, concluding a debate. (Basic Level)

Group discussion: Objectives of GD, Types of GDs; Initiating, Continuing, and concluding a GD (Basic Level)

STUDY SKILLS AND READING SKILLS LAB:

Use of Dictionary and Thesaurus: Advantages of using a Dictionary and Thesaurus; Effective use of Dictionary and Thesaurus.
Book reviews and Film reviews - Oral and Written
Vocabulary: - Registers.
Reading: - Reading different types of texts, Reading Newspapers, Magazines, Short–Stories, One-act plays, Content - related texts and making notes.

Learning Resources:
Speak Well: Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati - Orient BlackSwan
Suggested reading:

1. T.Balasubramanian: A textbook of English phonetics for Indian students, Macmillan, 2008.
2. Priyadarshi Patnaik : Group discussion and interviews, Cambridge University Press India private limited 2011.
3. Daniel Jones: Cambridge English Pronouncing Dictionary - A Definitive guide to contemporary English Pronunciation.
4. Reading Cards (Eng400): Orient Blackswan.

MATHEMATICS-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : Matrices (12 classes)

Rank of a Matrix- Consistency of Linear system of equations-Linearly independence and dependence of Vectors - Eigenvalues and Eigenvectors- Characteristic equation- Cayley - Hamilton Theorem- Diagonalization (using similarity and orthogonal transformation)- Reduction of Quadratic form to canonical form

UNIT – II: Infinite Series (10 classes)

Sequences- Series – Convergence and Divergence- Series of positive terms- Comparison tests - D'Alemberts Ratio Test – Raabe's Test – Logarithmic series test - Cauchy's root test - Alternating Series – Leibnitz test – Absolute and Conditional convergence

UNIT– III : Differential Calculus (15 classes)

Taylor's Series – Expansion of functions on power series- Curvature- Radius of Curvature (Cartesian, Polar and parametric co-ordinates) – Center of Curvature – Envelopes– Evolutes and Involutes- Curve tracing (Cartesian and Polar co-ordinates)

UNIT – IV : Functions of Several Real Variables (15 classes)

Limits and Continuity of Functions of two Variables - Partial Derivatives – Total Differential and Derivates - Approximation by total differentials - Derivatives of Composite and implicit functions - Higher Order Partial Derivatives -Taylor's series of functions of two variables –Applications of taylor's series to linear and quadratic approximations- Maxima and Minima of functions of two variables with constraints- Lagrange's method of multipliers - Change of Variables - Jacobian

UNIT – V : Multiple integrals (12 classes)

Double and Triple integrals - Change of order of integration- applications to evaluate area and volume

Learning Resources:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, B. S. Grewal 40th. Edition, Khanna Publishers.
3. Advanced Engineering Mathematics,8th Ed by Erwin Kreyszig, John Wiley & Sons.
4. Differential Calculus by Shanti Narayan S. Chand & Co
5. Matrices, by A R Vasishtha, Krishna Prakashan Media, Meerut
6. Advanced Engineering Mathematics by S.S.Sastry

ENGINEERING PHYSICS-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : OSCILLATIONS (09 periods)

1. ***Fundamentals of vibrations***: Equation of motion of a simple harmonic oscillator and its solution, torsion pendulum-expression for time period. Combination of two mutually perpendicular simple harmonic vibrations of same frequency, Lissajous figures.
2. ***Damped and forced oscillations***: Damped harmonic oscillator, equation of motion of damped oscillator under special cases. Differential equation of forced oscillator and its solution, resonance, Quality factor.

UNIT – II: FUNDAMENTALS OF ELECTRICAL AND ELECTROMAGNETIC WAVES (09 periods)

1. ***Electromagnetic theory:*** Review on conduction and displacement current, Maxwell's equations in integral and differential forms, electromagnetic wave equations in free space and conducting medium, transverse nature of EM waves and Poynting vector.
2. **A.C. Circuits:** Reactance, impedance-RC, LC and LR circuits, Series and parallel LCR resonance circuits, band width, sharpness, and electromechanical analogy.

UNIT– III : PHYSICAL OPTICS (08 periods)

1. ***Interference:*** Review on conditions for Interference, coherence, Interference in thin films (reflected light), Newton's rings experiment and measurement of wavelength and refractive index.
2. ***Diffraction:*** Distinction between Fresnel and Fraunhofer diffraction, diffraction at a single slit, double slit diffraction, diffraction grating (N-slits), -Measurement of wavelength
3. ***Polarization:*** Malus law- Double refraction, Nicol's prism, wave plates, optical activity, Laurent's half shade polarimeter, determination specific rotation.

UNIT – IV : LASERS AND FIBER OPTICS (8 periods)

1. ***Lasers:*** Characteristics of Lasers- induced absorption, spontaneous and stimulated emission of radiation - Population inversion – Ruby laser- Helium-Neon Laser - Applications of lasers.
2. ***Holography:*** Basic principles of holography– Construction and reconstruction of image on hologram – advantages of holography-Applications of holography
3. ***Fibre Optics:*** Introduction– Parts of an optical fibre-propagation of light through an optical fibre- Critical angle, Acceptance angle, Numerical aperture, Types of optical fibres-step index and Grin fibres, SMF and MMF fibres- brief introduction to loses in optical fibres-Application of optical fibres.

UNIT – V : **MATERIAL SCIENCE** (**8 periods)**

1. ***Magnetic Materials:*** Ferro, anti ferro and ferrimagnetism – Weiss molecular field theory of ferromagnetism- magnetic domains- hysteresis curve-Soft and hard magnetic materials— Ferrites and their application.
2. ***Dielectric materials:*** Dielectric polarization- Electronic and ionic orientation and space-charge polarizations–Expression for electronic and ionic polarizbilities-Frequency and temperature dependence of dielectric polarizations-Ferro electric materials and their characteristics

Learning Resources:

1. Introduction to Mechanics- Mahendra Kumar Varma, University Press, 2013
2. Optics, Ajay Ghatak, TMH
3. Introduction to Solid State Physics, Kittel C, Wiley Eastern
4. Engineering Technology, B.L.Teraja
5. Textbook of Engineering Physics, Avdhanulu and Kshira Sagar, -S.Chand.
6. Applied Physics for Engineers, Neeraj Mehta, PHI
7. http://ocw.mit.edu/courses/physics
8. http://oyc.yale.edu/physics
9. www.nptel.ac.in

PHYSICS LABORATORY-I

(Common to all branches of ¼ B.E- I Semester)

w.e.f the academic year 2014-15

1. Estimation of Errors in time period and determination of 'g' by simple pendulum
2. Determination of rigidity modulus of a given wire using Torsional pendulum
3. Determination of wavelength of spectral lines of mercury lamp by diffraction grating under normal incidence
4. Determination of Wavelength of a Laser light.
5. Determination of Radius of Curvature of a Plano-convex lens by forming Newton's Rings
6. Determination of Moment of Inertia of a Fly Wheel
7. Determination of hysteresis loss, coercivity and retentivity of a ferromagnetic (iron) materials by B-H Curve
8. Verification of Malus Law of polarization of light
9. Verification of laws of vibration of a stretched string and determination of linear density of given material of a given wire by sonometer
10. LCR series and parallel resonant circuits.

**** At least Eight experiments should be done the by the student in each semester***.

ENGINEERING CHEMISTRY-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : **Water Chemistry** (8)

Hardness of water- Types and its units (PPM, Clarks & French). Degree of hardness-numericals. Determination of hardness of water by EDTA method -numericals. Alkalinity of water and its determination-numericals. Effects of hardness in boilers- scales, sludge, causes and their prevention by Calgon & blow down processes. Softening of water by Reverse Osmosis. Characteristics of potable water, sterilization –Break point chlorination.

UNIT – II: **Polymers** (8)

Definition, Homo and Co-polymers, Homo chain and Hetero chain polymers. Addition and Condensation polymerization (no mechanisms). Plastics, Elastomers, fibers, Thermoplastics & Thermosets.

Preparation, Properties and Uses of A) Aramid, B) Bakelite, C) PVC (Plasticized & Unplasticized). Natural rubber- structure - Vulcanization. Preparation, Properties and uses of Buna-S, Butyl and Silicone rubbers, Concept of Biodegradable polymers-poly lactic acid.

UNIT– III : **Chemistry of Engineering Materials** (6)

a) Conducting polymers: Definition, Classification into extrinsic and intrinsic polymers. Mechanism of conduction in doped and undoped polyacetylene & Polyaniline - Applications.

b) Composite materials: Introduction, characteristics and constituents of composites. Classifications of composites (both matrix and dispersed medium). Reinforced composites-A)Glass B) Carbon & C) Aramid Fibre Reinforced composites- Applications of Reinforced composites.

UNIT – IV : **Thermodynamics** (10)

Introduction –Thermodynamic processes, Reversible & irreversible processes. First Law of thermodynamics -statements and its Limitations, spontaneous and non spontaneous processes. Heat engine & its efficiency. Carnot cycle - efficiency derivation, Carnot theorem. Concept of entropy, physical significance, Entropy changes in reversible & irreversible processes, criteria for spontaneity in terms of entropy. Statements of 2^{nd} Law of thermodynamics. Concept of free energy - criteria for spontaneity in terms of free energy, Variation of free energy with temperature and pressure. Gibbs – Helmholtz equation and its applications - Numericals.

UNIT – V : **Chemical Fuels** (10)

Introduction, Classification, requisites of a good fuel. Calorific value (CV)-HCV, LCV (Definition and relationship), Dulongs formula-Numericals.

Solid Fuels: Coal- Significance of Proximate & Ultimate analysis.
Liquid Fuels: composition and CV of Gasoline, Fixed bed catalytic cracking method, Knocking and its significance-, Octane number, Enhancement of quality of gasoline (removal of S, anti knocking agents-leaded & unleaded petrol). Catalytic converters and their role in reducing the toxicity of exhaust emissions. Diesel-composition, CV, Cetane number.
Gas Fuels: Composition and applications of CNG, LPG.
Bio-diesel: Source and Transesterification.

Learning Resources:

1. Elements of Physical Chemistry by S. Glasstone and D Lewis
2. Textbook of Polymer Science by Fred W. Billmeyer Jr.
3. Principles of physical chemistry by Puri, Sharma and Pathania.
4. Text book of physical chemistry by PLSoni & OP Dharmarha, S.Chand &Sons, New Delhi.
5. Engineering chemistry by PC Jain, M Jain Dhanpat Rai &sons (15th Ed), New Delhi
6. Engineering chemistry by Sashi Chawla, Dhanpat Rai &sons, New Delhi.
7. Engineering chemistry by O.G. PALANNA, tmh, and Newdelhi
8. Chemistry in engineering and technology by JC Kuriacose & J Rajaram TMH, New Delhi
9. Engineering chemistry by SS Dara, S Chand &Sons, New Delhi.
10. Wikipedia

CHEMISTRY LABORATORY-I

(Common to all branches of ¼ B.E- I Semester)

w.e.f the academic year 2014-15

1 Introduction – weighing demo
2 Preparation of standard solution
3 Estimation of Ferrous by permanganometry
4 Estimation of total hardness by EDTA
5 Estimation of Carbonate and bi carbonate
6 Determination of Parameters of Water

Conductometry

7 Strong acid vs strong base
8 weak acid vs strong base
9 Mixture of acids vs strong base

Colorimetry

10 Verification of Beer-Lamberts law & Determination of concentration of $K_2Cr_2O_7$
11 Verification of Beer-Lamberts law & Determination of concentration of $KMnO_4$
12 Preparation of Poly Pyrrole /Urea formaldehyde & Nylon 6.6 (Demo)

A Student should perform atleast 8 experiments

PROGRAMMING IN 'C' &PROBLEM SOLVING

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : **Introduction to computers:** Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flowcharts.
Number Systems (Binary, Octal, Decimal and Hexadecimal), Representation of numbers (fixed and floating point).
Introduction to C Language- Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Expressions, Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

UNIT – II: **UNIT-II**
Selection: Logical Data and Operators**,** if… else, switch statements, Standard Functions.
Repetition: Loops**,** while, for, do-while statements, Loop examples, break, continue, goto.
Functions: Designing Structured programs, Functions Basics, User Defined Functions, Inter Function Communication, Standard Functions, Scope, Storage Classes-Auto, Register, Static, Extern, Scope Rules and Type Qualifiers.

UNIT– III : **Recursion**-Recursive Functions, Preprocessor Commands.
Arrays: Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two -Dimensional arrays, Multidimensional Arrays, Linear search and Binary Search, Selection Sort and Bubble Sort.

UNIT – IV : **Pointers:** Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, LValue and RValue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing on Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command line arguments.
Strings – Concepts, C Strings, String Input / Output, Functions, Arrays of strings, String Manipulation Functions.

UNIT – V : The Type Definition (typedef), Enumerated Types.
Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self referential Structures, Unions
Input and Output: Files, Streams, Standard Library Input Output Functions, Character Input Output Functions.

Learning Resources:

1. B.A.Forouzan & Richard F.Gilberg, A Structured Programming Approach using C, 3rd Edition, Cengage Learning, 2013

2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,2nd Edition, Prentice-Hall, 2006
3. Steve Oualline ,Practical C Programming, 3rd Edition, O'reilly Press.
4. Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, Pearson Education,2007
5. E.Balagurusamy, Programming in ANSI C, TMG
6. Gottfried, Programming with c, Third Edition,TMH.
7. R G Dromey, How to solve it by Computer, Pearson Education, 1st Edition, 2006
8. Jon Bentley, Programming Pearls, 2nd Ed, Addison-Wesley, Inc., 2000.

C PROGRAMMING LAB-I

(Common to all branches of ¼ B.E-I Semester)
w.e.f the academic year 2014-15

1. Finding maximum and minimum of given set of numbers, Finding roots of quadratic equation
2. Sin x and Cos x values using series expansion.
3. Conversion of binary to decimal, octal, hexadecimal and vice versa
4. Generating Pascal Triangle
5. Recursion: Factorial, Fibonacci, GCD
6. Matrix addition and multiplication using arrays, Linear search and Binary Search.
7. Bubble sort, Selection sort
8. Programs on Pointers: pointer to arrays, pointer to functions
9. Functions for string manipulations
10. Programs on Structures and Unions
11. Finding the no: of characters, words and lines of given text file
12. File handling programs

Learning resources:

1. B.A.Forouzan & Richard F.Gilberg, A Structured Programming Approach using C 3rd Edition, Cengage Learning, 2013
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language 2nd Edition, Prentice-Hall, 2006
3. E.Balagurusamy, Programming in ANSI C, TMG,4th edition , 2008

ENGINEERING MECHANICS-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : Force Systems: (10 periods)

Resultant of coplanar concurrent forces, Components of force in space, Moment of force and its applications, Couples and resultant of force systems.

UNIT – II: Equilibrium of Force Systems: (12 periods)

Free body diagram, Equations of equilibrium, Equilibrium of planar and spatial system.

UNIT– III : Analysis of Structures: (10 periods)

Analysis of trusses by method of joints and method of sections

UNIT – IV : Friction: (12 periods)

Laws of friction. Application to simple systems. Connected systems and belt friction. Wedge friction.

UNIT – V : Centroid and Moment of Intertia: (16 periods)

Centroids of lines, areas and composite areas, Moment of inertia of areas, Composite areas, Polar moment of inertia, Radius of gyration.

Learning Resources:

Suggested Reading:

1. F.L.Singer, "Engineering Mechanics", Harpper & Collins, Singapore 1975.

Text Books for Reference:

1. S.P.Timoshenko and D.H.Young, "Engineering Mechanics", McGraw Hill International Edition, 1983
2. Andrew Pytel., Jaan Kiusalaas., "Engineering Mechanics", Cengage Learning.
3. F.P.Beer & E.R.Johnston, "Jr. Vector Mechanics for Engineers", TMH, 2004.
4. R.C.Hibbeler & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. K.L.Kumar, "Engineering Mechanics", Tata McGraw Hill, 1994
6. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
7. A.R.Basu., "Textbook of Engineering Mechanics", Dhanpat Rai & Co, 2014.
8. Basudeb Bhattacharyya., "Engineering Mechanics", Oxford University Press, 2008.
9. Meriam. J. L., "Engineering Mechanics", Volume 1: Statics, John Wiley & Sons, 2008.

ENGINEERING GRAPHICS-I

(Common to all branches of ¼ B.E-I Semester)

UNIT – I : (24 Periods)

Introduction: Instruments and their uses, lettering, types of lines and dimensioning methods.

Scales: Reduced and Enlarged scales, Representative fraction, Scales: plain, diagonal and vernier

UNIT – II: (24 periods)

Simple Geometric Construction: Regular polygons inscribed in a circle given the side of the polygon.

Engineering curves: Ellipse, Parabola, Hyperbola, Cycloid, Epicycloid, Hypocycloid and Involute.

UNIT– III : (24 periods)

Projections of points and straight lines: Orthographic projection, Projection of points placed in different quadrants. Projection of straight lines inclined to one and two reference planes: Traces.

UNIT – IV : (16 Periods)

Projections of planes: Projections of perpendicular planes, Oblique planes, Traces of planes, use of Auxiliary planes method.

UNIT – V : (22 Periods)

Projection of solids: Polyhedra, Solids of revolution, Projections of solids in simple position (prisms, pyramids, cylinders and cone), axis inclined to one plane, Axis inclined to both the reference planes, Projections of solids using auxiliary planes.

Learning Resources:

Text book:

1. N.D. Bhatt, "Elementary Engineering Drawing", Charotar Publishers, 2014.

Suggested Reading:

1. Thomas E French, Charles J Vierck, Robert J. Foster "Engineering Drawing and Graphic Technology", McGraw Hill Education, 1993.
2. P.S. Gill "Engineering Drawing: Geometrical Drawing", SK Kataria & sons, 2012.
3. K. Venugopal, "Engineering Drawing and Graphics + Autocad", New Age International (P) Ltd., New Delhi, 1998.
4. A.N. Siddiquee et al, "Engineering Drawing with a Primer on Autocad", Prentice hall of India Ltd., New Delhi, 2004.
4. Basanth Agrawal, CM Agrawal, "Engineering Graphics" First Edition, Tata McGraw Hill, 2012
6. BVR Gupta, M Raja Roy, "Engineering Drawing with AutoCad", IK Int Pvt Ltd, 2009

WORKSHOP PRACTICE-I

(Common to all branches of 1⁄4 B.E- I Semester)

FITTING:
1.Template fitting (square fit)
2. V- groove fit
3. Drilling and Tapping
4. Making a perfect fit (demo)

HOUSE WIRING:
1. Two lamps in (a) series (b) parallel with single switch
2. Staircase wiring
3. Tube light wiring
4. LT distribution panel with loads (demo)

CARPENTRY:
1. Half-lap joint
2. Dove-tail joint
3. Briddle joint
4. Wood turning operation (demo)

SHEETMETAL:
1. Rectangular box
2. Rectangular scoop
3. Making a Funnel
4. Making a T-Joint(demo)

Learning Resources:

1. P. Kannaiah & K. L. Narayana "Workshop manual" Scitech publications (I) Pvt. Ltd., Lingampally, Kachiguda, Hyderabad-500027, 2nd edition
2. K. Venugopal, Dr. V. Prabhu Raja, G. Sreekanjana "Workshop Manual" Anuradha Publications 1st Ed. 2012 Karuppur, Kumbakonam – RMS, PIN-612605
3. www.technologystudent.com
4. www.mewelding.com

ENGINEERING ENGLISH THEORY-II
(Common to all branches of ¼ B.E-II Semester)

UNIT – I : Interpersonal Communication—Johari Window; Styles of Communication; Persuasion techniques; Team building skills and team work.

UNIT – II: Oral communication; Importance of oral communication; Informal talks and situational dialogues; telephone etiquette, Speaking strategies-introducing a person and speaking about his achievements, team-presentations (Advanced level).

UNIT– III : Communication through letters: Structure of business letters: letters of complaint, letters of enquiry and responses; application letters and resume writing for jobs, circulars, notices, net- etiquette, short-reports on events.

UNIT – IV : Advanced Remedial English: Active and Passive Voice; Concord; Relative clauses; Vocabulary: Polysemes, Hyponyms, One- word Substitutes; Phrasal verbs, Collocations, multi-word expressions, Idiomatic usage.

UNIT – V : Reading Texts
Short-stories:
Goodbye Party for Miss Pushpa- T.S Nissim Ezekiel.
The Romance of a Busy Broker- O. Henry

Learning Resources:

1. Technical communication - Principles and Practice (2nd Edition 2014) - Meenakshi Raman and Sangeeta Sharma- Oxford University Press.

Suggested reading:

1. Essential English - E.Suresh Kumar, P. Sreehari, J. Savithri - Orient Blackswan 2011.
2. A.K Ramchandran et al., Business communication, Macmillan - 2009.
3. Sunitha Mishra., C. Murali Krishna., Communication Skills for Engineers, Pearson, 2004.
4. Monipally Mathew., Craft of Business Writing, Tata McGraw Hill.
5. Allen and Waters., How English Works.
6. Grillet. F., Developing Reading Comprehension

ENGLISH LANGUAGE LABORATORY-II
(Common to all branches of ¼ B.E-II Semester)

Interactive Communication Skills Lab (Advanced Level):

Debate: Essentials of debate, conducting oneself in a debate, moderating a debate, concluding a debate.
Group discussion: Discussions of cases.
Presentation Skills: Making Effective Presentations, Expressions which can be used in Presentations, Use of Non-Verbal Communication, Handling Question and Answer Session; Use of Audio-Visual Aids, Team PowerPoint Presentations.
Audio and Videos, News Clippings and Live Matches: - To Develop LS, Commentaries, and Dialogue Delivery.

Reading Skills Lab:

Use of Dictionary and Thesaurus: Advantages of using a Dictionary and Thesaurus; Effective use of Dictionary and Thesaurus.
Book reviews and Film Reviews - Oral and Written reviews, note-making from different texts.
Reading: - Reading different types of texts and analyzing the different registers, technical journals, Magazines, Short–Stories.

Prescribed textbook for lab:
Speak Well: Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati - Orient Black Swan.
Suggested reading:-

1. T.Balasubramanian: A textbook of English Phonetics for Indian students, Macmillan, 2008.
2. Priyadarshi Patnaik : Group discussion and Interviews, Cambridge University Press India Private Limited 2011.
3. Daniel Jones: Cambridge English Pronouncing Dictionary - A definitive guide to contemporary English Pronunciation
4. Authentic texts like magazines, journals and short-stories

MATHEMATICS-II

(Common to all branches of ¼ B.E-II Semester)

UNIT – I : Vector Calculus (16 Periods)

Scalars and Vector fields-Vector Differentiation-Gradient of a Scalar field and Directional Derivative – Divergence and Curl of a Vector field –Line Integrals- Green's Theorem –surface integrals - Stokes's Theorem- Volume integral- Divergence theorem of Gauss and their applications (all theorems without proof).

Beta, Gamma function and their properties.

UNIT – II: Ordinary Differential Equations of first order (15 Periods)

Exact first order differential equations-Integrating factors- Linear firs Bernoulli's equation-Riccati's Equation-Clairaut's Equation- Orthogonal t family of curves - Applications of First Order Differential Equations- Nev Natural rate of growth and decay

UNIT– III : Linear Differential equations (15 Periods)

Solutions of Homogeneous and Non Homogeneous equations with constants and coefficients- Method of reduction of order for homogenous second order differential equations with variable coefficients - Method of Variation of Parameters – Solution of Euler-Cauchy Equation – Legendre's equation – Applications of linear differential equations to LC and LCR circuits

UNIT – IV : Series Solution of differential equations (16 Periods)

Ordinary and Singular points of an equation – Power series solution Legendre's differential equation and Legendre's polynomials- Rodrigue's formula – Generating function for Legendre's polynomials $P_n(x)$ - Recurrence relations for Legendre's polynomials $P_n(x)$ – Orthogona property of Legendre's polynomials $P_n(x)$

UNIT – V : Bessel's differential equation (13 Periods)

Bessel's differential equation and Bessel functions – Derivatives and Integrals of Bessel functions- Recurrence Relations for $J_n(x)$- Generating function for $J_n(x)$- Orthogonal property of Bessel's function.

Learning Resources:

Text Books:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, B. S. Grewal 40th. Edition, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics, by Wylie & Barrett, Tata Mc Graw Hill, New Delhi.
2. Advanced Engineering Mathematics, 8th Edition by Erwin Kreyszig , John Wiley & Sons, Inc.
3. Ordinary and Partial Differential equations, by M.D.Raisinghania, S.Chand & Company Ltd.,1997.
4. Advanced Engineering Mathematics by N. Bali, M. Goyal, C. Watkins, Firewall, New Delhi.

ENGINEERING PHYSICS-II

(Common to Civil, Mechanical and EEE Branches of ¼ B.E-II Semester only)

UNIT – I : WAVE MECHANICS &CRYSTALLOGRAPHY (10 periods)

1. ***Wave mechanics:*** Wave function-Schrödinger time dependent and time independent wave equations- Applications: particle in an Infinite Square well (particle in a box) potential.
2. ***Crystal Systems*:** Introduction-Space lattice, Basis, Unit cell, Bravais lattices and crystal systems, Miller Indices, X-ray diffraction: Bragg's law, Experimental determination of lattice constant by powder diffraction method, defects in crystals-point defects (Schottky and Frankel), line defects (screw and edge dislocations), Burger Vector.

UNIT – II: STATISTICAL MECHANICS (06 PERIODS)

1. ***Classical Statistics:*** Concept of phase space-types of ensembles-micro canonical-cannonical and grand canonical ensembles-Maxwell-Boltzmann Statistics
2. ***Quantum Statistics*:** Bose-Einstein Statistics, Photon gas, Fermi-Dirac Statistics, electron gas.

UNIT– III : SEMICONDUCTORS AND SUPERCONDUCTORS (9 periods)

1. ***Band Theory of Solids:*** Success and failures of classical free electron theory, Kronig-Penney model (qualitative treatment). Classification of solids based on band theory.
2. ***Semiconductors*:** Fermi energy level in semiconductors-carrier concentration in intrinsic semiconductors–concept of effective mass, Hall Effect.
3. ***Superconductivity:*** Superconductivity -General properties of super conductors – Meissner effect. Type I and Type II superconductors - BCS Theory (in brief)–Cooper pairs- high T_c superconductors (1-2-3 type)- Applications of superconductors (Josephson's junction and SQUIDS), magnetic levitation.

UNIT – IV : ACOUSTICS (8 periods)

1. ***Ultrasonics*** : Ultrasonic waves and their properties, Production of ultrasonic's by Piezo-electric and magnetostriction methods-Detection of ultrasonics-Engineering applications of ultrasonics-SONAR-Non-destructive testing.
2. ***Acoustics*:** Intensity of sound-intensity level-reverberation-reverberation time-Sabine's formula-Remedies to reverberation-sound absorbent materials-Conditions for good acoustics of a building.

UNIT – V : NANOMATERIALS (08 periods)

1. ***Nanomaterials*:** Distinction between bulk, thin and nano materials-surface to volume ratio, quantum confinement-Reduction of dimensionality, Quantum dots (zero dimensional), Quantum wires (one dimensional), Quantum wells (two dimensional) and their density of states. Electrical, electronic, chemical, mechanical and optical properties of nanomaterials.

2. ***Nano materials Preparation Techniques***: Top-down and bottom-up approaches. Bottom-up methods: sol-gel and chemical vapour deposition (CVD). Top-down method: ball milling. Elementary ideas on Carbon nanotubes– Applications of nanomaterials. Working principle and characterization of nanomaterials by TEM.

Learning Resources :

1. Introduction to Solid State Physics, Kittel C, Wiley Eastern
2. Solid State Physics, S.O. Pillai, S.Chand.
3. Applied Physics for Engineers, Neeraj Mehta, PHI
4. N Chattopadhyay, K. K.Banerjee- Introduction to Nanoscience and Nanotechnology, PHI
5. http://ocw.mit.edu/courses/physics
6. http://oyc.yale.edu/physics
7. www.nptel.ac.in

ENGINEERING PHYSICS-II

(Common to CSE, ECE and IT Branches of ¼ B.E-II Semester)

UNIT–I : WAVE MECHANICS &CRYSTALLOGRAPHY (10 periods)

1. ***Wave mechanics:*** Wave function-Schrödinger time dependent and time independent wave equations- Applications: particle in an Infinite Square well (particle in a box) potential.
2. ***Crystal Systems*:** Introduction-Space lattice, Basis, Unit cell, Bravais lattices and crystal systems, Miller Indices, X-ray diffraction: Bragg's law, Experimental determination of lattice constant by powder diffraction method, defects in crystals-point defects (Schottky and Frankel), line defects (screw and edge dislocations), Burger Vector.

UNIT–II: SEMICONDUCTORS AND SUPERCONDUCTORS (9 periods)

1. ***Band Theory of Solids:*** Success and failures of classical free electron theory, Kronig-Penney model (qualitative treatment). Classification of solids based on band theory.
2. ***Semiconductors*:** Fermi energy level in semiconductors-carrier concentration in intrinsic semiconductors–concept of effective mass, Hall Effect.
3. ***Superconductivity:*** Superconductivity -General properties of super conductors – Meissner effect. Type I and Type II superconductors - BCS Theory (in brief)–Cooper pairs- high T_c superconductors (1-2-3 type)- Applications of superconductors (Josephson's junction and SQUIDS), magnetic levitation.

UNIT–III: SEMICONDUCTING DEVICES (8 periods)

1. **Conduction in semiconductors**: diffusion current, Drift current, mobility, equation of continuity, expression for conductivity in intrinsic and extrinsic semiconductors.
2. **Semiconductor devices**: Solar cell: construction, working, efficiency and fill factor, Light Emitting diode(LED), photo diode, Laser diode, quantum efficiency, Thermister

UNIT–IV : SPECIAL THEORY OF RELATIVITY (8 periods)

1. Frames of references-inertial and non-inertial frame, postulates of special theory of relativity, Galilean and Lorentz transformations, length contraction, time dilation
2. Relativistic velocity addition, relativistic mass, mass-energy equivalence.

UNIT–V : NANOMATERIALS (08 periods)

1. ***Nanomaterials***: Distinction between bulk, thin and nano materials-surface to volume ratio, quantum confinement-Reduction of dimensionality, Quantum dots (zero dimensional), Quantum wires (one dimensional), Quantum wells (two dimensional) and their density of states. Electrical, electronic, chemical, mechanical and optical properties of nanomaterials.
2. ***Nano materials Preparation Techniques***: Top-down and bottom-up approaches. Bottom-up methods: sol-gel and chemical vapour deposition (CVD). Top-down method: ball milling. Elementary ideas on Carbon nanotubes– Applications of nanomaterials. Working principle and characterization of nanomaterials by TEM.

Learning Resources :

1. Introduction to Solid State Physics, Kittel C, Wiley Eastern
2. Solid State Physics, S.O. Pillai, S.Chand.
3. Applied Physics for Engineers, Neeraj Mehta, PHI
4. N Chattopadhyay, K. K.Banerjee- Introduction to Nanoscience and Nanotechnology, PHI
5. http://ocw.mit.edu/courses/physics
6. http://oyc.yale.edu/physics
7. www.nptel.ac.in

PHYSICS LABORATORY-II

(Common to all branches of ¼ B.E-II Semester)

w.e.f the academic year 2014-15

1. I-V Characteristics of a Solar Cell- Estimation of efficiency and fill factor
2. V-I characteristics of P-N Junction Diode
3. Determination of specific rotation of sugar solution using Polari meter
4. Calculation of NA, Acceptance angle and power loss of a given Optical Fibre
5. Determination of Seebeck coefficient –Thermocouple
6. Study of Thermistor characteristics
7. Determination of Planck's constant using photocell Photo Cell
8. Determination of Energy Gap of a Semiconductor
9. Measurement of voltage, time period and frequency by CRO
10. Determination of Hall coefficient

**** At least Eight experiments should be done the by the student in each semester***.

ENGINEERING CHEMISTRY-II

(Common to Civil, Mechanical and EEE Branches of ¼ B.E-II Semester)

UNIT – I : Electro Chemistry (09)

Types of conductors, Types of Conductance (Specific conductance, Equivalent conductance & Molar conductance) and their relationship. Electrolytic and Galvanic cells. Electrode potential, IUPAC convention of Cell notation, Cell reaction, EMF, Electro chemical series – applications, Nernst equation, Numericals. Reversible & Irreversible cells. Types of electrodes, Calomel Electrode (CE), Quinhydrone and Glass Electrode (GE). Determination of P^H using Quinhydrone and Glass Electrodes.

UNIT – II: Battery Technology (8)

Definition, Types, Primary cell- Zn-C cell and Zn-alkaline cell,
Secondary cells: –Ni-Cd battery, Lead-acid battery, Li – ion battery-charging & discharging reactions - applications. Fuel cells: phosphoric acid fuel cell - applications.

UNIT– III : Corrosion & Its Control (8)

Concept, Gravity of corrosion-Types of corrosion (Dry & Wet), Mechanism of wet corrosion. Formation of anodic and cathodic areas-Differential aeration corrosion. and Galvanic corrosion- Factors influencing corrosion, Galvanic series.

Nature of metal: Relative areas of anode & cathode, Nature of corrosion product, Relative position of metal in galvanic series.

Nature of environment: Temperature, P^H, Humidity.

Corrosion control methods: Cathodic protection, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP)-principle of electro plating & electro less plating and their differences (no plating process), Paint-its constituents and their Applications.

UNIT – IV : Phase rule (8)

Terms, Statement of phase rule, one component system-water system- Condensed phase rule, two component system-Lead- Silver (Pb-Ag) system, Pattinson's process, Copper -Nickel (Cu-Ni) system, Safety fuses and solders.

UNIT – V : Chemistry of Engineering Materials (9)

a) Lubricants: Definition, Mechanism of lubrication: Hydro dynamic-Boundary-Extreme pressure lubrication, , Classification: solid, semi solid and liquid lubricants, Properties of lubricants:(Viscosity, viscosity index, Saponification number and iodine number).

b) Refractories: Definition, Classification and Properties-Refractoriness, RUL, Thermal spalling and Porosity.

c) Membrane technology: Introduction, Synthesis of two membranes. Applications.

Learning resources:

1. Elements of Physical Chemistry by S. Glasstone and D Lewis
2. Principles of physical chemistry by Puri, Sharma and Pathania.
3. Text book of physical chemistry by PLSoni and OP.Dharmarha, S.Chand & Sons, New Delhi.
4. Engineering chemistry by PC Jain, M Jain Dhanpat Rai &sons (15^{th} Ed), New Delhi
5. Engineering chemistry by Sashi Chawla, Dhanpat Rai &sons, New Delhi.
6. Engineering chemistry by O.G. PALANNA, TMH, Newdelhi
7. Chemistry in engineering and technology by JC Kuriacose and J Rajaram TMH, New Delhi
8. Engineering chemistry by SS Dara, S Chand &sons, New Delhi.
9. Wikipedia

ENGINEERING CHEMISTRY-II

(Common to CSE, ECE and IT Branches of ¼ B.E-II Semester)

UNIT – I : Electro Chemistry (09)

Types of conductors, Types of Conductance (Specific conductance, Equivalent conductance & Molar conductance) and their relationship. Electrolytic and Galvanic cells. Electrode potential, IUPAC convention of Cell notation, Cell reaction, EMF, Electro chemical series – applications, Nernst equation, Numericals. Reversible & Irreversible cells. Types of electrodes, Calomel Electrode (CE), Quinhydrone and Glass Electrode (GE). Determination of P^H using Quinhydrone and Glass Electrodes.

UNIT – II: Battery Technology (8)

Definition, Types, Primary cell: Zn-C cell and Zn-alkaline cell Secondary cells: –Ni-Cd battery, Lead-acid battery, Li – ion battery-charging & discharging reactions - applications. Fuel cells: phosphoric acid fuel cell - applications.

UNIT– III : Corrosion & Its Control (8)

Concept, Gravity of corrosion-Types of corrosion (Dry & Wet), Mechanism of wet corrosion. Formation of anodic and cathodic areas-Differential aeration corrosion. and Galvanic corrosion- Factors influencing corrosion, Galvanic series.

Nature of metal: Relative areas of anode & cathode, Nature of corrosion product, Relative position of metal in galvanic series.

Nature of environment: Temperature, P^H, Humidity.

Corrosion control methods: Cathodic protection, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP)-principle of electro plating & electro less plating and their differences (no plating process), Paint-its constituents and their Applications.

UNIT – IV : Phase rule (8)

Terms, Statement of phase rule, one component system-water system- Condensed phase rule, two component system-Lead- Silver (Pb-Ag) system, Pattinson's process, Copper -Nickel (Cu-Ni) system, Safety fuses and solders.

UNIT – V : Chemistry of Engineering Materials (9)

a) **Liquid Crystals:** Introduction, Classification of liquid crystals- Thermotropic and Lyotropic - Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals- Nematic, Smetic and Cholostric - Applications.
b) **Nano Materials:** Introduction, preparation methods-(Vapor deposition & Sol-gel) - Applications.
c) **Membrane technology:** Introduction, Synthesis of two membranes. Applications.

Learning resources:

1. Elements of Physical Chemistry by S. Glasstone and D Lewis
2. Principles of physical chemistry by Puri, Sharma and Pathania.
3. Text book of physical chemistry by PLSoni and OP Dharmarha, S Chand & Sons, New Delhi.
4. Engineering chemistry by PC Jain, M Jain Dhanpat Rai &sons (15^{th} edition), New Delhi
5. Engineering chemistry by Sashi Chawla, Dhanpat Rai &sons, New Delhi.
6. Engineering chemistry by O.G. PALANNA,TMH, New Delhi
7. Chemistry in engineering and technology by JC Kuriacose and J Rajaram TMH, New Delhi
8. Engineering chemistry by SS Dara, S Chand &sons, New Delhi.
9. Wikipedia

CHEMISTRY LABORATORY-II

(Common to all branches of ¼ B.E- II Semester)

w.e.f the academic year 2014-15

1 Estimation of Iron by dichrometry
2 Estimation of Copper by Iodometry
3 Estimation of Dichromate by Iodometry
4 Estimation of Calcium in milk or lime by EDTA
5 Determination of saponification value of an oil / Acid value of an oil
6 Estimation of Phosphoric acid in soft drinks

Potentiometry

7 Strong acid vs Strong base
8 Weak acid vs Strong base
9 Redox titration

p^H metry

10 Strong acid vs Strong base (Determination of p^{ka})
11 Weak acid vs Strong base (Determination of p^{ka})
12 **Colorimetry :** Verification of Beer- Lamberts law - Determination of Iron

A Student should perform atleast 8 experiments

OBJECT ORIENTED PROGRAMMING USING C++
(Common to all Branches of ¼ B.E-II Semesters)

UNIT – I : Introduction to C++: Programming paradigms, Object oriented programming concepts, Advantages and Applications of OOPs. Variables and Assignments, Input and Output, Data Types, Expressions, Simple Flow control and Control structures.

UNIT – II: Functions: Call by value, Call by reference, Parameters using procedural abstraction, Testing and Debugging functions.
I/O streams as an introduction to classes and objects.
Arrays: Introduction to Arrays, Arrays in functions, Programming with arrays and multidimensional arrays,
Defining classes: Structures, Classes, Abstract data types

UNIT– III : Strings, Pointers and Dynamic Arrays, Recursion, Constructors, Destructors, Copy Constructors.
Static Polymorphism: Function and Operator overloading, Friend functions.

UNIT – IV : **Inheritance:** The notion of Inheritance, Derived classes, overriding, Virtual base class
Runtime polymorphism, virtual functions, Function templates, Class templates

UNIT – V : **Exception handling:** Exception-handling basics, Programming techniques for exception-handling

Pointers and Linked lists: Nodes and Linked lists, Implementation of stacks and queues using arrays and linked lists, operations on linked lists, inserting a node, deleting a node, searching for a node.

Learning resources:

1. Walter Savitch, "Problem solving with C++", Sixth Edition, Pearson Education Publishing, 2009.
2. Behrouz A.Forouzan, Richard F. Gilberg, " Computer Science, A Structured approach using C++", 2 edition, Cengage Learning, 2010
3. E Balagurusamy, "Object-Oriented Programming with C++", second edition, Tata Mc-GrawHill
4. S.B.Lippman ., J Lajoie ,"C++ Primer" 3rd Edition, AW Publishing Company, 2007
5. Bjarne Stroustrup, "The C++ Programming Language" Third Edition, Pearson Education.

C++ PROGRAMMING LAB

(Common to all Branches of ¼ B.E-II Semester)

1. Implementation of matrix and complex numbers using classes.
2. Programs using constructors, destructors and copy constructors.
3. Programs on dynamic memory allocation for arrays.
4. Programs on static data members, string manipulations.
5. Programs on friend class.
6. Programs on inheritance.
7. Programs on function overloading, operator overloading.
8. Programs on virtual functions, dynamic polymorphism.
9. Programs on templates, exception handling.
10. Programs on bubble sort, selection sort and insertion sort.
11. Program on operations in a singly linked list.
12. Program on implementation of stacks and queues using arrays and linked list.

BASIC ELECTRICAL ENGINEERING

(Common TO ¼ B.E CSE, ECE & IT Branches - II – Semester)

UNIT– I : **DC Circuits:** Network elements, Ohm's Law, Kirchoff's Voltage and current Law, Power in DC circuits, Series and parallel circuits.
AC Circuits: Sinusoidal sources, Phasor representation of sinusoidal quantities, Average and RMS values, Form factor, Analysis of RLC Circuits to sinusoidal inputs, Power factor, Active & reactive powers, energy stored in inductance and capacitance.

UNIT– II: **Three-Phase Circuits:** Production of 3-phase voltages, balanced star and delta connections, Measurement of power by Two-wattmeter method.
Single Phase Transformers: Principle of operation, Transformer on No-load and Load, Equivalent circuit, Efficiency & regulation, O.C and S.C tests, Principle of Autotransformer

UNIT-III: **DC Generators:** Construction and working principle, types of excitation, types of generators, Production of emf in Generator, characteristics of Series, Shunt and Compound generators, losses and efficiency , Applications.
DC Motors: Working principle, types of DC motors, Torque in a DC motor, Characteristic of Series, Shunt and Compound motors, Speed control of DC motors, losses and efficiency, Applications, three point starter.

UNIT–IV: **Three Phase Induction Motors:** Production of rotating magnetic field, construction and principle of induction motors, Torque –slip characteristics, Star delta starters and Speed control by Stator voltage and Rotor resistance methods, Applications.
Single Phase Motors: Basic theory, Capacitor Start and Capacitor Run motor, Stepper motor, Characteristics and Applications.

UNIT– V : **Power Generation:** Basic ideas of thermal, hydro, nuclear and renewable sources, layout.
Three Phase Alternators: Construction, production of EMF, Regulation by synchronous impedance method.

Learning resources:

1. M.S. Naidu and Kamakshaiah–Introduction to Electrical Engineering, Tata McGraw Hill, 1995.
2. V.K. Mehta–Principles of Electrical Engineering and Electronics, S. Chand & Co, Dec 2006.
3. Cotton H., Electrical Technology, BI Publications, Feb 2004
4. www.electrical4u.com
5. www.faadooengineers.com
6. www.nptel.ac.in
7. www.oupinheonline.com
8. www.cosmolearning.com

CS WORKSHOP
(Only for ¼ B.E CSE Branch-II Semester)

PC Hardware (6 Periods)

1. System Assembly (identify and describe the relationships and role of the components of the logical diagram of computer. RAM, ROM, BIOS , input, output, storage)

2. Relate the logical diagram of a computer system to the physical system identifying physical components of a computer and describing their purpose (eg. The processor, memory chips, motherboard, diskdrives, and controller card such as AGP board, network cards, sound card, as well as parallel & serial ports etc)

System Software (6 Periods)

3. Load the OS with partitions for latest Windows and Linux, Configure for Network connection (TCP/IP)

4. Be able to use basic Commands in Linux and DOS

Productivity Tools (15 Periods)

5.**Word Processing:** Create documents with standard formatting commands, single/ multi column, inert pictures/ objects, drawing, hyperlinks, header/footer, tables No. macros

6**. Presentation:** Create presentations with preset animations using different layouts, backgrounds, slide master, insert pictures/objects, drawings, hyperlinks, header/ footer , tables

7**. Spread Sheet:** Creating worksheets with various kinds of data, making charts, conditional formatting, awareness of the various functions- statistical, date/time, math/trig etc, ability to explore (help) and use these functions if need be, demonstration through some common functions like sum, average, standard deviation

8**.Database:** Create a new database, Create a Table in the Database, Entering data into the Table, Sort the table, Move & Deletion of Rows and Columns, Query the table ,Create a Form and Report on the Table

9**.HTML & CSS:** Should be able to create their web-page (title, text, frames, and hyperlinks to some sites, pictures, lists, tables, fonts, and colours) without using any web authoring tools

10**.Photoshop:** The use of Toolbar, Colour correction, Touch ups and enhancements, Basic drawing with Pen tool

Search Engines and Cyber Hygiene (6 Periods)

11.Know what search engines are and how to use the search engines

12.Install an anti -virus software, configure personal firewall and windows update on the computer

Learning Resources :

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2005
2. Govindarajulu, IBM PC And Clones: Hardware, Trouble shooting And Maintenance, Tata McGraw-Hill, 2008
3. Peter Norton ,Introduction To Computers, Tata McGraw-Hill,6th edition,2004
4. Kate J. Chase ,PC Hardware and A+ Hand book, Microsoft Press, 2004

IT WORKSHOP
(only for B.E. 1/4 IT branch- II-Semester)

PC Hardware

1. **System Assembly** (identify and describe the relationships and role of the components of the logical diagram of computer. RAM, ROM, BIOS , input, output, storage).
   Relate the logical diagram of a computer system to the physical system identifying physical components of a computer and describing their purpose (eg. The processor, memory chips, motherboard, disk drives, and controller card such as AGP board, network cards, sound card, as well as parallel and serial ports etc)

System Software

2. Load the OS with partitions for latest Windows and Linux, Configure for Network connection (TCP/IP).
   Be able to use basic Commands in Linux and DOS

Productivity Tools

3. **Libre Office Writer:** Create documents with standard formatting commands, single/ multi column, inert pictures/ objects, drawing, hyperlinks, header/footer, tables No. macros
4. **Libre Office Impress:** Create presentations with preset animations using different layouts, backgrounds, slide master, insert pictures/objects, drawings, hyperlinks, header/ footer , tables
5. **Libre Office Calc:** Creating worksheets with various kinds of data, making charts, conditional formatting, awareness of the various functions- statistical, date/time, math/trig etc, ability to explore (help) and use these functions if need be, demonstration through some common functions like sum, average, standard deviation
6. **Libre Office Base:** Create a new database, Create a Table in the Database, Entering data into the Table, Sort the table, Move & Deletion of Rows and Columns, Query the table, Create a Form and Report on the Table.
7. **HyperText Markup Language (HTML) & Cascading Style Sheet (CSS):** Should be able to create their web-page (title, text, frames, and hyperlinks to some sites, pictures, lists, tables, fonts, and colours) without using any web authoring tools
8. **Photoshop:** The use of Toolbar, Colour correction, Touch ups and enhancements, Basic drawing with Pen tool

Search Engines and Cyber Hygiene

9. Know what search engines are and how to use the search engines
   Install an anti -virus software, configure personal firewall and windows update on the computer

Electronics Lab Fundamentals

10. Study of measuring and diagnostic instruments like multi-meter, function generator, oscilloscope, power supplies etc.,
    - Study the function of each instrument and their applications.
    - Demonstration of the usage of the instruments by conducting simple experiments.
11. Study of different electronic components R, L, C, Transistors, ICs (Linear & Non-Linear ICs), using their Data Sheets, Colour Code Charts etc.
12. Soldering and Desoldering practice
    - Using appropriate soldering iron or soldering system, the components are to be de-soldered first, clean the leads and re-solder the same using proper solders and fluxes.
    - Check for the dry solders and shorts, if any and make sure that the circuit performance is the same as that of the original circuit.
13. Preparation of layout for a given circuit schematic using a CAD tool.
    - Study of a CAD tool.
    - Prepare the layout using the tool.
    - Take print of the layout.
    - Transfer the layout onto the single sided PCB.
    - Etch the conducting pattern and drill the holes for mounting and fixing the components.
    - Solder the components/bases permanently to the PCB.
    - Check the performance of the circuit.

Suggested Reading:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2005
2. Ibm PC And Clones: Hardware, Trouble shooting And Maintenance By Govindarajulu, Tata McGraw-Hill, 2008
3. Introduction To Computers By Peter Norton , Tata McGraw-Hill ,6th edition
4. PC Hardware and A+ Hand book By J. Chase PHI (Microsoft)
5. Data Sheets and Manuals of the Electronic Components and Instruments respectively.

ELECTRONICS WORKSHOP
(only for B.E. 1/4 ECE branch- II-Semester)

1. Study of (with reference to typical electromechanical specifications, circuit representation): Electronic components (all types of discrete active & passive devices, display devices, integrated components/circuits with their packaging etc.,), electro mechanical components (switches, sockets, connectors etc.,) electromagnetic components (coils-different types of magnetic and ferrite cored, potted components, relays etc.,)
2. Study and use of different meters (moving coil, moving iron, volt/ammeter, AVO/Multi meter) for the measurement of electrical parameters.
3. Measurement of R, L, C components using LCR Meter
4. Study and use of bread board to connect circuits and measure basics parameters.
5. Study of CRO & Measurement of voltage, frequency and Phase Angle.
6. Design and fabrication (winding) of an iron cored inductance coil for a given value of L, current and core specifications.
7. Design of AC mains operated step down transformer for a given turns ratio, current ratings and core specifications. Measurements of their functional electrical parameters
8. PCB design of a small circuit with its layout using tapes & etching.
9. Soldering & de-soldering exercises using discrete components & ICs for a specific circuit requirement.
10. Fault diagnosis
11. Mini Project

Suggested Reading:

1. Paul Zbar, Albert Malvino, Michael Miller, Basic Electronics: A Text-Lab Manual, McGraw Hill Education (India) Private Limited; 7/e , 2001.
2. Paul B. Zbar, Industrial Electronics, A Text – Lab Manual, 3rd Edition, TMH, 1983

ENGINEERING GRAPHICS-II

(Common to Civil, Mechanical and EEE Branches of ¼ B.E-II Semester only)

UNIT – I : Sections of Solids (24)
True shape of sections, sections of prisms, pyramids, cylinders and cones.

UNIT – II: Development of Surfaces (22)
Basic concepts of development of surfaces. Methods of development –Parallel line development and radial line development. Development of prisms, pyramids, Cylinders and cones.

UNIT– III : Intersection of Surfaces (24): Intersection of cylinder and cylinder, cylinder and cone.

UNIT – IV : Isometric Projections (22): Isometric scale, Isometric projections of prisms, pyramids,cylinders, cones and spheres, and combinations of two or three solids.

UNIT – V : Conversion of Isometric Views to Ortho-graphic views (18)
Drawing orthographic views from Isometric views for simple objects.

Text book:

1. N.D. Bhatt, "Elementary Engineering Drawing", Charotar Publishers, 2014.

Learning Resources:

1. Thomas E French, Charles J Vierck, Robert J. Foster "Engineering Drawing and Graphic Technology", McGraw Hill Education, 1993.
2. P.S. Gill "Engineering Drawing: Geometrical Drawing", SK Kataria & sons,2012.
3. K. Venugopal, "Engineering Drawing and Graphics + Autocad", New Age International (P) Ltd., New Delhi, 1998.
4. A.N. Siddiquee et al, "Engineering Drawing with a Primer on Autocad", Prentice hall of India Ltd., New Delhi, 2004.
5. Basanth Agrawal, CM Agrawal, "Engineering Graphics" First Edition, Tata McGraw Hill, 2012
6. BVR Gupta, M Raja Roy, "Engineering Drawing with AutoCad", IK Int Pvt Ltd, 2009

WORKSHOP PRACTICE-II

(Common to Civil, Mechanical and EEE only of 1⁄4 B.E- II Semester)

BLACK SMITHY:
1. Flattening (round to square cross section)
2. Bending Operation (U-shape)
3. S-shape hook
4. Fullering Operation (demo)

WELDING:
1. Bead formation
2. Butt joint
3. Lap joint
4. Gas welding/Spot welding (demo)

PLUMBING:
1. Pipe thread cutting and making single joint with coupling
2. Tap connection
3. Water shower connection
4. Geyser connection(demo)

MACHINING:
1. Plain turning and step turning
2. Taper turning
3. Thread Cutting
4. Milling operation (demo)

Learning Resources:

1. P. Kannaiah & K. L. Narayana "Workshop manual" Scitech publications (I) Pvt. Ltd., Lingampally, Kachiguda, Hyderabad-500027, 2nd edition
2. K. Venugopal, Dr. V. Prabhu Raja, G. Sreekanjana "Workshop Manual" Anuradha Publications 1st Ed. 2012 Karuppur, Kumbakonam – RMS, PIN-612605
3. S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjar Roy "Workshop Technology-I&II" Media Promoters & Publishers Pvt. Limited, Mumbai-400007.
4. www.technologystudent.com
5. www.mewelding.com

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTIONS & EXAMINATION
M.E. I-YEAR (ADVANCED DESIGN AND MANUFACTURING - MECHANICAL ENGINEERING)

SEMESTER – I								
Sl No.	**Syllabus Ref .No.**	**SUBJECT**	**Scheme of Instructions**		**Scheme of Examination**			**Credits**
			Periods per Week		**Duration in Hours**	**Maximum Marks**		
			L	**D/P**		**Sessionals**	**SEM Exam**	
THEORY								
1	MA5010	Mathematical methods for Engineers	3	-	3	30	70	3
2	ME5020	Metal Cutting and Forming	3	-	3	30	70	3
3	ME5030	Finite Element Techniques	3	-	3	30	70	3
4	ME5040	Computer Integrated Design and Manufacture	3	-	3	30	70	3
5	ME5050	Flexible Manufacturing Systems	3	-	3	30	70	3
6	ME5XX0	Elective – 1	3	-	3	30	70	3
PRACTICALS								
7	ME5011	CAD / CAM Laboratory	-	3	3	25	50	1
8	ME5012	Seminar-I	-	3	-	25	-	1
		Total				**230**	**470**	**20**

M.E. I-YEAR (ADVANCED DESIGN AND MANUFACTURING - MECHANICAL ENGINEERING)

Syllabus Ref .No.		SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Periods per Week		Duration in Hours	Maximum Marks		
			L	D/P		Sessionals	SEM. Exam	
SEMESTER - II		**THEORY**						
1	ME5060	Design for Manufacture	3	-	3	30	70	3
2	ME5070	Metal Casting and Welding Processes	3	-	3	30	70	3
3	ME5080	Computer Aided Mechanical Design and Analysis	3	-	3	30	70	3
4	ME5XX0	Elective -2	3	-	3	30	70	3
5	ME5XX0	Elective - 3	3	-	3	30	70	3
6	ME5XX0	Elective - 4	3	-	3	30	70	3
PRACTICALS								
7	ME5021	Modeling & Simulation Laboratory	-	3	3	25	50	1
8	ME5022	Seminar-II	-	3	-	25	-	1
		Total				**230**	**470**	**20**

Syllabus Ref .No.	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
		Periods per Week		Duration in Hours	Maximum Marks		
		L	D/P		Sessionals	SEM. Exam	
SEMESTER – III							
ME6015	Dissertation-I		8	-	100	-	8
SEMESTER – IV							
ME6015	Dissertation-II		12	-	-	**Viva-voce (Grade)**	12

M.E. I-YEAR (ADVANCED DESIGN AND MANUFACTURING - MECHANICAL ENGINEERING)

S. No.	Code No.	Title
Design Group (Elective)		
1	ME5090	Advanced Kinematics
2	ME5100	Mechanical vibrations
3	ME5110	Advanced Mechanics of solids
4	ME5120	Theory of Elasticity and Plasticity
5	ME5130	Mechanics of composite materials
6	ME5140	Robotic Engineering
7	ME5150	Fracture Mechanics
8	ME5160	Gear Design
Manufacturing Group (Elective)		
9	ME5170	Advanced Non destructive Evaluation Techniques
10	ME5180	Rapid Prototyping, Principles and Applications
11	ME5190	MEMS and Nano Technology
12	ME5200	An introduction to nano science and technology
13	ME5210	Product Design and Process Planning
14	ME5220	Quality and Reliability Engineering
15	ME5230	Value Engineering
Analysis Group (Elective)		
16	ME5240	Engineering Research Methodology
17	ME5250	Neural Networks and Fuzzy Logic
18	ME5260	Experimental techniques and Data Analysis
19	ME5270	Optimization Techniques

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR I YEAR M.E. (AD&M) I-SEMESTER

MATHEMATICAL METHODS FOR ENGINEERS

UNIT-I

Vectors: Vectors, Operations and operators, identities

UNIT-II

Tensors: Cartesian tensors: Definition, notation, transformation matrix, orthogonal properties, order of a tensor, operations, contraction, quotient rule, vector identities and theorems in tensor form

UNIT-III

Linear algebraic equations: Matrix form, matrix operations, determinants, Cramer's rule, inverse, singularity, inconsistent equations gauss elimination, Gauss-seidal, LU decomposition, finding inverses, echelon form, general solution for under determined systems, least squares solutions for over determined systems, eigen values and eigen vectors, orthogonalisation method, singular value decomposition

UNIT-IV

Ordinary Differential Equations: Applications of Laplace transforms to solve differential equations, Sturm-liouville problem, orthogonal functions, gram-Schdmit procedure

UNIT-V

Partial Differential Equations : Classification of second order PDEs, wave equation, heat equation, Laplace equation, transformation of PDEs in cylindrical and spherical coordination systems.

Learning Resources:

1. Higher Engineering Mathematics by B S Greval, Khanna Publications
2. Advanced Engineering Mathematics by RK Jain, SRK Iyengar, Narosa Publications
3. Advanced Engineering Mathematics by I Kreyszig, 8th Edition, John Wiley and Sons Ltd., 2006
4. A text book of Engineering Mathematics by N.P. Bali & Manish Goyal, Laxmi Publications.

SYLLABUS FOR I YEAR M.E. (AD&M) I-SEMESTER
METAL CUTTING AND FORMING

UNIT-I

Tool Materials: Tool material properties – HSS, Carbides, coated carbides, ceramic and CBN and diamonds, sialons, powder coatings – Relative advantages. Tool Geometry: Various methods of tool nomenclature and their inter relationship. Theoretical Determination of shear angle and cutting forces: Shear plane theory– Merchants models, Lee and Shofers model. Velocity relations. Estimation of shear angle experimentally. Metal cutting friction. Real area of contact-Rules of dry sliding, stress distribution of tool face-variation of co-efficient of tool face friction with the rake angle.

UNIT-II

Dynamometry: Theoretical and empirical estimation of force and power in turning, drilling, milling and grinding processes optimization in cutting forces – Dynamometer requirements – Force measurements – Electric transducers. Lathe, drilling and milling dynamometers. Cutting Temperatures: Shear Plane temperature – Average chip-tool interface temperature-interface temperature by dimensional analysis – Distribution of shear plane temperature-Measurement of temperature by radiation pyrometer – Moving thermo couple – Photo cell – Photographic method.

UNIT-III

Tool Wear, Tool life and Machinability: Mechanism of tool wear – Adhesive, Abrasive, Diffusive and Chemical wear – Taylor‟s tool life equation. Cutting Fluids – Carbon tetrachloride – Direction of fluid application – Chip curl-economics of machining – Comparison of machinability of different metals. Recent development in metal cutting: Hot machining. Rotary machining – High speed machining, rapid proto typing.

UNIT-IV

Plastic Deformation: Mechanism of plastic deformation, Factors affecting plastic deformation, Strain hardening behavior. Recovery, Recrystallization and grain growth. Variables affecting stress-strain curves, Ideal & Practical stress-strain curves. Cold working, warm working and hot working. Plasticity cycle. Tresca‟s and Von Mises‟s yield criteria under complex states of stress, including Plane stress & Plane strain condition.Rolling: Principle of rolling, process parameters. Estimation of rolling loads. Principles of roll pass design for various product shapes. Principles of ring rolling.

UNIT-V

Unconventional Methods In Metal Forming: High energy rate forming. Merits and limitations of HERF Processes. Principle, merits, limitations and applications of pneumatic-mechanical systems. Explosive forming, electro-magnetic forming, electro-hydraulic forming and water hammer forming. Forming with rubber pads – Guerin, Marform & Wheelon forming techniques.

Learning Resources:

1. M.C. Shaw. Metal cutting principles – CBS Publications, New Delhi, 1992.
2. BhattaCharya, Metal cutting – Central book publishers, Calcutta – 1996.
3. Heinrich Makelt, Mechanical presses, Edward Arnold (Pvt) Ltd., London, 1968.
4. Bary. Donald.F and Reads. Edward A., Techniques of press working sheet metal, Prentice Hall Publ., 1974.
5. Kameschikov, Forming Practice, Mir Publishers, Moscow, 1970.
6. High Velocity Forming methods, ASTME, Michigan, 1968.

SYLLABUS FOR I YEAR M.E. (AD&M) I-SEMESTER
FINITE ELEMENT TECHNIQUES

UNIT-I

Introduction to Finite Element Method of solving field problems. Stress and Equilibrium. Boundary conditions. Strain-Displacement relations. Stress-strain relations. One Dimensional Problem: Finite element modeling. Local, natural and global coordinates and shape functions. Potential Energy approach : Assembly of Global stiffness matrix and load vector. Finite element equations, treatment of boundary conditions. Quadratic shape functions.

UNIT-II

Analysis of trusses and frames: Analysis of plane truss with number of unknowns not exceeding two at each node. Analysis of frames with two translations and a rotational degree of freedom at each node. Analysis of Beams: Element stiffness matrix for two noded, two degrees of freedom per node for beam element.

UNIT-III

Finite element modeling of two dimensional stress analysis problems with constant strain triangles and treatment of boundary conditions. Two dimensional four noded isoparametric elements and numerical integration. Finite element modeling of Axisymmentric solids subjected of axisymmetric loading with triangular elements. Convergence requirements and geometric isotropy.

UNIT-IV

Steady state heat transfer analysis: One dimensional analysis of a fin and two dimensional conduction analysis of thin plate. Time dependent field problems: Application to one dimensional heat flow in a rod. Dynamic analysis: Formulation of finite element modeling of Eigen value problem for a stepped bar and beam. Evaluation of Eigen values and Eigen vectors. Analysis of a uniform shaft subjected to torsion using Finite Element Analysis.

UNIT-V

Finite element formulation of three dimensional problems in stress analysis. Finite Element formulation of an incompressible fluid. Potential flow problems Bending of elastic plates. Introduction to non-linear problems and Finite Element analysis software.

Learning Resources:

1. Tirupathi R Chandraputla and Ashok. D. Belegundu, *Introduction of Finite Element in Engineering,* Prentice Hall of India, 1997.
2. Rao S.S., *The Finite Element Methods in Engineering,* Pergamon Press, 1989.
3. Segerland. L.J., *Applied Finite Element Analysis,* Wiley Publication, 1984.
4. Reddy J.N., *An Introduction to Finite Element Methods,* Mc Graw Hill Company, 1984.

SYLLABUS FOR I YEAR M.E. (AD&M) I-SEMESTER
COMPUTER INTEGRATED DESIGN AND MANUFACTURE

UNIT-I

Product Design and CAD/CAM in the Production Systems - Product development through CAD and CAE: Geometric modeling techniques using wireframe, surface and solid modeling-graphic standards, Advanced modeling for curves, surfaces, NURBS- Advanced assembly – assembly constraints – subassembly – modification - concepts of engineering analysis and optimization using CAE techniques.

UNIT-II

Advanced Manufacturing Technology – Design drafting interface, Graphic libraries, Computer aided manufacturing technologies using Numerical Control, CNC and DNC, process interface hardware, programming languages, direct digital control, supervisory compiler controls and optical control, adoptive control – Agile and lean manufacturing.

UNIT-III

Rapid proto typing: Various techniques & mathematical background. Automated inspection & RE-engineering techniques: Point cloud data acquisition & analysis.

UNIT-IV

Concepts of Production Planning, Material Requirement Planning, up to down planning and bottom up replanning – Master production scheduling, PPC, Material Handling Requirements, Technology Planning.

UNIT-V

Communication aspects in CIM – Issues in Implementation of Advanced Manufacturing Technology – configuration management, database systems, networking concepts, LAN, MAN, SQL, CIM Models, Economics of CIM.

Learning Resources:

1. MP Groover,"Automation, Production Systems and Computer Integrated Manufacturing", - Pearson Education, 2nd Edition, 2001.
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", - Tata McGraw Hill, 1991.
3. FH Mitchell, "CIM Systems - An Introduction", - Prentice Hall, 1986.
4. Eric Teicholz & JN, "CIM Handbook", - McGraw Hill, 1986.

SYLLABUS FOR I YEAR M.E. (AD&M) I-SEMESTER
FLEXIBLE MANUFACTURING SYSTEMS

UNIT-I

Evolution of Manufacturing Systems: FMS definition and description, General FMS considerations, Manufacturing cells, Cellular versus Flexible Manufacturing. Systems Planning: Objective, introduction planning, preparation guidelines, the project team, supplier selection, system description and sizing, facility preparation planning, FMS layouts. Human resources: staff considerations, team work, communication and involvement, the supervisors role, personnel selection, job classifications, employee training.

UNIT-II

Manufacturing's Driving Force: Definition, description and characteristics. Just in-time manufacturing, definition and description, benefits and relationship to FMS, implementation cornerstones, quality and quantity application principles. Single manufacture Cell – design scheduling of jobs on single manufacturing cells. Group Technology: Concepts, classification and coding, benefits and relationship to FMS, design of group technology using rank order clustering technique.

UNIT-III

FMS Design – Using Bottleneck, Extended bottleneck models, Processing and Quality Assurance: Turning centres, Machining centre, construction and operations performed, axes, programming, and format information, work-holding and work-changing equipment, automated features and capabilities, cleaning and deburring – station types and operation description, importance to automated manufacturing, coordinate measuring machines, types, construction and general function, operation cycle description, importance to flexible cells and systems.

UNIT-IV

Automated movement and storage systems–AGVs, Robots, automated storage and retrieval systems, storage space design, queuing carousels and automatic work changers, coolant and chip Disposal and recovery systems, auxiliary support equipment, cutting tools and tool Management – introduction, getting control of cutting tools, Tool Management, tool strategies, data transfer, tool monitoring and fault detection, guidelines, work holding considerations, General fixturing, Modular fixturing. FMS and the relationship with workstations – Manual, automated and transfer lines design aspects.

UNIT-V

FMS: computer Hardware, Software, Communications networks and Nanotechnology – general functions, and manufacturing usages, hardware configuration, programmable logic controllers, cell controllers, communications networks. FMS implementation.

Learning Resources:

1.William Luggen, "Flexible Manufacturing Systems", Prentice-Hall, Newjersy, 1991
2. Parrish, D.J., "Flexible Manufacturing-Butter Worths– Heinemann, Oxford, 1993.

3. Groover, M.P., "Automation, Production Systems and CI", - Prentice Hall India, 1989.
4. Kusiak, A., "Intelligent Manufacturing Systems" , - Prentice Hall, 1990.
5. Ranky, P.G., "Design and Operation of FMS", - IFS Publishers, UK, 1988

SYLLABUS FOR M.E. (AD&M) I-SEMESTER
CAD / CAM LABORATORY

List of Experiments:

CAD

1. Sketching
2. Part modelling
3. Assembly
4. Simulation – Static Analysis

CAM

1. Understanding of CNC Machines and CNC Programming and Creation of 2-D controur pockets, slots
2. Drills and Facing, 2-D high speed blend
3. Surface Roughing for Bottle die
4. Surface finishing for phone die
5. Manufacturing simulation of
    - Crane hook
    - Connecting rod
    - Turbine blade

Learning Resources:

1. Siemens NX Software manual
2. ANSYS Software manual
3. Sinumeric CNC controller instructions
4. G & M codes

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR M.E. (AD&M) I-SEMESTER

SEMINAR-I

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to following aspects of seminar presentations.

Topics to be selected from published Journals / Conference Proceedings in the area of Design and Manufacturing Engineering.
Report to be prepared showing literature survey, organisation of material, preparation of PPT and displaying technical writing skills.

Each student is required to

Submit a one page synopsis of the seminar talk.
Give a 30 minutes presentation through OHP, PC, Slide projector followed by a 10 minutes discussions
Submit a report on the seminar topic with literature survey

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

The sessional marks will be awarded to the students by atleast 2 faculty members on the basis of an oral and a written presentation as well as their involvement in the discussions.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR I YEAR M.E. (AD&M) II-SEMESTER
DESIGN FOR MANUFACTURE

Unit-I
Introduction: General design principles for manufacturability, mechanical behavior of materials. Materials and design, evolution of engineering materials and their properties. Materials selection charts, selection of engineering materials and their shape, selection of manufacturing processes, examples and case studies. Introduction to design for manufacturing concepts; importance of product specification and standardization, selection of materials and shapes.

Economic Use of Raw Materials: Ferrous steel, hot rolled steel, cold finished steel, stainless steel, non ferrous materials aluminium, copper, brass, non metallic materials, plastics, rubber and composites.

Unit-II
Metallic Components Design: Metal extrusion, metal stamping, fine blanking, spun metal parts, cold headed parts, extruded parts, rolled formed parts, specialized forming methods, turned parts, drilled parts, milled parts.

Unit-III
Metallic Components Design: Planned and shaped parts, internal ground parts, center less ground, electrical discharged, electro chemical parts. Sand cast, die cast and investment cast.

Unit-IV
Non Metallic Components Design: Thermosetting plastic, injection moulded and rotational moulded parts, blow moulded, ceramics. Design for assembly, design for reassembly, design for automated assembly, design for ergonomics, design for quality and reliability, design for X concepts.

Unit-V
Assembled Parts Design: Welded parts, arc, resistance, brazed and soldered parts, gear box assembly, bearing assembly. Retention, bolted connection, screwed connections, press fitted connections, heat treated parts, NC machining, group technology, computer aided manufacture, product design requirements.
Case Studies: Identification of economical design and redesign for manufacture.

Learning Resources:

1. James G. Bralla, "Hand book of product design for manufacturing" McGraw Hill Co., 1986
2. K.G. Swift "Knowledge based design for Manufacture", Kogan page Limited, 1987.
3. Ashby. Materials selection in Mechanical Design fourth edition Elsevier, 2011
4. Boothroyd, Geoffrey, Peter Dewhurst, and Winston A. Knight. "Product Design for Manufacture and Assembly", 3rd edition, Fl: Standards media, 2010
5. Swift, K.G., and J.D. Booker. Manufacturing Process Selection Handbook, Butterworth-Heinemann, 2013

SYLLABUS FOR I YEAR M.E. (AD&M) II-SEMESTER
METAL CASTING AND WELDING PROCESSES

UNIT-I
Metallurgy of Cast Steel and Cast Iron: Solidification microstructure, effect of cooling rate, carbon content, malleable and ductile Cast Iron.

Solidification of Castings: Solidification of pure metals and alloys, solidification rate and directional solidification, grain structure of cast metals, shrinkage, gases in cast metals, degassification.

Miscellaneous Practices: Refractories, metallurgical control, Inoculation, malleabilisation. Heat treatment of cast steel, cast iron, stress relieving, solution treatment, age hardening of castings.

UNIT-II

Metallurgy of copper base alloys-brass, bronze, Berillium Bronze, Chromium copper. Alluminium alloys – Heat treated and not heat treated.

Zinc based die casting alloys, Nickel chromium high temperature alloys, Foundry practices of copper, aluminium and magnesium base alloys.

UNIT-III

Welding metallurgy – Weld zone, Fusionboundary zone, Heat affected Zone. Heat treatment and relatged processes in Fusion welding – Annealing, Normalizing, Austempering stress relieving, Solution treatment.

UNIT-IV

Microstructural products in weldments – Schaeffler diagram, Delta Ferrite, Austenite, pearlite, Martensite. Effect of Alloying elements on microstructure. Welding stresses – Residual stresses, effects, methods of relieving.

UNIT-V

Weldability aspects of low alloy steels, strainless steels, aluminium alloys, Magnesium and Titanium alloys.

Weld cracks – cold and hot cracks; Liquation cracks, Hydrogen Induced cracks, Lamellar cracks.

Learning Resources:

1. Taylor, Flemings & Wulff, "Foundry Engineering", N.Y,Wiley & Song,Inc,1987
2. Heine, Richard.W, and others, "Principles of metal casting", Tata McHill, New York, 1983.
3. Udin Funk & Wulff, "Welding for Engineers", N.Y.John Wiley,1954.
4. J.F. Lancaster, "Metallurgy of welding", London,George Allen & Unwio,1970.
5. R.S. Parmar, "Welding Processes & Technology", Delhi, Khanna Publishers, 1992.

SYLLABUS FOR I YEAR M.E. (AD&M) II-SEMESTER

COMPUTER AIDED MECHANICAL DESIGN AND ANALYSIS

UNIT-I

Design of pressure Vessels: Introduction and constructional features of pressure vessels, stresses in pressure vessels, shrink fit stresses in built up cylinders, autofrettage of thick cylinders, thermal stresses and their significance.

UNIT-II

Stresses in flat plates: Introduction, Bending of plate in one direction, Bending of plate in two perpendicular directions, Thermal stresses in plates, Bending of circular plates of constant thickness, Bending of uniformly loaded plates of constant thickness.

UNIT-III

Fracture Mechanics: Introduction, Modes of fracture failure Griffith Analysis, Energy release rate, Energy release rate of DCB specimen; Stress Intensity Factor: SIF‟s for edge and centre line crack, Fracture toughness, Elastic plastic analysis through J-integral method: Relevance and scope, Definition of J-integral, Path independence, stress strain relation, Strain Energy Release Rate Vs J-integral.

UNIT-IV

Eigen Value Problems: Properties of Eigen values and Eigen Vectors, Torsional, Longitudinal vibration, lateral vibration, Sturm sequence. Subspace iteration and Lanczo‟s method, Component mode synthesis, Eigen value problems applied to stepped beams and bars.

UNIT-V

Dynamic Analysis: Direct integration method, Central difference method, Wilson-method, Newmark method, Mode superposition, Single degree of freedom system response, Multi degree of freedom system response, Rayleigh damping, Condition for stability. (Note: The related algorithms and codes to be practiced by students)

Learning Resources:

1. John, V. Harvey, "Pressure Vessel Design: Nuclear and Chemical Applications", Affiliated East West Press Pvt. Ltd., 1969.
2. Prasanth Kumar, "Elements of Fracture Mechanics", Wheeler Publishing, New Delhi-1999.
3. V. Rammurti, "Computer Aided Mechanical Design and Analysis", Tata Mc Graw Hill-1992.
4. Bathe, J., " Finite Element Procedures", Prentice Hall of India-1996.

SYLLABUS FOR M.E. (AD&M) II-SEMESTER
MODELING & SIMULATION LABORATORY

List of Experiments

I. MAT LAB

1. Basic syntax and command-line exercises
2. Basic array exercises
3. Relational and logical operations
4. Control of flow: if-blocks
5. Loop constructs: for and while
6. Basic 2D and 3 D plots
7. Solving ordinary differential equations
8. Curve fitting and interpolation
9. Data Analysis and statistics
10. Solving non-linear algebraic equations
11. Introduction to optimiztion methods like GA, Fuzzy, Neural & PSO
12. Introduction to SIMULINK
13. Modeling of problems related to design of robot using MATLAB

II. SIMULATION SOFTWARE

14. Hydraulic equipment simulation using H-Simulator
15. Pneumatic equipment simulation using P-Simulator
16. PLC simulator
17. Simulation of mechanisms using ADAMS software

Learning resources:

1. MAT LAB programming for Engineers, S.J. Chapman, Thomson Brooks / Cole 2002
2. ADAMS training manual

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR M.E. (AD&M) II-SEMESTER

SEMINAR-II

Seminar topics may be chosen by the students with advice from the faculty members with specific reference to the work being carried out as part of project work.

Students are to be exposed to following aspects of seminar presentations.

The seminar topic shall be presented with the help of PPT under the following broad categories:
Literature survey
Organisation of material
Status of project work

Each student is required to

Submit a one page abstract of the seminar talk.
Give a 30 minutes presentation followed by a 10 minutes discussion.
Submit a report on the seminar topic with literature survey.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

The sessional marks will be awarded to the students by atleast 2 faculty members on the basis of an oral and a written presentation as well as their involvement in the discussions.

SYLLABUS FOR I YEAR M.E. (AD&M)

ADVANCED KINEMATICS (ELECTIVE)

Unit-I

Kinematic analysis of plane mechanism: Analytical method of kinematic analysis of four bar mechanisms. Acceleration analysis of complex mechanisms by auxiliary point method. Good man's indirect method.

Unit-II

Kinematic synthesis of linkages: Number synthesis, associated linkage or equivalent linkage concept, dimensional synthesis by analytical and graphical methods.

Unit-III

Kinematic analysis of four link RGGR spatial mechanism, D-H parameters, Transformations matrix method for position velocity and acceleration analysis of special mechanisms.

Unit-IV

Cams: Analysis of follower motions, analytical cam design.

Unit-V

Kinematic analysis of two-degree freedom of Robot arm.

Learning Resources:

1. Amitabh Gosh and Ashok Kumar Mallik, 'Theory of Mechanisms and Machines', Affiliated East-West Press Pvt. Ltd., New Delhi, 1998.
2. Artur, G.Erdman and George.N.Sandor, 'Mechanism Design', Volume-I and -II, Prentice Hall of India, 1984.
3. Joseph Edward. Shigley and J.Joseph Uicker, 'Theory of Mechanisms and Machines', McGraw-Hill Company, 1995.
4. RL Norton 'Kinematics and Dynamics of Machines' by McGraw-Hill Company

SYLLABUS FOR I YEAR M.E. (AD&M)

MECHANICAL VIBRATIONS (ELECTIVE)

Unit-I

(A) Multi Degree Freedom System:-Free Vibration equation of motion. Influence Coefficient i)Stiffness Coeff. (ii) Flexibility Coeff. Generalized co ordinates, and Coordinate couplings. Langranges Equations Matrix Method Eigen Values Eigen Vector problems. Modal Analysis. Forced Vibrations of undamped system and modal analysis.

(B) Multi Degree System Numerical Methods:-(i)Rayleigh`s Method, (ii)Rayleigh-Ritz Method (iii)Holzer`s Method (iv)Methods of Matrix iterations (v) Transfer Matrix Method, Impulse response and frequency response functions.

Unit-II

Continuous System:- Vibrations of String, Bars, Shafts and beams, free and forced vibration of continuous systems.

Unit-III

Transient vibrations:-Response of a single degree of freedom system to step and any arbitrary excitation, convolution (Duhamel's) integral, impulse response functions.

Unit-IV

Vibration Control:-Balancing of rotating machine, In-situ balancing of rotors, control of naturalfrequency introduction of damping, vibration isolation & vibration absorbers..Vibration Measurement:- FFT analyzer, vibration exciters, signal analysis. Time domain & Frequency domain analysis of signals. Experimental modal analysis, Machine Conditioning and Monitoring, fault diagnosis.

Unit-V

Random Vibrations:- Expected values auto and cross correlation function, Spectral density, response of linear systems, analysis of narrow band systems.

Non Linear Vibrations:-Systems with non-linear elastic properties, free vibrations of system with non-linear elasticity and damping, phase-plane technique, Duffing's equation, jump phenomenon, Limit cycle, perturbation method.

Learning Resources:

1. W T Thomson., " Theory of Vibrations with Applications", CBS Publishers
2. S S Rao, " Mechanical Vibrations", Addison-Wesley Publishing Co.
3. Leonard Meirovitch, " Fundamentals of Vibration", McGraw Hill International Edison.
4. Asok Kumar Mallik, " Principles of Vibration Control", Affiliated East- West Press.
5. J P Den Hartog, "Mechanical Vibrations",Mc Graw Hill.
6. Srinivasan, " Mechanical Vibration Analysis", Mc Graw Hill.

SYLLABUS FOR I YEAR M.E. (AD&M)

ADVANCED MECHANICS OF SOLIDS (ELECTIVE)

Unit – I

Definition and notation of stress. Components of stress and stain. Generalized Hooke's law. Stress and strain in three dimensions. Stress components on an oblique plane. Transformation of stress components under change of co-ordinate system.

Principal stresses and principal planes. Stress invariants. Mean and deviator stress. Strain energy per unit volume. Octahedral shear stress. Strain of a line element. Principle strains. Volume strain.

Unit – II

Two dimensional problems in elasticity: Plane stress and plane strain situations. Equilibrium equations. Compatibility equations. St. Venant's principle. Uniqueness of solution. Stress components in terms of Airy's stress functions. Applications to cantilever. Simply supported and fixed beams with sample loading.

Unit – III

Solutions of problems in polar co-ordinates. Equilibrium equations. Stress Strain Components. Compatibility equation. Applications using Airy's stress functions in polar co-ordinates for stress distributions symmetric about an axis. Effect of hole on stress distribution in a plate in tension. Stresses due to load at a point on a semi-infinite straight boundary. Stresses in a circular disc under diametrical loading

Unit -IV

Torsion – Torsion of various shapes of bars, Stress function method of solution applied to circular and elliptical bars. Prandtl's membrane analogy, Solution of torsion of rectangular bars by (i) Raleigh Ritz method and (ii) Finite difference method

Unit-V

Bending of curved beams:

Winkler-Bach Formula, Elasticity solution for : pure bending of curved beams, curved cantilever under end loading

Learning Resources:

1. S. Timoshenko & N. Goodier, "Theory of Elasticity", Mc Graw Hill., 1951
2. Valiappan, "Theory of Elasticity", Mc. Graw Hill, 2010
3. L.S. Srinath, "Advanced Mechanics of Solids" Tata McGraw Hill, 2007

SYLLABUS FOR I YEAR M.E. (AD&M)

THEORY OF ELASTICITY AND PLASTICITY (ELECTIVE)

Unit-I

Basic concepts of stress: Definition, State of stress at a point, stress tensor, invariants of stress tensor, principal stresses, stress ellipsoid, derivation for maximum shear stress and planes of maximum shear stress, octahedral shear stress, deviatoric and hydrostatic components of stress, invariance of deviatoric stress tensor, plane stress.

Unit-II

Basic concepts of strain: Deformation tensor, strain tensor and rotation tensor; invariants of strain tensor, principle strains, derivation for maximum shear strain and planes of maximum shear strain, octahedral shear strain, deviatoric and hydrostatic components of strain tensor, invariance of deviatoric strain tensor, plane strain.

Unit-III

Generalized Hooke's law: Stress-strain relationships for an isotropic body for three dimensional stress space for plane stress and plane strain conditions, differential equations of equilibrium, compatibility equations, material (D) matrix for Orthotropic Materials.

Unit-IV

True stress and true strain, von-Mise's and Tresca yield criteria, Haigh-Westergard stress space representation of von-Mise's and Tresca yield criteria, effective stress and effective strain, St. Venants theory of plastic flow, Prandtle –Reuss and Levy-Mise's constitutive equations of plastic flow, strain hardening and work hardening theories, work of plastic deformation.

Unit-V

Analysis methods: Slab method, slip line field method, uniform deformation energy method, upper and lower bound solutions. Application of slab method to forging, wire drawing, extrusion and rolling processes.

Learning Resources:

1. Timoshenko and Goodier,– 'Theory of Elasticity', McGrawHill Publications 3rd Edition.
2. Madleson, Theory of Plasticity,
3. J. Chakrabarty, Theory of Plasticity, 2nd Edition, McGraw Hill Publications 1998
4. George E Dieter, Mechanical Metallurgy, McGraw Hill Publications 1988

SYLLABUS FOR I YEAR M.E. (AD&M)

MECHANICS OF COMPOSITE MATERIALS (ELECTIVE)

Unit-I

Introduction: Fibres, Matrix materials, interfaces, polymer matrix composites, metal matrix composites, ceramic matrix composite, carbon fibre composites.

Unit-II

Micromechanics of Composites: Mechanical Properties: Prediction of Elastic constant, micromechanical approach, Halpin-Tsai equations, Transverse stresses. Thermal properties: Hygrothermal stresses, mechanics of load transfer from matrix to fibre.

Unit-III

Macro-mechanics of Composites: Elastic constants of a lamina, relations between engineering constants and reduced stiffness and compliances, variation of lamina properties with orientation, analysis of laminated composites, stresses and strains with orientation, inter-laminar stresses and edge effects. Simplified composite beam solutions. Bending of laminated beams.

Unit-IV

Strength, fracture, fatigue and design:Tensile and compressive strength of unidirectional fibre composites, fracture modes in composites: Single and multiple fracture, de-bonding, fibre pullout and de-lamination failure, fatigue of liminate composites, Effect of variability of fibre strength.
Strength of an orthotropic lamina: Max stress theory, max strain criteria, maximum work (Tsai-Hill) criterion, quadratic interaction criteria. Designing with composite materials.

Unit-V

Analysis of plates and stress: Plate equilibrium equations, Bending of composite plates, Levy and Navier solution for plates of composite material. Analysis of composite cylindrical shells under axially symmetric loads.

Learning Resources:

1. Jones, R.M., 'Mechanics of Composite Materials', Mc-Graw Hill Co., 1967.
2. Calcote, L.R., 'The Analysis of Laminated Composite Structures', Van Nostrand, 1969.
3. Whitney. I.M., Daniel, R.B. Pipes, 'Experimental Mechanics of Fibre Reinforced Composite Materials', Prentice Hall, 1984.
4. Hyer. M.W., 'Stress Analysis of Fibre-Reinforced Composite Materials', McGraw Hill Co., 1998.
5. Carl. T.Herakovich, 'Mechanics of Fibrous Composites', John Wiley Sons Inc., 1998.

SYLLABUS FOR I YEAR M.E. (AD&M)
ROBOTIC ENGINEERING (Elective)

UNIT-I

Brief History, Types of robots, Overview of robot subsystems, resolution, repeatability and accuracy, Degrees of freedom of robots, Robot configurations and concept of workspace, Mechanisms and transmission, End effectors and Different types of grippers, vacuum and other methods of gripping. Pneumatic, hydraulic and electrical actuators, applications of robots, specifications of different industrial robots.

UNIT-II

Rotation matrices, Euler angle and RPY representation, Homogeneous transformation matrices, Denavit-Hartenberg notation, representation of absolute position and orientation in terms of joint parameters, direct kinematics.

UNIT-III

Inverse Kinematics, inverse orientation, inverse locations, Singularities, Jacobian, Trajectory Planning: joint interpolation, task space interpolation, executing user specified tasks, sensor based motion planning: The Bug Algorithm, The Tangent Bug Algorithm, The Incremental Voronoi Graph.

UNIT-IV

Static force analysis of RP type and RR type planar robots, Dynamic analysis using Lagrangean and Newton-Euler formulations of RR and RP type planar robots, , Independent joint control, PD and PID feedback, actuator models, nonlinearity of manipulator models, force feedback, hybrid control. Introduction to robot programming.

UNIT-V

Sensors and controllers: Internal and external sensors, position, velocity and acceleration sensors, proximity sensors, force sensors, laser range finder. Robot vision: image processing fundamentals for robotic applications, image acquisition and preprocessing. Segmentation and region characterization object recognition by image matching and based on features

Learning Resources:

1. Nagrath and Mittal, "Robotics and Control", Tata McGraw-Hill, 2003.
2. Spong and Vidhyasagar, "Robot Dynamics and Control", John Wiley and sons, 2008.
3. Fu. K.S, Gonzalez, R.C., Lee, C.S.G, Robotics, control, sensing, Vision and Intelligence, McGraw Hill International, 1987
4. Steve LaValle, "Planning Algorithms", Cambridge Univ. Press, New York, 2006.
6. Howie Choset, Kevin Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia Kavraki and Sebastian Thurn, "Principles of Robot Motion: Theory, Algorithms, and Implementations", Prentice Hall of India, 2005.

SYLLABUS FOR I YEAR M.E. (AD&M)

FRACTURE MECHANICS (Elective)

Unit-I

Introduction: Crack in a Structure – Griffth Criterion – Cleavage fracture – Ductile fracture – Fatigue Cracking. Service failure analysis.

Unit-II

Elastic Crack: Elastic Crack tip stress field – Solution to crack problems. Effect of finite size stress intensity factor – Special cases – Irwin plastic zone correction. Actual shape of plastic zone – Plane stress – Plane strain.

Unit-III

Energy Principle: Energy release rate – Criterion for crack growth – Crack resistance curve – Principles of crack arrest – Crack arrest in practice.

Fatigue Crack Growth: Fatigue crack growth test, stress intensity factor, factors affecting stress intensity factor – Variable amplitude service loading, retardation model.

Unit-IV

Elastic Plastic Fracture Mechanics: Elastic plastic fracture concept – Crack tip opening displacement – J-integral technique; Determination of J-using FEM.

Unit-V

Application of Fracture Mechanics: Fracture design – Selection of materials – fatigue crack growth rate curve – Stress intensity factor range – Use of crack growth law.

Learning Resources:

1. David Broek – Elementary Engineering Fracture Mechanics: Sifth off an Noordhoff Internal Publishers – 1978.
2. John M. Barson and Stanely T. Rolfe: Fracture and Fatigue Control in Structures – Prentice Hall, Inc. USA 1987.
3. Jean Cemative and Jean Louis Chboche Mechanics of Solid Materials, Cambridge University Press, Cambridge, 1987.
4. Prashant Kumar, "Elements of Fracture Mechanics", Wheeler Publications, 1999

SYLLABUS FOR I YEAR M.E. (AD&M)
GEAR DESIGN (Elective)

UNIT – I

Introduction, Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry, gear manufacturing process and Inspection, gear tooth failure modes, stresses, selection of right kind of gears.

SPUR GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

UNIT – II

HELICAL GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology Complete design of helical gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

GEAR FAILURES: Analysis of gear tooth failures, Nomenclature of gear tooth wear and failure, tooth - breakage, pitting, scoring, wear, overloading, gear-casing problems, lubrication failures.

UNIT – III

WORM GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of worm gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Heat dissipation consideration. Design of gear shaft and bearings.

UNIT – IV

BEVEL GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load. Design of gear shaft and bearings.

UNIT – V

GEAR TRAINS: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile, Design of gear trains from the propeller shafts of airplanes for auxiliary systems.

OPTIMAL GEAR DESIGN: Optimization of gear design parameters. Weight minimization, Constraints in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains. Application of Traditional and non-traditional optimization techniques.

Learning Resources:

1. W Dudley, "Handbook of Practical Gear Design", CRC Press LLC, 2002.
2. Gitin M Maitra, "Handbook of Gear Design", 2nd Edition, Tata McGraw-Hill, 2003.
3. H. E Merritt, "Gear Engineering", 3rd Indian Edition, Wheeler Publication, 1992.
4. Joseph E Shigley, Charles R Mischke, "Mechanical Engineering Design", 6th Edition, Tata McGraw Hill, 2003.
5. Robert C Juvinall, Kurt M Marshek, "Fundamentals of Machine Component Design", 3rd Edition, John Wiley & Sons, 2000.

SYLLABUS FOR I YEAR M.E. (AD&M)

Advanced Non-Destructive Evaluation Techniques (Elective)

Unit-I

Types of defects and characteristics, Quantification aspects relevant for NDE including fracture aspects and stress intensity factors - NDT overview – quality assurance–visual inspection–comparative features of conventional Nondestructive Testing and Evaluation Methods including Optical, Radiography, Ultrasonic Testing, Dye penetrant testing, Eddy current testing etc.

Unit-II

Leak testing – liquid penetrant testing – penetrant used – equipment – penetration, emulsification, solvent removal. Eddy current testing – material conductivity – coil impedance–coils and instruments–testing in non-ferromagnetic conducting materials and ferro magnetic materials – skin effect – frequency used – inspection probes – phase analysis.

Unit-III

Radiography–sources of radiation–shadow formation, enlargement and distortion – recording media – exposures, markers.

Infrared and thermal testing – imaging systems – detectors – analysis methods.

Ultrasonic testing – generation of ultrasound – methodologies – transducers and equipment used – flaw detection - sensitivity and calibration.

Magnetic particle testing–magnetization methods–continuous and residual methods – sensitivity – demagnetization.

Unit-IV

Computer aided image processing methods for radiography and ultrasonics, tomography in these areas.

Optical techniques of nondestructive evaluation: Principles of Photoelasticity, holographic Interferometry and Laser speckle techniques; use of fibre optics, noninvasive techniques in medical field and NDT.

Unit-V

Machine Vision-system components, Sensors, specifications for resolution & range. Grid and Moire NDT, acoustic, ultrasonic and shearography, Principles of Microwave, acoustic emission techniques and Infrared thermography.

Learning Resources:

1. Barry Hull, 'Non-Destructive Testing' –Vernon John, ELBS/ Macmillay, 1988.
2. Baldev Raj, T.JayaKumar, M.Thavansimuthee, 'Practical Non-Destructive Testing', - Narosa Publishing House, New Delhi, 1997.
3. Journals: British Journal of NDT, Materials Evaluation, ISNDT Journal.

SYLLABUS FOR I YEAR M.E. (AD&M)
RAPID PROTOTYPING, PRINCIPLES AND APPLICATIONS (Elective)

Unit-I

Introduction: Prototyping fundamentals, Historical development, fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used terms, classification of RP process, Rapid prototyping process chain: Fundamental Automated processes, process chain.

Unit-II

Liquid based rapid prototyping systems: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. Solid ground curing (SGC): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

Solid based rapid prototyping systems: Laminated object manufacturing (LOM): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modeling (FDM): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

Unit-III

Powder Based Rapid Prototyping Systems: Selective laser sintering (SLS): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs Rt, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Spray Metal Deposition, RTV Epoxy Tools, Ceramic tools, investment casting, spin

casting, die csting, sand casting, 3D Keltool process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP

Unit-IV

Rapid Prototyping Data Formats: STL Format, STL File Problems, Consequence of Building Valid and invalid tressellated models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats.

Rapid Prototyping Software's: Features of various RP software's like Magics, Mimics, Solid View, view expert, 3 D view, velocity 2, Rhino, STL view 3 data expert and 3 D doctor

Unit-V

RP Applications: Application – Material Relationship, application in design, application in engineering, Analysis and planning, aerospace industry, automatic industry, Jewelry industry, coin industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Application: Planning and simulation of complex surgery, customized implant and prosthesis, design and production of medical devices, forensic science and anthropology, visualization of biomolecules.

Learning Resources:

1. Chua C.K., Leong K.F. and LIM C.S Rapid prototyping: Principles an Applications, World Scientific publications, third edition, 2010
2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001
3. Terry Wohlers, " Wholers Report 2000", Wohlers Associates, 2000
4. Paul F. Jacobs, " Rapid Prototyping and Manufacturing"–, ASME Press, 1996

SYLLABUS FOR I YEAR M.E. (AD&M)

MEMS and Nano-technology (Elective)

Unit-I

MEMS: Introduction to Micro-manufacturing - Semiconductor Manufacturing: Lithography and Oxidation - Diffusion – Etching (Dry and Wet) and Thin Film Deposition - Ion Implantation, Interconnections and Contacts, Packaging and Yield – Clean rooms and vacuum systems – Metrology for MEMS components. Concept of Accuracy and Factors Effecting Accuracy Microfinishing Processes.

Unit-II

Micro-Electro Mechanical System (MEMS): Scaling - Materials - Fabrication - LIGA, X-ray based Fabrication.

Unit-III

Application of Sensors & Actuators – Mechanical – MEMS Devices (Cantilevers, anemometers, pressure transducers and micro pumps) – RF, Electrical and Magnetic MEMS – Bio-MEMS.

Unit-IV
Nano-technology: Fabrication – Nanolithography – Nano-Devices – atomic force microscope–Scanning Electron Microscope – TEM - Nanoindentation Spin devices.

Unit-V
Technology to make components like Computer Hardware, Optical Systems, Fibre Optics & Allied components, Micro Injection Moulding and Nano Technology

Learning Resources:

1. Murthy., R.L., 'Precision Engineering in Manufacturing', - New Age International Publishers, 1996.
2. Mohamed Gad-elHak, 'The MEMS Handbook', CRC Press, 2002
3. Groover, M. P., 'Fundamentals of Modern Manufacturing: Materials, Processes, and Systems,' second edition, Wiley, 2002.
4. Jeager, 'Introduction to Microelectronic Fabrication', Addison-Wesley, 1993.
5. Zant, 'Microchip Fabrication', fourth edition, McGraw Hill, 2000.
6. Quirk, Serda, 'Semiconductor Manufacturing Technology', Prentice Hall, 2001.

SYLLABUS FOR I YEAR M.E. (AD&M)
AN INTRODUCTION TO NANO SCIENCE AND TECHNOLOGY (Elective)

Unit-I
Introduction: Evolution of science and technology, Introduction to Nanotechnology, Nanotechnology – Definition – Difference between Nanoscience and Nanotechnology, Feynman predictions on Nanotechnology, Moores law, Role of Bottom up and top down approaches in nanotechnology, challenges in Nanotechnology.

Unit-II
Nano materials: History of materials, Nanomaterials – Definition, Classification of Nanostructured materials, cause of interest in nanomaterials, some present and future applications of nanomaterials.

Unit-III
Synthesis and processing of nano powders: Processes for producing ultrafine powders – mechanical milling, wet chemical synthesis, gas condensation process, chemical vapour condensation, laser ablation.

Design and Synthesis of self assembled nano structured materials.

Unit-IV
Special nanomaterials, characterization and tools: Carbon nanotubes, nano composites, carbon fullerenes: An overview of preparation, properties applications. Electron Microscopy Techniques: Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Probe Microscopy – X ray methods.

Unit-V

Nanoelectronics: Introduction to micro, nano fabrication: Optical lithography, Electron beam lithography, Atomic lithography, Molecular beam epitaxy, MEMS:- Introduction, Principles, Types of MEMS:- Mechanical, Thermal, Magnetic MEMS; Fabrication of MEMS.

Learning Resources:

1. A S Edelstein & R C Cammarata, " Nano materials" , Institute of physics publishing, Bristc and Philadelphia.
2. J.Dutta & H.Hofman, "Nano materials"
3. Guozhong cao, " Nano structures & Nano materials", Imperial college press.
4. N.P.Mahalik, "Micro manufacturing and Nano Technology"
5. Mark Ratner & Danier Ratner, "Nano Technology", Prentice Hall.

SYLLABUS FOR I YEAR M.E. (AD&M)

PRODUCT DESIGN AND PROCESS PLANNING (Elective)

Unit-I

Product design and process design functions, selection of a right product, essential factors of product design, Morphology of design, sources of new ideas for products, evaluations of new product ideas. Product innovation procedure-Flow chart. Qualifications of product design engineer. Criteria for success/failure of a product. Value of appearance, colours and laws of appearance.

Unit-II

Product Reliability, Mortality curve, Reliability system, Manufacturing reliability and quality control.

Patents: Definitions, classes of patents, applying for patents. Trademarks and copy rights. Cost & Quality sensitivity of products, Elements of cost of a product, costing methods, cost reduction and cost control activities. Economic analysis, break even analysis Charts. Value engineering in product design, creativity aspects and techniques. Procedures of value analysis - cost reduction, material and process selection.

Unit-III

Various manufacturing processes, degree of accuracy and finish obtainable, process capability studies. Methods of Improving tolerances. Basic Product design rules for Casting, Forging, Machining, Sheet metal and Welding. Physical properties of engineering materials and their importance on products. Selection of plastics, rubber and ceramics for product design.

Unit-IV

Industrial ergonomics: Man-machine considerations, ease of maintenance. Ergonomic considerations in product design-Anthropometry, Design of controls, Man-machine information exchange. Process sheet detail and their importance, Advanced techniques for higher productivity. Just-in-time and Kanban System. Modern approaches to product design; quality function development, Rapid prototyping.

Unit-V
Role of computer in product design and management of manufacturing, creation of manufacturing data base, Computer Integrated Manufacturing, communication network, production flow analysis, Group Technology, Computer Aided design and process planning. Integrating product design, manufacture and production control.

Learning Resources:

1. Niebel B.W., and Draper A.B, 'Product design and process Engineering', Mc.Graw Hill-Kogakusha Ltd., Tokyo, 1974.
2. Chitale A.K., & Gupta R.C., 'Product Design and manufacturing', Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Mahajan M., 'Industrial Engineering and Production Management', Dhanpath Rai &Co., 2000.
4. Harry, B. Waton, New Product Planning, Prentice Hall Inc., 1992

SYLLABUS FOR I YEAR M.E. (AD&M)
QUALITY & RELIABILITY ENGINEERING (Elective)

Unit-I
Quality value and engineering – Quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design quality costs – quality improvement.
Statistical Process Control-x, R, P, C charts, process capability. Acceptance Sampling by variables and attributes, Design of Sampling Plans, Single, Double, Sequential plans.

Unit-II
Loss Function, Tolerance Design – N Type, L Type, S Type; determination of tolerance for these types, nonlinear tolerances. Online Quality Control – Variable Characteristics, Attribute Characteristics, Parameter Design.

Unit-III
Quality function deployment – House of Quality, QFD Matrix, Total Quality Management Concepts. Quality Information Systems; Quality Circles, Introduction to ISO 9000 Standards.

Unit-IV
Reliability – Evaluation of design by tests - Hazard Models; Linear, Releigh, Weibull. Failure Data Analysis System, Reliability, Reliability of series, Parallel Standey Systems; reliability prediction and system effectiveness, reliability prediction based on weibull distribution, Reliability improvement.

Unit-V
Maintainability, Availability, Economics of Reliability Engineering; Replacement of items, Maintenance Costing and Budgeting, Reliability Testing – Burn in testing by binomial, exponential models, Accelerated life testing.

Learning Resources:

1. G Taguchi, 'Quality Engineering in Production Systems', - McGraw Hill, 1989.
2. W.A. Taylor, 'Optimization & Variation Reduction in Quality', Tata McGraw Hill, 1991, 1st Edition.
3. Philipposs, 'Taguchi Techniques for Quality Engineering', McGraw Hill, 1996, 2nd Edition.
4. E.Bala Guruswamy, 'Reliability Engineering', Tata McGraw Hill, 1994.
5. LS Srinath, 'Reliability Engineering', Affiliated East West Pvt. Ltd., 1991, 3rd Edition.
6. Grant, 'Statistical Process Control', McGraw Hill, 1988, 6th Edition.

SYLLABUS FOR I YEAR M.E. (AD&M)
VALUE ENGINEERING (Elective)

Unit-I
Basic concepts of Value Engineering – Function, Value, Value analysis, Value of job plan, Study of Engineering materials specially latest materials with respect to their mechanical properties, Cost and availability. Study of wide range of manufacturing processes based on the factors – productivity time, cost, surface finish, tolerance etc. Mechanical properties of products based on manufacturing processes.

Unit-II
Information phase, Functional phase, Creation – phase, Evaluation phase, Recommendation phase. DARSIRI method.
Fast diagramming: Critical path of function, how, why and when logic, supporing and all time functions, Ground rule for FAST diagram.

Unit-III
Productivity, improvement by Value Engineering and Value analysis – Selection of Engineering Products of different applications and studying each one of them about design, types of stresses induced, manufacturing method.

Unit-IV
Results acceleration – Basic steps, valuation of Value Engineering, Problem setting, Problem solving case studies alternative methods and best possible method.

Unit-V

Work study and Value Engineering Methods: Case studies in work study and Value Engineering methods – product Design implementation using Value Engineering. Developing any one product (important in functional aspect) which actually adds Value to Existing product in use.

Learning Resources:

1. L.D. Miles, 'Techniques of Value Analysis and Engineering', McGraw Hill, 1961
2. A.E. Mudge, 'Value Engineering A Systematic Approach', McGraw Hill, 1971.
3. Greve J.W. and Wilson, 'Value Engineering in Manufacturing', Prentice Hall, Englewood Cliffs, 1967.
4. SS Iyer, 'Value Engineering', New Age International Pvt. Ltd.

SYLLABUS FOR I YEAR M.E. (AD&M)

ENGINEERING RESEARCH METHODOLOGY (Elective)

UNIT-I

Research Methodology: Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods verses Methodology, Research and Scientific Method, Important of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general.

Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique involved in Defining a Problem.

UNIT-II

Literature Survey: Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet.

Literature Review: Need of Review, Guidelines for Review, Record of Research Review.

UNIT-III

Research Design: Meaning of Research Design, Need of Research Design, Feature of a Good Design, Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, Developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

UNIT-IV

Data Collection: Exploring the data, Description and Analysis of Data, Sample Design and Sampling, Role of Statistics for Data Analysis, Functions of Statistics, Estimates of Population, Parameters, Parametric V/s Non Parametric methods, Descriptive Statistics, Points of Central tendency, Measures of Variability, Measures of relationship, Inferential Statistics-Estimation, Hypothesis Testing, Use of Statistical software.

Data Analysis: Deterministic and random data, Uncertainty analysis, Tests for significance: Chi-square, student's't' test, Regression modeling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modeling.

UNIT-V

Research Report Writing: Format of the Research report, Style of writing report, References/Bibliography/Webliography, Technical paper writing/Journal report writing.

Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal..

Learning Resources:

1. C.R Kothari, "Research Methodology, Methods & Technique"; New Age International Publishers, 2004
2. R. Ganesan, "Research Methodology for Engineers", MJP Publishers, 2011
3. Y.P. Agarwal, "Statistical Methods: Concepts, Application and Computation", Sterling Publs., Pvt., Ltd., New Delhi, 2004
4. Vijay Upagade and Aravind Shende, "Research Methodology", S. Chand & Company Ltd., New Delhi, 2009
5. P. Ramdass and A. Wilson Aruni, "Research and Writing across the Disciplines", MJP Publishers, Chennai, 2009

SYLLABUS FOR I YEAR M.E. (AD&M)

NEURAL NETWORKS AND FUZZY LOGIC (Elective)

Unit-I

Concepts of fuzzy sets: Introduction-Crisp sets, notation of fuzzy sets, basic concepts of fuzzy sets, operation, fuzzy compliment, union, intersection. Binary relation, Equivalence and similarity relations, belief and plausibility measurements, probability measures, computability, relations, ordering morphisms, possibility and necessary measures.

Uncertainty and information: types of uncertainty, measures of dissonance, measures of confusion, measures of nonspecificity, uncertainty and information. Complexity, Principle of uncertainty.

Unit-II

Adaptive fuzzy systems: Neural and Fuzzy intelligence, Fuziness as multivalent, fuzziness in probabilistic world, randomness verses ambiguity.

Unit-III

Fuzzy association memories: Fuzzy and neural function estimates. FAN mapping, neural verses fuzzy representation of structural knowledge, FAM as mapping, Fuzzy hebb FAM's: Bidirectional FAM theorem. Super imposition of FAM rules, FA system architecture.

Unit-IV
Introduction to Neural networks: Knowledge base information processing, general view of Knowledge based algorithm, neural information processing, Hybrid intelligence, and artificial neurons.

Unit-V
Characteristics of artificial Neural Networks: Single Neural Networks, Multi layer Neural Networks, training of ANN-objective, supervise training, unsupervised training, overview of training.
Neural networks paradigms: Perception meculloch and Pitts model, back propagation algorithm and deviation, stopping criterion. Hopfield nets, Boldman's machine algorithm, Neural networks applications.

Learning Resources:

1. Bart. Kosko, 'Neural Networks and Fuzzy Systems', Prentice Hall of India, 1994.
2. Limin Fu., 'Neural Networks in Computer Intelligence', McGraw Hill, 1995.
3. George.J. Klir and Tina.A.Folger, 'Fuzzy sets uncertainty an information', Prentice Hall of India, New Delhi, 2000.
4. James.A.Freeman, 'Simulating Neural Networks', Adison Publication, 1995.

SYLLABUS FOR I YEAR M.E. (AD&M)
EXPERIMENTAL TECHNIQUES AND DATA ANALYSIS (Elective)

Unit-I
Measurement of cutting forces: Strain gauge and piezoelectric transducers and their characteristics. Dynamometer construction, Bridge circuits. Instrumentation and calibration. Displacement and Strain measurements by photoelasticity, Holography, interferometer, Moir techniques, strain gauge rosettes.

Unit-II
Temperature Measurement: Circuits and instrumentation for different transducers viz., bimetallic, expanding fluid, electrical resistance, thermister, thermocouples, pyrometers.
Flow Measurement: Transducers for flow measurements of Non-compressible fluids, Obstruction and drag methods. Vortex shredding flow meters. Ultrasonic, Laser Dopler and Hotwire anemometer. Flow visualization techniques, Shadow graphs, Schilieren photography. Interferometer.

Unit-III
Metallurgical Studies: Optical and electron microscopy, X-ray diffraction, Bragg's Law and its application for studying crystal structure and residual stresses. Electron spectroscopy, electron microprobe.
Surface Measurement: Micro hardness, roughness, accuracy of dimensions and forms. 3-D Co-ordinate measuring machines.

Unit-IV

Experiment design & data analysis: Statistical methods, Randomised block design, Latin and orthogonal squares, factorial design. Replication and randomization.
Data Analysis: Deterministic and random data, uncertainty analysis, test of significance: Chi-square, student's 't' test. Regression modeling, direct and interaction effects. ANOVA, F-test. Time Series analysis, Autocorrelation and autoregressive modeling.

Unit-V

Taguchi Methods: Experimental design and planning with Orthogonal arrays and linear graphs. Additive cause-effect model, Optimization of response level. Identification of Design and noise factors. Performance evaluation and Optimization by signal to noise ratios. Concepts of loss function and its application.

Learning Resources:

1. Holman, J.P., 'Experimental Methods for engineers', McGraw Hill Int., New York.
2. Venkatesh, V.C., and Chandersekharan, 'Experimental Methods in Metal cutting', Prentice Hall of India, Delhi.
3. Davis O.V., 'The design and analysis of industrial experiments', Longman, London.
4. Box and Jenkins, 'Time Series Analysis, Forecasting and control', Holden Day, Sanfransisco
5. Dove and Adama, 'Experimental Stress Analysis and Motion Measurement', Prentice Hall of India, Delhi.
6. Tapan P.Bagchi, 'Taguchi methods explained', Prentice Hall of India, Delhi.

SYLLABUS FOR I YEAR M.E. (AD&M)

OPTIMIZATION TECHNIQUES (Elective)

Unit-I

Statement of Optimization Problem, Linear Programming: Simplex method, revised simplex method, sensitivity analysis, parametric programming, and transportation problem.

Unit-II

Nonlinear programming approach, convergence and scaling of design variables; Unconstrained optimization direct search methods: Random Search, Univariate, Simplex Method; Indirect Search methods: Steepest Descent, Conjugate Gradient, Newton, Quasi Newton, DFP Methods.

Unit-III

Nonlinear programming constrained optimization direct methods: Lagrange multipliers, Kuhn-Tucker conditions, Beal's method, indirect method: Penalty function and applications.

Unit-IV

Introduction to dynamic programming; Concept of sub optimization and the principle of optimality; Linear and continuous dynamic programming with applications; Introduction to integer programming; Cutting plane method; Branch and bound method; Introduction to genetic algorithms, particle swarm optimization.

Unit-V

Sequencing and scheduling, Project scheduling by PERT-CPM; Probability and cost consideration in project scheduling; Queuing theory, Single and multi server models; Queues with combined arrivals and departures; Queues with priorities for service.

Learning Resources:

1. Rao, S.S., 'Engineering Optimization Theory and Practice', New Age Int. Pub., 3rd Ed., 1996
2. Haug, E.J. and Arora, J.S., 'Applied optimal design' Wiley Inter Science Publication, NY, 1979
3. Douglas J. Willde, 'Globally optimal design' Jhon Wiley & Sons, New York, 1978
4. Johnson Ray C., 'Optimum design of mechanical elements', John Wiley & Sons, 1981
5. S.D. Sharma, 'Operations Research', Khanna Publications, 2001
6. David Goldberg, Genetic Algorithms, pearson publications, 2006
7. Prem Kumar Gupta, "Operations Research", S Chand Publications, 2008
8. Maurice Cleric, Particle Swarm Optimization, ISTE Publications, 2006

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME OF INSTRUCTION & EXAMINATION

M. Tech I YEAR - I SEMESTER

S. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction			Scheme of Examination			
			Periods per week			Duration in Hrs	Maximum Marks		Credits
			L	T	P		Sem Exam	Sessionals	
1	CS 5010	Advanced Algorithms	4	-	-	3	70	30	3
2	CS 5020	Advanced Operating Systems	4	-	-	3	70	30	3
3	CS 5030	Artificial Intelligence	4	-	-	3	70	30	3
4	CS 5040	Object oriented Software Engineering	4	-	-	3	70	30	3
5		ELECTIVE-I	4	-	-	3	70	30	3
6		ELECTIVE-II	4	-	-	3	70	30	3
7		Finishing School	2	-	-	-			1
Practicals									
8	CS 5051	Software lab1 (AA and OOSE)	-	-	3	-	-	50	3
9	CS 5066	Seminar-I	-	-	3	-	-	50	2
		Total	**26**		**6**		**420**	**280**	
		Grand Total		**32**			**700**		**24**

Elective I & Elective II

CS 5070 Mobile computing
CS 5080 Information storage management
CS 5090 Parallel Computer Architecture
CS 5100 Advanced Computer Graphics
CS 5110 Human computer interaction
CS 5120 Simulation modeling
CS 5130 Software project management
CS 5140 Embedded Systems
CS 5150 Reliability & fault tolerance

M. Tech I YEAR- II Semester

S. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction				Scheme of Examination			Credits
			Periods per Week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEM.Exam	Sessionals	
	THEORY									
1.	CS 5160	Distributed Computing	4	-	-	-	3	70	30	3
2.	CS 5170	Advance Databases	4	-	-	-	3	70	30	3
3.		ELECTIVE-III	4	-	-	-	3	70	30	3
4.		ELECTIVE-IV	4	-	-	-	3	70	30	3
5.		ELECTIVE-V	4	-	-	-	3	70	30	3
6.		ELECTIVE-VI	4	-	-	-	3	70	30	3
7		Finishing School	2	-	-	-	-			1
	PRACTICALS									
8	CS 5181	Software lab II (DC & ADB)	-	-	-	3		-	50	3
9.	CS 5196	Seminar-II	-	-	-	3		-	50	2
		Total	**26**		**6**			**420**	**280**	
		Grand Total	**32**					**700**		**24**

Elective III & IV

CS 5200 Image processing
CS 5210 Data Mining
CS 5220 Machine learning
CS 5230 Soft Computing
CS 5240 Real time systems
CS 5250 Natural Language Processing
CS 5260 Neural Networks
CS 5270 Software Quality & testing
CS 5280 Parallel algorithms

Electives V & VI

CS 5290 Cloud Computing
CS 5300 Network Security
CS 5310 Information Retrieval Systems
CS 5320 Multimedia Technologies
CS 5330 Web Engineering
CS 5340 Software reuse techniques
CS 5350 Big data Analytics
CS 5360 Software Engineering for Real Time Systems
CS 5370 Web mining

M. Tech II YEAR- III & IV Semesters

S.No	Syllabus Ref. No.	SUBJECT	Scheme of Instruction				Scheme of Examination			Credits
			Periods per Week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEM. Exam	Sessionals	
Semester-III										
1.	CS 5196	Dissertation + Project Seminar	-	-	-	6	-	-	100	6
		Grand Total				**6**			**100**	**6**
Semester-IV										
1	CS 5205	Project Dissertation	-		-	-	6	*Grade		6
		Grand Total				**6**				**6**

*Grade: Excellent/Very good/Good/Satisfactory/Unsatisfactory

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Syllabus for First Year M.Tech (CSE)– I Semester

ADVANCED ALGORITHMS

UNIT-I : **(14 Periods)**

Algorithm Analysis: Asymptotic Notations, Amortization

Basic Data Structure: Stacks and Queues, Vectors, Lists and Sequences, Trees, Priority Queues, Heaps, Dictionaries and Hash Tables

Search Trees and Skip Lists: Ordered Dictionaries and binary Search Trees, AVL trees, Bounded-Depth Search Trees.

UNIT-II : **(13 Periods)**

Fundamental Techniques: The Greedy Method, Divide and Conquer, Dynamic Programming

Graphs: The Graph abstract data Type, Data Structures for Graphs, Graph Traversal, Directed Graphs.

UNIT-III : **(8 Periods)**

Weighted Graphs: Single Source Shortest Paths, All pairs Shortest Paths, Minimum Spanning Trees

Network Flow and Matching: Flows and Cuts, Maximum Flow, Maximum Bipartite Matching, Minimum Cost Flow

UNIT-IV : **(8 Periods)**

Text processing: Strings and Pattern Matching algorithms, Tries, Text Compression, Text Similarity testing.

Number Theory and Cryptography: Fundamental Algorithms involving numbers, Cryptographic Computations, Information Security Algorithms and Protocols.

UNIT-V : **(5 Periods)**

Computational Geometry: Range Trees, Priority Search Trees, Quad trees and k-d Trees,
Convex Hulls.
P, NP, NP-Complete, NP-Hard, cooks theorem, reducibility.

Learning Resources:

1. M.T.Goodrich, R.Tomassia, "Algorithm design – Foundations, Analysis, and Internet Algorithms", John Wiley, 2002
2. E Horrowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms",Second Edition University Press, 2007.
3. Aho, A V craftHop Ullman JD ,"The Design and Analysis of Computer Algorithms",Pearson Education,2007.
4. Hari Mohan Pandy, " Design analysis and Algorithms", University Science Press, 2009
5. Thomas H. Cormen, Charles E. Lieserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Second Edition, PHI,MIT press,USA, 2003

First Year M.Tech (CSE)– I Semester
ADVANCED OPERATING SYSTEMS

UNIT-I : **(9 Periods)**

Architecture of Distributed Systems: Types, Distributed OS, Issues in Distributed Operating Systems, Theoretical Foundations: Global clock, Lamport's Logical clocks, Vector Clocks, Global State, Termination Detection.

UNIT-II : **(14 Periods)**

Distributed Mutual Exclusion: classification, requirement, performance, non-token based algorithms, Lamport's algorithms, the Ricart-Agrarwala algorithm, token based algorithm-Suzuki kasami's broadcast algorithm, Singhal's heuristic algorithm.

Deadlock Detection: Resource Vs communication deadlock, A graph – theoretic model, prevention, avoidance, detection, control organization, centralized deadlock-detection algorithm, the completely centralized algorithm, the HO- Ramamoorthy algorithms. Distributed deadlock detection algorithm- path-pushing, edge-chasing, hierarchical deadlock detection algorithm, menasce-muntz and Ho-Ramamoorthy algorithm. Agreement protocols: The system model, the Byzantine agreement, the consensus problem.

UNIT-III : **(11 Periods)**

Distributed File System: Mechanisms, Design Issues

Case Studies: Sun NFS, Sprite File System, DOMAIN, Coda File system

Distributed shared memory: Algorithms for implementing DSM, Memory Coherence, Coherence Protocols, Design Issues.

Case Studies: IVY, Mirage, Clouds

Distributed Scheduling: Issues in Load Distribution, components of Algorithm, Stability, Load Distributing Algorithm, and Performance.

UNIT-IV : **(11 Periods)**

Failure Recovery: Backward, Forward Error Recovery in Concurrent Systems, consistent Set of Check Points, Synchronous and Asynchronous check Pointing and Recovery.

Fault Tolerance: Commit protocols, Non-blocking Commit Protocols, Voting Protocols. **Protection and Security**: Access Matrix, Private Key, Public Key, Kerberos System.

UNIT-V : **(12 Periods)**

Multiprocessor Operating Systems: Motivation, Basic Multiprocessor System Architectures, Interconnection Networks for Multiprocessor Systems, caching, Hypercube Architecture. Threads, Process Synchronization, Processor Scheduling, memory management.

Database Operating System: Concurrence Control, Distributed databases, Concurrency control Algorithms.

Learning Resources:

1. Singhal M, Shivaratri N.G., "Advanced concepts in Operating systems", McGraw Hill Intl., 1994
2. Pradeep K Sinha, "Distributed Operating Systems Concepts and Design", PHI, 2002
3. Andrew S Tanenbaum, "Distributed Operating System", Pearson Education India,2001

First Year M.Tech (CSE)– I Semester
ARTIFICIAL INTELLIGENCE

UNIT-I : **(14 Periods)**

Introduction : History, Intelligent Systems, Foundation of AI, Sub areas of AI, Applications.

Problem Solving – State – Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive Searches, Heuristic Search Techniques, Iterative – Deepening A*, Constraint Satisfaction.

Game Playing, Bounded Look – Ahead Strategy and use of Evaluation Function, MINIMAX procedure, Alpha-Beta Pruning.

UNIT-II : **(10 Periods)**

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT-III : (08 Periods)

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert System versus Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shell and tools.

Uncertainty Measure – Probability Theory : Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster – Shafer Theory.

UNIT-IV : (10 Periods)

Machine – Learning Paradigms: Introduction, Machine learning Systems, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees (Learning Resources: 2) Deductive Learning, Clustering, Support Vector Machines.

Artificial Neural Networks : Introduction Artificial Neural Networks, Single – Layer Feed Forward Networks, Multi – Layer Feed Forward Networks, Radial – Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks

UNIT-V : (9 Periods)

Fuzzy Sets and Fuzzy logic : Fuzzy sets, Fuzzy set operations, Types of membership Functions, Multi valued logic, Fuzzy Logic, Linguistic variables and Hedges, Fuzzy Propositions, Inference Rules for Fuzzy Propositions, Fuzzy Systems.

Advanced Knowledge representation Techniques: Case Grammars

Natural Language Processing : Introduction. Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge

Learning Resources:

Learning Resources:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning, 2011.
2. Russell, Norvig," Artificial Intelligence, A Modern Approach ", Pearson Education, Second Edition, 2004.
3. Elaine Rich, Kevin Knight, Shivshankar B. Nair, "Artificial Intelligence", Tata McGraw Hill, Third Edition 2009.

First Year M.Tech (CSE)– I Semester
OBJECT ORIENTED SOFTWARE ENGINEERING

UNIT-I : **(11 Periods)**
Information System: Problems in Information Systems, development, Project Life Cycles, Managing Information Systems Development, User Involvement and Methodological approaches, Basic Concepts and Origins of Object Orientation Modeling concepts.

UNIT-II : **(9 Periods)**
Requirement Capture, Requirement Analysis, Refining the Requirement Models, Object Interaction

UNIT-III : **(14 Periods)**
Operations, Control, Design, System Design**.**

UNIT-IV : **UNIT-IV (12 Periods)**
Object Design, Design patterns, Human Computer Interaction, Designing Boundary Classes.
Testing concepts: Fault and Erroneous states and failures, Test Cases
Testing activities: Component Inspection, Usability Testing, Unit Testing, Integration Testing ,system testing, Regression Testing, Model Based Testing.

UNIT-V : **(11 Periods)**
Data Management Design, Implementation, Reusable Components, Managing Object Oriented Projects, System Development Methodologies.

Learning Resources:

1. Simon Benett, Steve Mc Robb & ray Farmer, Object Oriented System Analysis and Design using UML, McGraw Hill, 2002
2. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns and Java, 2nd Edition, Pearson Education Asia
3. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language-User Guide, Addison Wesley, 1999.
4. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Addison Wesley, 1999

First Year M.Tech (CSE)– I Semester
MOBILE COMPUTING

UNIT-I : **(11 Periods)**

Introduction: Wireless Transmission, Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread Spectrum, MAC- SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

UNIT-II : **(11 Periods)**

Telecommunication Systems: GSM, GPRS, Satellite Systems - Basics, Routing, Localization, Handover, FAMA and DAMA, Broadcast Systems- DAB, DVB, CDMA and 3G.

UNIT-III : **(11 Periods)**

Wireless LAN: IEEE 802.11, Architecture, Services, MAC-Physical Layer, IEEE 802.11a-802.11b Standards, Bluetooth.

UNIT-IV : **(11 Periods)**

Mobile IP - Dynamic Host Configuration Protocol, Traditional TCP-Classical TCP Improvements-WAP, WAP 2.0

Publishing & Accessing Data in Air: Pull and Push Based Data Delivery models, Data Dissemination by Broadcast, Broadcast Disks, Directory Service in Air

File System Support for Mobility: Distributed File Sharing for Mobility Support, CODA and other Storage Manager for Mobility Support.

UNIT-V : **(10 Periods)**

Mobile Platforms - Android, iOS, Windows Phone 8, Mobile App or Website, Android Development Tools, Application Development, Android development practices

Mobile Transaction and Commerce: Models for Mobile transaction, Kangaroo and Joey Transactions, Team Transaction. Recovery Model for Mobile Transactions, Electronic Payment and Protocols for Mobile Commerce.

Learning Resources:

1. Jochen, M Schiller, "Mobile Communications",2nd Ed Pearson Education, 2009.
2. Jeff McWherter, Scott Gowell, "Professional Mobile Application Development", Wiley Publishers, 2012
3. KumkumGarg, "Mobile Computing",Pearson Education, 2010.
4. Asoke K Talukder,Roopa R Yavagal, "Mobile Computing",TMH, 2008.
5. Raj Kamal, "Mobile Computing", Oxford, 2009.
6. A Survey of Mobile Transactions appeared in Distributed and Parallel Databases, pgs. 193-230, Kluwer Academic Publishers,2004.
7. Balancing Push and Pull for Data Broadcast,S.Acharya, M.Franklin and S.Zdonik. Proceedings of ACM SIGMOD, Tuscon, AZ, May 1997.
8. Broadcast Disks: Data Management for Asymmetric Communication Environments, S.Acharya, R. Alonso, M.Franklin and S.Zdonik. Proceedings of ACM SIGMOD Conference San Jose, CA, May 1995.

First Year M.Tech (CSE)– I Semester
INFORMATION STORAGE & MANAGEMENT

UNIT-I : **(10 Periods)**

Storage System

Introduction to information storage, virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk drive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)

UNIT-II : **(13 Periods)**

Storage Networking

Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCSI and FCIP as an IP-SAN solutions, Converged networking option – FCoE, Network Attached Storage (NAS) - components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform

UNIT-III : **(16 Periods)**

Backup, Replication, Archive

Business continuity terminologies, planning and solutions, Clustering and multipathing architecture to avoid single points of failure, Backup and recovery - methods, targets and topologies, Data deduplication and backup in virtualized environment, Fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection

UNIT-IV : **(7 Periods)**

Cloud Infrastructure

Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits, Cloud Service Models, Deployment Models, Cloud Computing Infrastructure, Cloud Challenges, Cloud Adoption Considerations, Concepts in practice

UNIT-V : **(11 Periods)**

Storage Security & Management

Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle management (ILM) and storage tiering

Learning Resources :

Suggested Reading

1. Information Storage and Management, Somasundaram G, Alok Shrivastava, Second Edition, Wiley Publishers

2. Implementation Management and Security - John W. Rittinghouse, James F. Ransome, CRC Press
3. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill, Osborne, 2003.

References

1. Building Storage Networks, Marc Farley, Tata McGraw Hill, Osborne. 2001.
2. Storage Area Network Fundamentals, MeetaGupta, Pearson Education Limited, 2002.

SOFTWARE LAB1 (AA AND OOSE)

First Year M.Tech (CSE)– I Semester

Experiments

Algorithms:

1. Shortest Path
2. Minimal Spanning Tree
3. String and pattern matching
4. Network Flow

OOSE:

A case study using case tool supporting UML

Note: The students have to submit a report at the end of the semester.

Learning Resources :

1. Grady Booch, James Rumbagu, Ivor Jacobson, "The Unified Modeling Language-User guide", (Covering UML 2.0) 2nd Edition Pearson Education, India 2007.

SEMINAR-I & SEMINAR-II

First Year M.Tech (CSE)– I Semester

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of state of the art topics in broad area of his/her specialization.

Seminar topics can be chosen by the students with the advice from the faculty members. Students are to be exposed to following aspects of seminar presentation.

Literature survey
Organization of material
Preparation of OHP slides / PC presentation
Technical writing.

Each student is required to

Submit one page of synopsis of the seminar talk two days before for display on notice board. Student should give 20 minutes presentation on their proposed topic using OHP, PC and LCD projector and then 10 minutes discussion. A report on the seminar topic with list of references and slides should be submitted within a week.

The Sessional marks will be awarded to the students on the basis of an oral and a written presentation as well as their involvement in the discussion. The evaluation shall be done by at least two faculty members. Average of two presentations is considered for award of sessional marks for each student.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
DISTRIBUTED COMPUTING
First Year M.Tech (CSE)– II Semester

UNIT-I : **(09 Periods)**

Introduction: Definition of Distributed Systems, Goals: Connecting Users and Resources, Transparency, Openness, Scalability, Hardware Concepts: Multiprocessors, Homogeneous Multicomputer systems, Heterogeneous Multicomputer Systems, Software Concepts: Distribute Operating Systems, Network Operating Systems, Middleware, The Client-Server Model: Clients and Servers, Application Layering, Client-Server Architectures.

UNIT-II : **(12 Periods)**

Communication: Layered Protocols: Lower-Level Protocols, Transport Protocols, Higher-Level Protocols, Remote Procedure Call: Basic RPC Operation, Parameter Passing, Extended RPC Models, Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static verses Dynamic Remote Method Invocations, Parameter Passing, Message Oriented Communication: Persistence and Synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented Persistent Communication, Stream Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

UNIT-III : (11 Periods)

Process: Threads: Introduction to Threads, Threads in Distributed Systems, Clients: User Interfaces, Client-Side Software for Distribution Transparency, Servers: General Design Issues, Object Servers, Software Agents: Software Agents in Distributed Systems, Agent Technology, Naming, Naming Entities: Names, Identifiers, and Address, Name Resolution, The Implementation of a Name System, Locating Mobile Entities: Naming verses Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches.

UNIT-IV : (13 Periods)

Distributed Object based Systems: CORBA: Overview of CORBA, Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance, Security, Distributed COM: Overview of DCOM, Communication, Processes, Naming, Synchronization, Replication, Fault Tolerance, Security, GLOBE: Overview of GLOBE, Communication, Process, Naming, Synchronization, Replication, Fault Tolerance, Security, Comparison of CORBA, DCOM, and GLOBE: Philosophy, Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance, Security.

UNIT-V : (07 Periods)

Distributed Multimedia Systems: Introduction, Characteristics of Multimedia Data, Quality of Service Management: Quality of Service Negotiation, Admission Control, Resource Management: Resource Scheduling.

Learning Resources :

1. Andrew S. Tanenbaum and Van Steen, "Distributed Systems", Pearson Education, 2002.
2. Colouris G. Dollimore Jean, Kindberg Tim, "Distributed Systems Concepts and Design", 3rd Edition Pearson Education, 2002.KumkumGarg, "Mobile Computing",Pearson Education, 2010.

First Year M.Tech (CSE)– II Semester
ADVANCED DATABASES

UNIT-I : **(10 Periods)**

Object Based Databases: Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.

UNIT-II : **(11 Periods)**

XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application program Interface to XML , Storage of XML application.

UNIT-III : (10 Periods)

Query Processing: Overview, 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 Plans, Materialized Views.

UNIT-IV : (11 Periods)

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Query Optimization, Design of Parallel Systems.

Distributed Databases : Homogeneous and Heterogeneous Database, Distributed Data Storage, Distributed. Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing, Heterogeneous Distributed Databases, Cloud-Based Databases, Directory Systems.

UNIT-V : (13 Periods)

Advanced Application Development: Performance Tuning, Performance Benchmarks Other Issues in Application Development, Standardization.

Spatial and Temporal Data and Mobility: Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases, Mobility and Personal Databases.

Learning Resources :

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, "Database System Concepts", McGrawHill international Edition, Sixth Edition, 2010.
2. Elmasri Navathe, Somayajulu, Gupta fundamentals ofDatab.ase Systems", Pearson Education, Fourth Edition, 2006.
3. CJ Date, A Karman, S Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
4. Ramakrishna, Gehrke, "Database Management" International Edition, Third Edition, 2003.

First Year M.Tech (CSE)– II Semester
IMAGE PROCESSING

UNIT-I : **(10 Periods)**
Image formation & description: Digital image representation – Elements of visual perception. Sampling & Quantization. Elements of digital image processing systems.

UNIT-II : **(11 Periods)**
Image transforms: Digital Image transforms – Fourier transform, Extension to 2D, DCT Walsh, Hadamard transforms.

UNIT-III : (10 Periods)
Image enhancement & segmentation: Histogram modification. Image smoothing – Image sharpening, Thresholding. Edge detection. Segmentation. Point and region dependent techniques.

UNIT-IV : (11 Periods)
Image encoding: Fidelity criteria. Transform compression. KL. Fourier, DCT, Spatial compression. Run length coding. Huffman coding. Contour coding.

UNIT-V : (13 Periods)
Restroration: Restroration models. Inverse filtering. Least squares Filtering. Recursive filtering.

Learning Resources :

1. Gonzalex R. C. Woods R.E: Digital Image Processing, Addison Wesley, 1992.
2. Rosenfeld A. Kak AC: Digital Picture Processing Vol. I & II, Acad. Press, 2nd ed.1982.
3. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing and Analysis and Machine Vision, 2nd Edition, Thomson Learning, 1999.

First Year M.Tech (CSE)– II Semester
DATA MINING

UNIT-I : **(10 Periods)**

Introduction: Challenges-Origins of Data Mining and Data Mining Tasks Data: Types of Data Quality-Data Preprocessing-Measures of Similarity and Dissimilarity OLAP and Multidimensional Data Analysis.

UNIT-II : **(14 Periods)**

Classification: Preliminaries-General Approach to Solving a Classification Problem-Decision Tree Induction-Model Over fitting-Evaluating the performance of a Classifier-Methods of Comparing Classifiers-Rule-Based Classifier.

UNIT-III : (12 Periods)

Classification: Nearest-Neighbor classifiers-Bayesian Classifiers-Artificial Neural Networks-Support Vector Machine-Ensemble Methods-Class Imbalance Problem-Multiclass Problem.

UNIT-IV : (10 Periods)

Association Analysis: Problem Definition-Frequent Item Set Generation-Rule Generation-Compact Representation of Frequent Item Sets-Alternative Methods for Generating Frequent Item Sets-FP-Growth Algorithm-Evaluation of Association Patterns-Effect of Skewed Support Distribution-Handling Categorical Attributes and Handling Continuous Attributes-Handling a concept Hierarchy.

UNIT-V : (9 Periods)

Cluster Analysis: Overview-K-means-Agglomerative Hierarchical Clustering-DBSCAN Cluster Evaluation on Characteristics of Data, Clusters, and Clustering Algorithms.

Learning Resources :

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining", Pearson Education.2008.
2. 2.K.P.Soman, Shyam Diwakar, V.Ajay, "Insight into Data Mining Theory and Practice,PHI.2010.
3. Arun K Pujari, "Data Mining Techniques", University Press,2nd Edn,2009.
4. Vikram Pudi P.Radha Krishna, "Data Mining", Oxford University Press, Ist edition 2009.
5. S Sumathi, S N Sivanandam."Introduction to Data Mining and its Applications",Springer2006.

First Year M.Tech (CSE)– II Semester
CLOUD COMPUTING

UNIT-I : **(11 Periods)**

The Evolution of Cloud Computing: Hardware Evolution, Internet Software Evolution, Establishing a common Protocol for the Internet, Evolution of Ipv6, Finding a Common Method to Communicate Using the Internet Protocol, Building a Common Interface to the Internet, Cloud Formation- From One Computer to a Grid of Many, Server Virtualization, parallel Processing, Vector Processing, Symmetric Multiprocessing Systems, Massively Parallel Processing Systems.

UNIT-II : **(13 Periods)**

Web Services and the Cloud: Communication-as-a Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a-Service (MaaS), Platform-as-a-Service (PaaS), Software-NIS-a-Service(SaaS)

Building Cloud Networks: The Evolution from the MSP Model to Cloud, Computing and Software- as-a-Service, The Cloud Data Centre, Collaboration, Service-Oriented Architectures as a Step Towards Cloud Computing, Basic Approach to a Data Center-Based SOA The Role of Open Source Software in Data Centers, Where Open Source Software is Used Case studies: Amazon web services, Google App Engine.

UNIT-III : (11 Periods)

Virtualization: Introduction, Types and Technologies, Accomplishing virtualization, importance of virtualization in Cloud computing. Case studies: Xen Virtual machine monitor – Xen API, VMware – VMware product – VMware Features, Microsoft Virtual Server – Features of Microsoft Virtual Server

UNIT-IV : (11 Periods)

Federation in the Cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information System. Cloud Security Challenges, Software-as-a-Service Security, Security-as-a-Service the New MSSP.

UNIT-V : (8 Periods)

Common Standards in cloud Computing: The Open Cloud Consortium, The Distributed Management Task Force, Standards for Application Developers, Standards for Messaging, Internet Messaging Access Protocol (IMAP), Standard for Security

Examples of End-Use Access to Cloud Computing Mobile Internet Devices and the Cloud: Mobile Operating Systems for Smartphones Mobile Platform Virtualization, Collaboration Applications for Mobile Platforms.

Learning Resources :

1. Cloud Computing: Implementation, Management and Security John W. Rittinghouse, James F. Ransome. CRC Press 2009.
2. Virtualization Specialist level complete certification kit – Study guide from www.theartofservice.org.

3. Professional Xen Virtualization, William Von Hagen, Wrox Publications, January, 2008.
4. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, APress 2005.
5. Advanced Server Virtualization: VMware and Microsoft Platform in the virtual Data Center, David Marshall, Wade A. Reynolds, Auerbach Publications. 2006
6. http://aws.amazon.com/ec2
7. http://code.google.com/appengine

First Year M.Tech (CSE)– II Semester
NETWORK SECURITY

UNIT-I : **(10 Periods)**
Introduction: Attributes of Security, Integrity, Authenticity, Non-repudiation, Confidentiality, Authorization, Anonymity, Types of Attacks, DoS, IP Spoofing, Replay, Man-in-the-Middle W attacks., General Threats to Computer Network,Worms, Viruses, Trojans

UNIT-II : **(16 Periods)**
Secret Key Cryptography: DES, Triple DES, AES, Key distribution, Attacks
Public Key Cryptography: RSA, ECC, Key Exchange (Diffie-Hellman), Java Cryptography Extensions, Attacks

UNIT-III : (11 Periods)
Integrity, Authentication and Non-Repudiation: Hash Function (MD5, SHA5), Message Authentication Code (MAC), Digital Signature (RSA, DSA Signatures), Biometric Authentication

UNIT-IV : (15 Periods)
PKI Interface: Digital Certificates, Certifying Authorities, POP Key Interface, System Security using Firewalls and VPN's.

Smart Cards: Application Security using Smart Cards, Zero Knowledge Protocols and their use in Smart Cards, Attacks on Smart Cards
UNIT-V : (5 Periods)
Applications: Kerberos, Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments, Case Studies of Enterprise Security (.NET and J2EE)

Learning Resources :
1. Cryptography and Network Security -William Stallings, 4th Edition. pearson. 2009
2. Behrouz A Forouzan, "Cryptography and Network Security", TMH, 2009
3. Joseph Migga Kizza," A guide to Computer network security", Springer, 2010
4. Dario cataiano," Contemporary Cryptalogy", Springer, 2010

First Year M.Tech (CSE)– II Semester

SOFTWARE LAB-II

DISTRIBUTED COMPUTING AND ADVANCED DATABASES LAB

Experiments

Distributed Computing:

1. Applications using RPC
2. Application using CORBA
3. Application using EJB
4. Application using XML, SOAP

Advanced Databases: An application involving above technologies and database has to developed.

Note: The students have to submit a report at the end of the semester.

Learning Resources:

NirvaMorisseau-Leroy, Martin K. Solomon, Julie Basu, "Oracle8i Java Component Programming With EJB, CORBA AND JSP", Tata McGraw Hill, 2000.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EXAMINATION
M.E. (ECE) Program-Four semester (Regular)
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

S. No.	Subject	Periods per week		Duration (Hours)	Max. Marks		Credits
		L/T	D/P		SEM. Exam	Sessional	
Semester – I							
1.	Core	4	--	3	70	30	3
2.	Core	4	--	3	70	30	3
3.	Core / Elective	4	--	3	70	30	3
4.	Core / Elective	4	--	3	70	30	3
5.	Core / Elective	4	--	3	70	30	3
6.	Elective	4	--	3	70	30	3
7.	Lab – I	--	3	--	--	50	2
8.	Lab - II	--	3	--	--	50	2
9.	Seminar – I	--	3	--	--	50	2
	Total	**24**	**9**	**--**	**420**	**330**	**24**
Semester – II							
1.	Core	4	--	3	70	30	3
2.	Core	4	--	3	70	30	3
3.	Core / Elective	4	--	3	70	30	3
4.	Core / Elective	4	--	3	70	30	3
5.	Core / Elective	4	--	3	70	30	3
6.	Elective	4	--	3	70	30	3
7.	Lab – III	--	3	--	--	50	2
8.	Lab - IV	--	3	--	--	50	2
9.	Seminar – II	--	3	--	--	50	2
	Total	**24**	**9**	**--**	**420**	**330**	**24**
Semester – III							
1.	Dissertation + Project Seminar*	--		-- 6	--	100**	6
	Total	**--**		**6**	**--**	**100****	**6**
Semester – IV							
1.	Dissertation	--		--	Viva-voce	Grade***	- 10
	Total	**--**		**--**	**--**	**--**	**-- 10**

List of subjects for M.E. (ECE) Program

Specialization in

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

Core Subjects

EC 6010	Signal Compression Theory and Methods
EC 6020	Multirate Processing
EC 6030	Speech Signal Processing
EC 6040	Digital Modulation Techniques
EC 6050	Wireless Communications and Networking
EC 6060	Principles of Communication Systems Simulation with Wireless Applications
EC 6011	Advanced Signal Processing Laboratory
EC 6012	Embedded Systems Laboratory
EC 6013	Communication Systems Simulation Laboratory
EC 6014	DSP Processors Applications Laboratory
EC 6015	Seminar – I
EC 6016	Seminar – II
EC 6017	Project Seminar
EC 6018	Dissertation

Elective subjects

EC 6070	Array Signal Processing
EC 6080	Spread Spectrum and CDMA Systems
EC 6090	Wireless Channel Coding
EC 6100	Advanced Optical Communication
EC 6110	MIMO Communication Systems
EC 6120	Global Navigational Satellite Systems
EC 6130	Radar Signal Processing
EC 6140	Adaptive Signal Processing
EC 6150	CODECS for Multimedia Applications
EC 6160	Software Defined and Cognitive Radio
EC 6170	Detection and Estimation Theory
EC 6180	Coding Theory and Techniques
EC 6190	Satellite and Microwave Communication
EC 6200	Smart Antennas for Mobile Communications
EC 6210	Image and Video Processing
EC 6220	Data and Computer Communication Networks
EC 6230	DSP Processors – Architecture
EC 6240	Statistical Signal Processing

M.E. (ECE) Program
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SIGNAL COMPRESSION THEORY AND METHODS

UNIT – I

Review of Information Theory, The discrete memory less information source - Kraft inequality; optimal codes Source coding theorem. Compression Techniques - Lossless and Lossy Compression - Mathematical Preliminaries for Lossless Compression -Huffman Coding - Optimality of Huffman codes - Extended Huffman Coding – Adaptive Huffman Coding - Arithmetic Coding - Adaptive Arithmetic coding, Run Length Coding, Dictionary Techniques - Lempel-Ziv coding, Applications - Predictive Coding - Prediction with Partial Match – Burrows Wheeler Transform, Dynamic Markov Compression.

UNIT – II

Rate distortion theory: Rate distortion function R(D),Properties of R(D); Calculation of R(D) for the binary source and the Gaussian source, Rate distortion theorem, Converse of the Rate distortion theorem, Quantization - Uniform & Non-uniform - optimal and adaptive quantization, vector quantization and structures for VQ, Optimality conditions for VQ, Predictive Coding - Differential Encoding Schemes.

UNIT – III

Mathematical Preliminaries for Transforms, Sub-bands and Wavelets, Karhunen Loeve Transform, Discrete Cosine and Sine Transforms, Discrete Walsh Hadamard Transform, Lapped transforms.

UNIT – IV

Transform coding – Sub-band coding – Wavelet transform based Compression - Analysis/Synthesis Schemes.

UNIT – V

Basics of Data Compression standards: Zip, gZip; Audio Compression standards: MPEG, Dolby AC3; and Video Compression Standards: MPEG, H.261, H.263 and H.264.

Learning Resources:

1. Khalid Sayood, "Introduction to Data Compression," Morgan Kaufmann Publishers., 3/e, 2011.
2. David Salomon, "Data Compression: The Complete Reference," Springer Publications, 4/e, 2006.
3. Toby Berger, "Rate Distortion Theory: A Mathematical Basis for Data Compression," PHI, 1971.
4. R.G.Gallager, "Information Theory and Reliable Communication," John Wiley & Sons, 1968.
5. Martin Vetterli and Jelena Kovacevic, "Wavelets and Subband Coding," PHI, 1995.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

MULTIRATE PROCESSING

UNIT – I

Fundamentals of Multirate Theory: The sampling theorem - sampling at sub-Nyquist rate - Basic Formulations and schemes. Basic Multirate operations-Decimation and Interpolation - Digital Filter Banks- DFT Filter Bank- Identities-Poly-phase representation (c) Maximally decimated filter banks: Poly-phase representation, Errors in the QMF bank, Perfect reconstruction (PR) QMF Bank, Design of an alias free QMF Bank.

UNIT – II

M-channel perfect reconstruction filter banks: Uniform band and non uniform filter bank - tree structured filter bank- Errors created by filter bank system- Poly-phase representation- perfect reconstruction systems –

UNIT – III

Perfect reconstruction (PR) filter banks: Para-unitary PR Filter Banks- Filter Bank Properties induced by para-unitarity- Two channel FIR para-unitary QMF Bank-Linear phase PR Filter banks- Necessary conditions for Linear phase property-Quantization Effects: -Types of quantization effects in filter banks. - coefficient sensitivity effects, dynamic range and scaling.

UNIT – IV

Cosine Modulated filter banks: Cosine Modulated pseudo QMF Bank- Alas cancellation- phase - Phase distortion- Closed form expression- Poly-phase structure- PR System

UNIT – V

Introduction to Wavelet Transforms: Short time Fourier Transform, Gabor Transform, Wavelet Transform, Recursive multi resolution decomposition, Haar wavelet, Digital Filter implementation of the Haar wavelet.

Learning Resources:

1. Robert Cristi, "Modern Digital Signal Processing," Thomson Books, 2004.
2. F.J. Harris, "Multirate Signal Processing for Communication Systems," PHI, 2004.
3. N.J. Fliege, "Multirate Digital Signal Processing", John Wiley 1994.
4. E.C. Ifeachor and B.W.Jervis, Digital Signal Processing: A Practical Approach, Addison-Wesley, 1993.
5. Sanjit K. Mitra, "Digital Signal Processing", TMH, 1998.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SPEECH SIGNAL PROCESSING

UNIT – I

Digital models for the speech signal - mechanism of speech production - acoustic theory - lossless tube models - digital models - linear prediction of speech - auto correlation - formulation of LPC equation - solution of LPC equations - Levinson Durbin algorithm - Levinson recursion - Schur algorithm – lattice formulations and solutions - PARCOR coefficients - Spectral analysis of speech - Short Time Fourier analysis - filter bank design. Auditory Perception : Psychoacoustics- Frequency Analysis and Critical Bands - Masking
properties of human ear :

UNIT – II

Speech coding: sub-band coding of speech - transform coding - channel vocoder - formant vocoder – cepstral vocoder - vector quantizer coder- Linear predictive Coder. Speech synthesis - pitch extraction algorithms - gold rabiner pitch trackers - autocorrelation pitch trackers - voice/unvoiced detection

UNIT – III

Homo-morphic speech processing – homo-morphic systems for convolution - complex cepstrums - pitch extraction using homo-morphic speech processing. Sound Mixtures and Separation - CASA, ICA & Model based separation.

UNIT – IV

Speech Transformations - Time Scale Modification - Voice Morphing. Automatic speech recognition systems - isolated word recognition - connected word recognition -large vocabulary word recognition systems - pattern classification - DTW, HMM - speaker recognition systems - speaker verification systems – speaker identification Systems.

UNIT – V

Audio Processing: Non speech and Music Signals - Modeling -Differential, transform and sub-band coding of audio signals & standards - High Quality Audio coding using Psychoacoustic models - MPEG Audio coding standard. Music Production - sequence of steps in a bowed string instrument - Frequency response measurement of the bridge of a violin. Audio Data bases and applications - Content based retrieval.

Learning Resources:

1. Rabiner L.R. & Schafer R.W., "Digital Processing of Speech Signals," Pearson, 2011.
2. Ben Gold & Nelson Morgan, "Speech and Audio Signal Processing," John Wiley & Sons, 2007.
3. Thomas F. Quatieri, "Discrete-time Speech Signal Processing: Principles and Practice," PHI, 2006.
4. Marina Bosi and Richard E. Goldberg, "Introduction to Digital Audio Coding and Standards," Springer, 2010.
5. Thomas W. Parsons, "Voice and Speech Processing," McGraw Hill, 1986.

M.E. (ECE) Program
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DIGITAL MODULATION TECHNIQUES

UNIT – I
Review of fundamental concepts and parameters in Digital Communication. Digital modulation schemes, Power spectra of digital modulation signals.

UNIT – II
Performance of carrier modulation schemes : Performance of BPSK and QPSK in AWGN Channel, Performance of Binary FSIC in M-ary PSK in AWGN Channel, Minimum Shift keying (MSK) Modulation, GMSK continuous phase modulation(CPM) schemes.

UNIT – III
Channel characterization and modeling: Optimum receivers for AWGN Channels, Equalization techniques, Orthogonal Frequency Division Multiplexing (OFDM). Carrier Synchronization, Timing synchronization.

UNIT – IV
Introduction to spread spectrum modulation, Direct Sequence modulation, spreading codes, Advantage of CDMA for wireless, Code Synchronization, Code Acquisition and tracking. Channel estimation, Power control, the near-far problem, FEC coding and CDMA, Frequency Hopping spread spectrum, Complex baseband representation of FHSS, slow and fast frequency hopping, Processing gain.

UNIT – V
Spread spectrum as a Multiple access technique: Multi channel and Multi carrier systems; Digital Communication through fading multipath channels; Multi user communications. 'Space diversity on Receiver' technique, MIMO antenna systems, Space time codes for MIMO wireless Communication, Differential space time block codes, SDMA, Smart antennas.

Learning Resources:

1. John G. Proakis and Masoud Salehi, "Digital Communications," McGraw Hill, 5/e, 2008.
2. Stephen G. Wilson, "Digital Modulation and coding," Pearson Education, 2010.
3. Simon Haykin and Michael Moher, "Modern Wireless Communications," Pearson Education, 2005.
4. Marvin K. Simon, Sami M. Hinedi and W. C. Lindsay, "Digital Communication Techniques," Eastern Economy Edition, 2010.
5. Andrew J Viterbi, "CDMA principles spread spectrum communications," Adison Wesley, 1995.

M.E. (ECE) Program
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

WIRELESS COMMUNICATIONS AND NETWORKING

UNIT - I
Radio Propagation Characteristics: Models for path loss, shadowing and multipath fading (delay spread, coherence band width, coherence time, Doppler spread), Jakes channel model, Digital modulation for mobile radio, analysis under fading channels:

UNIT – II
Wireless Communication Techniques: Diversity techniques and RAKE demodulator, channel coding techniques, multiple access techniques used in wireless mobile communications. Space time propagation, wireless channel, channel as a space time random field, space time channel and signal models, capacity of space time channels, spatial diversity, space time receivers, space time coding with channel knowledge, space time OFDM.

UNIT – III
Wireless networks: WLAN, Bluetooth. Suitable mini-projects in the areas of Space-Time codes and OFDM. The cellular concept: Frequency reuse: The basic theory of hexagonal cell layout: Spectrum efficiency, FDM / TDM cellular systems: Channel allocation schemes, Handover analysis, Erlang capacity comparison of FDM / TDM systems and cellular CDMA. GSM and CDMA cellular standards.

UNIT – IV
Signaling and call control: Mobility management, location tracking. Wireless data networking, packet error modeling on fading channels, performance analysis of link and transport layer protocols over wireless channels.

UNIT – V
Wireless/Wireline interworking: Mobile IP, WAP, Mobile ad-hoc networks. Wireless data in GSM, IS – 95 and GPRS. Space time Wireless Communications.

Learning Resources:

1. Theodore S. Rappaport, "Wireless Communications: Principles and Practice," Pearson Education, 2011.
2. John G. Proakis and Masoud Salehi, "Digital Communications," McGraw Hill, 5/e, 2008.
3. William Stallings, "Wireless Communications and Networking," PHI, 2006.
4. C Sivarama Murthy and B S Manoj, "Ad-Hoc Wireless Networks: Architectures and Protocols," Pearson Education, 2011.
5. Jon W. Mark and Weihua Zhuang, "Wireless Communications and Networking," PHI, 2005.
6. Vijay K. Garg, "Wireless Communications and Networking," Elsevier, 2011.

PRINCIPLES OF COMMUNICATION SYSTEMS SIMULATION WITH WIRELESS APPLICATIONS

UNIT – I

The Role of Simulation: Examples of Complexity, Multidisciplinary Aspects of Simulation, Models, Deterministic and Stochastic Simulation, The role of simulation, Simulation Methodology: Introduction, Aspects of Methodology, Performance estimation, Sampling and Quantizing: Sampling, Quantizing, Reconstruction and Interpolation, The Simulation Sampling Frequency.

UNIT – II

Low pass Simulation Models for Band pass Signals and Systems: The Low pass Complex Envelope for Band pass Signals, Linear Band pass Systems, Multicarrier Signals, Nonlinear and Time-Varying Systems, Filter Models and Simulation Techniques: Introduction, IIR and FIR Filters, IIR and FIR Filter Implementations, IIR Filters: Synthesis Techniques and Filter Characteristics, FIR Filters: Synthesis Techniques and Filter Characteristics.

UNIT – III

Case Study: Phase-Locked Loops and Differential Equation Methods: Basic Phase-Locked Loop Concepts, First-Order and Second-Order Loops, Case Study: Simulating the PLL, Solving Differential Equations Using Simulation, Generating and Processing Random Signals: Stationary and Ergodic Processes, Uniform Random Number Generators, Mapping Uniform RVs to an Arbitrary PDF, Generating Uncorrelated Gaussian Random Numbers, Generating Correlated Gaussian Random Numbers, Establishing a PDF and a PSD, PN Sequence Generators, Signal Processing.

UNIT – IV

Post processing: Basic Graphical Techniques, Estimation, Coding, Introduction to Monte Carlo Methods: Fundamental Concepts, Application to Communications Systems-The AWGN Channel, Monte Carlo Integration.

UNIT – V

Monte Carlo Simulation of Communication Systems: Two Monte Carlo Examples, Semi analytic Techniques, Methodology for Simulating A Wireless System: System-Level Simplifications and Sampling Rate Considerations, Overall Methodology.

Learning Resources:

1. William H. Tranter, K. Sam Shanmugan, Thodore S. Rappaport and Kurt L. Kosbar, "Principles of Communication systems simulation with Wireless applications," Pearson Education, 2004.
2. Roger L. Peterson, Rodger E. Zeimer and David E. Borth, "Introduction to spread spectrum communications," PHI, 1995.
3. William H. Tranter, "Principles of Communications: systems, Modulation and Noise, 5/e, Wiley, 2007.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

ADVANCED SIGNAL PROCESSING LABORATORY

Section - 1:

1. Generating basic waveforms (impulse, step, ramp, exponential, sin, …)
2. Digital FIR Filter implementation and realizations: with and without windows.
3. Design of IIR filters (Butterworth, Chebychev, IIR, …).
4. Generation of musical effects using digital filters.
5. Using the Simulink generate the basic waveforms (impulse, step, ramp, exponential, sin, …) observe the waveforms on the CRO.
6. Using Simulink generate the modulated waveforms.
7. Study and implementation of sigma - delta modulator/ Transmultiplexer.

Section – 2:

1. Declaring and initializing the variables and moving the data to and from Memory (register to memory, memory to register).
2. Setting up Circular buffering, hardwared loops:
3. Adding the 10 consecutive numbers
4. Splitting the numbers
5. Bit level operations.
6. Understanding the DSP MAC capabilities.
7. Windowing, Convolution, FIR filtering
8. Understanding the DSP parallel instruction optimization.
9. FFT without parallel instructions
10. FFT with parallel instructions
11. Creation of periodic waveforms and noise sequences using the DSP kit.
12. Interfacing the DSP processor in real time.
13. Initialization of Audio codec.

Note: The experiments will be decided and modified if necessary and conducted by the faculty member concerned.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

EMBEDDED SYSTEMS LABORATORY

List of Experiments using Embedded C/Embedded C++:

1. To toggle LEDs connected to GPIOs of AT89S52 with some intentional Delay.
2. To design & implement 4x3 matrix Keypad Device Driver for ASCII mapping.
3. To design & implement 2x16 LCD Device Driver for displaying below text:
   Line-1: "Welcome@ESD Lab!"
   Line-2:"Enter to Proceed"
4. To Configure Timer0 and Timer1 for intended delay without interrupts.
5. To design & demonstrate the UART drivers for data transmission and data reception at 9600bps full duplex baud.
6. To design & implement the concept of writing Interrupt Service Routine (ISR) for external interrupt INT0, INT1.
7. To design & implement the concept of mixing of external ISRs with Internal ISRs and understanding the ISR handling process.
8. To design & implement LED Seven Segment driver with adjustable delay.
9. To design & implement User Centric template Menu designs in Embedded C
10. To design & implement User Centric template Menu designs in Embedded C++.

Suggested tools for use:

Hardware Target CPU	–	AT89S52
Embedded Software Development	–	Keil µVision4 IDE
Embedded Debugger	–	Keil µVision4 Debugger
Hardware Simulator	–	Proteus

Note: The experiments will be decided and modified if necessary and conducted by the faculty member concerned.

COMMUNICATION SYSTEMS SIMULATION LABORATORY

Section - 1:

1. Simulation study of wavelength division multiplexing and de-multiplexing.
2. Study of digital modulation schemes using Spectrum analyzer.
3. Study and implementation of different simulation techniques.
4. Error detection codes in data communications.
5. Analysis of error coding, parity check and hamming check.
6. Simulation of a communication channel using convolutional encoding and Viterbi decoding using MATLAB.
7. Simulation of Channel coding / decoding using MATLAB and SIMULINK.

Section – 2:

Study of wireless LAN using Wireless digital communication trainer, study of:
a) Baseband digital communication link
b) Quadrature modulation schemes
c) Adaptive equalization techniques
d) GSM and Basics of DS-CDMA
f) Basics of OFDM.
Implementation of DPSK modulators and demodulators using MATLAB.
Simulation of software radio system using MATLAB.
Simulation study of collaborative transmission schemes for Multiuser wireless systems using MATLAB.

Note: The experiments will be decided and modified if necessary and conducted by the faculty member concerned.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DSP PROCESSORS APPLICATIONS LABORATORY

List of Experiments:

Introduction and Preview: Digital Signal Processing and Digital Signal Processors
Design space exploration: How many DSP processors and which types? How much on-chip/off-chip memory? What type of bus and other hardware components, etc. Consider timing, power, area and cost.
DSP Algorithms, TMS320C6000 Family
Code Composer Studio and the DSK
Architectural features of DSP processors (arithmetic, memory organization, pipe lining, and use of special on-chip hardware)
Amplitude quantization effects (in A/D and D/A conversion, waveform generation and digital filter implementation)
Special on-chip hardware (serial ports, host ports, and timers)
Programming of DSP processors
Optimal code generation: the most time and power efficient codes for DSP processors.
Design and implementation of FIR and IIR filters
Realization of an FIR filter (any type) to meet given specification. The input can be a signal from function generator/speech signal.
FFT usage
Impulse response of a given system of first and second order.
Real-time concepts (interrupts, critical sections, threads of execution, etc.).
Data Transfers from/to Codec
Noise removal: Add noise above 3 kHz and then remove; Interference suppression using 400 Hz tone.

Note: The experiments will be decided and modified if necessary and conducted by the faculty member concerned.

Learning Resources:

1. Dahnoun, D. Digital Signal Processors TMS320C6000. Collection of the PowerPoint Shows. Bristol : University of Bristol, 2002, Copyrighted by the Texas Instruments, Inc.
2. Chassaing, R. DSP Applications Using C and the TMS320C6x. First Edition. New York : John Wiley & Sons, Inc., 2002.
3. Porat, B. A Course in Digital Signal Processing. New York : John Wiley & Sons, Inc., 1997

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SEMINAR – I & SEMINAR - II

Oral presentation and technical report writing are two important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in the advanced fields of Communication Engineering and related topics.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects for a seminar presentation.
Literature survey
Organization of the material
Presentation of OHP slides / LCD presentation
Technical writing

Each student required to:
Submit a one page synopsis before the seminar talk for display on the notice board.
Give a 20 minutes time for presentation following by a 10 minutes discussion.
Submit a detailed technical report on the seminar topic with list of references and slides used.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule shall not be entertained.

For award of sessional marks, students are to be judged by at least two faculty members on the basis of an oral and technical report preparation as well as their involvement in the discussions.

M.E. (ECE) Program
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

PROJECT SEMINAR

The main objective of the Project Seminar is to prepare the students for the dissertation to be executed in 4th semester. Solving a real life problem should be focus of Post Graduate dissertation. Faculty members should prepare the project briefs (giving scope and reference) at the beginning of the 3rd semester, which should be made available to the students at the departmental library. The project may be classified as hardware / software / modeling / simulation. It may comprise any elements such as analysis, synthesis and design.

The department will appoint a project coordinator who will coordinate the following:

Allotment of projects and project guides.
Conduct project - seminars.

Each student must be directed to decide on the following aspects
Title of the dissertation work.
Organization.
Internal / External guide.
Collection of literature related to the dissertation work.

Each student must present a seminar based on the above aspects as per the following guidelines:
Submit a one page synopsis before the seminar talk for display on the notice board.
Give a 20 minutes presentation through OHP, PC followed by a 10 minutes discussion.
Submit a report on the seminar presented giving the list of references.

Project Seminars are to be scheduled from the 3rd week to the last week of the semester.
The internal marks will be awarded based on preparation, presentation and participation.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DISSERTATION

The students must be given clear guidelines to execute and complete the project on which they have delivered a seminar in the 3rd semester of the course.

All projects will be monitored at least twice in a semester through student's presentation. Sessional marks should be based on the grades/marks, awarded by a monitoring committee of faculty members as also marks given by the supervisor.

Efforts be made that some of the projects are carries out in industries with the help of industry coordinates.

Common norms will be established for documentation of the project report by the respective department.

The final project reports must be submitted two weeks before the last working day of the semester.
The project works must be evaluated by an external examiner and based on his comments a viva voice will be conducted by the departmental committee containing of HOD, two senior faculty and supervisor.

+ Excellent /Very Good / Good/Satisfactory / Unsatisfactory

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

ARRAY SIGNAL PROCESSING

UNIT – I

Spatial Signals: Array fundamentals. Signals in space and time. Signal models. Spatial frequency, Propagation Signal Direction Vs Spatial Frequency. Wave fields. Far field and Near field signals.

UNIT – II

Sensor Arrays: Spatial sampling, Spatial sampling theorem. Aliasing in spatial frequency domain. Sensor arrays. Uniform Linear Arrays (ULA) basic idea of Direction of Arrival using Uniform Linear Array. Array transfer (steering) vector. Array steering vector for ULA. Planar and Random Arrays. Broadband arrays.

UNIT – III

Spatial Frequency: Spatial Frequency Transform, Spatio-Temporal Filter. Spatial spectrum. Spatial Domain Filtering, Spatial smoothing, Smoothing filters, Sharpening filters. Spatially white signal.

UNIT – IV

Direction of Arrival Estimation: Conventional Beam Forming, Tapered and optimum Beam Forming, Eigen analysis, Interference cancellation, Side lobe canceller. Non parametric methods - Beam Forming and Capon methods. Resolution of Beam Forming.

UNIT – V

Subspace methods: Maximum likely hood estimation, Pisaranko's method, MUSIC, Minimum Norm and ESPRIT techniques and algorithms.

Learning Resources:

1. Don H. Johnson and Dan E. Dugeon, "Array Signal Processing: Concepts and Techniques," PHI, 2010.
2. Prabhakar S. Naidu, "Sensor Array Signal Processing," 2/e, CRC Press, 2009.
3. Simon Haykin, "Array Signal Processing," PHI, 1984.
4. Petre Stoica and Randolph L. Moses, "Spectral Analysis of Signals," PHI, 2005.

SPREAD SPECTRUM AND CDMA SYSTEMS

UNIT – I

Fundamentals of Spread Spectrum: Introduction to spread spectrum communication, pulse noise jamming, low probability of detection, direct sequence spread spectrum, frequency-hopping and time-hopping spread spectrum systems , correlation functions, spreading sequences- maximal-length sequences, gold codes, Walsh orthogonal codes- properties and generation of sequences Synchronization and Tracking: delay lock and tau-dither loops, coarse synchronization- principles of serial search and match filter techniques.

UNIT – II

Performance Analysis of SS system: Performance of spread spectrum system under AWGN, multi-user Interference, jamming and narrow band interferences
Low probability of intercept methods, optimum intercept receiver for direct sequence spread spectrum, Error probability of DS-CDMA system under AWGN and fading channels, RAKE receiver

UNIT – III

Capacity & Coverage of Spread Spectrum Multiple Access Networks: Basics of spread spectrum multiple access in cellular environments, reverse Link power control, multiple cell pilot tracking, soft and hard handoffs, cell coverage issues with hard and soft handoff, spread spectrum.

UNIT – IV

Control of Spread Spectrum Multiple Access Networks: Multiple access outage, outage with imperfect power control, Erlang capacity of forward and reverse links. Multi-user Detection -MF detector, decorrelating detector, MMSE detector. Interference Cancellation: successive, Parallel Interference Cancellation, performance analysis of multiuser detectors and interference cancellers.

UNIT – V

CDMA Systems: General aspects of CDMA cellular systems, IS-95 standard, Downlink and uplink, Evolution to Third Generation systems, WCDMA and CDMA-2000 standards, Principles of Multicarrier communication, MCCDMA and MC-DS-CDMA.

Learning Resources:

1. R. L. Peterson, R. Ziemer and D. Borth, "Introduction to Spread Spectrum Communications," PHI, 1995.
2. J. Viterbi, "CDMA - Principles of Spread Spectrum Communications," Addison-Wesley, 1997.
3. Vijay K. Garg, Kenneth Smolik, and Joseph E. Wilkes, "Applications of CDMA in Wireless/Personal Communications," PHI, 1995.
4. S. Verdu, " Multiuser Detection," Cambridge University Press, 1998
5. M. K. Simon, J. K. Omura, R. A. Scholts and B. K. Levitt, " Spread Spectrum Communications Handbook," McGraw- Hill, 1994.
6. G. R. Cooper and C. D. McGillem, "Modern Communications and Spread Spectrum," McGraw- Hill,1985.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

WIRELESS CHANNEL CODING

UNIT – I

Overview of wireless communications. Characterization of wireless channels: Path Loss and shadowing models, Statistical fading models, Narrowband/Wideband fading models. Capacity of Wireless Channels. Performance of Digital Modulation. Diversity in Fading Channels.

UNIT – II

Multiple Antenna and Space-Time Communications: Narrowband MIMO Model, Parallel Decomposition of MIMO Channel, MIMO diversity Gain: Beam forming, Space-Time modulation and coding. Frequency-Selective MIMO communications, Smart Antennas, MIMO Channel Capacity.

UNIT – III

Coding for Wireless Channels: Channel Coding and its potential. Coding in a signal space. Coded modulation and coding with interleaving. Basic error control coding & concerned mathematics. Linear block codes, Cyclic codes, BCH and Reed-Solomon codes.

UNIT – IV

Trellis representation of codes, Coding on a trellis, Convolutional Codes, Trellis coded modulation. Codes on graphs and Concatenated codes. Turbo Codes and LDPC codes.

UNIT – V

Adaptive modulation and coding: Adaptive techniques, Variable-Rate Variable-Power MQAM: adaptive rate and power techniques, Adaptive coded modulation, adaptive techniques in combined fast and slow fading.

Learning Resources:

1. Ezio Biglieri, "Coding for Wireless Channels," Springer, 2005.
2. D.Tse, and P. Viswanath, "Fundamentals of Wireless Communication," CUP, 2005.
3. A. Goldsmith, "Wireless Communications," CUP, 2005.
4. M.K. Simon and M.S. Alouini, "Digital Communication over Fading channels: A Unified approach to performance analysis," Wiley, 2000.
5. Theodore S. Rapport, "Wireless Communications- Principles and practice," 2/e, PHI, 2002.

6. M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

ADVANCED OPTICAL COMMUNICATION

UNIT – I

Solution to Maxwell's equation in a circularly symmetric step index optical fiber, linearly polarized modes, single mode and multimode fibers, concept of V number, graded index fibers, total number of guided modes (no derivation), attenuation mechanisms in fibers, dispersion in single mode and multimode fibers, dispersion shifted and dispersion flattened fibers, attenuation and dispersion limits in fibers, Kerr nonlinearity, self phase modulation, combined effect of dispersion and self phase modulation.

UNIT – II

Optical sources - LED and laser diode - Principles of operation, concepts of line width, phase noise, switching and modulation characteristics. Optical detectors - PN detector, pin detector, avalanche photodiode - Principles of operation, concepts of responsivity, sensitivity and quantum efficiency, noise in detection, typical receiver configurations (high impedance and trans-impedance receivers).

UNIT – III

Coherent systems - Homodyne and heterodyne systems, coherent systems using PSK, FSK, ASK and DPSK modulations.

UNIT – IV

Noise Effects in coherent systems: Related noise effects, performance degradation induced by laser phase and intensity noise, degradation due to fiber dispersion, degradation induced by nonlinear effects in fiber propagation.

UNIT – V

Optical amplifiers - semiconductor amplifier, rare earth doped fiber amplifier (with special reference to erbium doped fibers), Raman amplifier, Brillouin amplifier - principles of operation, amplifier noise, signal to noise ratio, gain, gain bandwidth, gain and noise dependencies, inter modulation effects, saturation induced crosstalk, wavelength range of operation.

Learning Resources:

1. John Senior, "Optical Fiber Communications: Principles and Practice," 3/e, Pearson, 2010.
2. Govind P. Agrawal, "Fiber-Optic Communication Systems," 3/e, John Wiley & Sons, 2002.
3. Gerd Keiser, "Optical Fibre Communications," 3/e, McGraw Hill, 2000.
4. John Gowar, "Optical Communication Systems," 2/e, PHI, 1993.

M.E. (ECE) Program
COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

MIMO COMMUNICATION SYSTEMS

UNIT – I

Information theoretic aspects of MIMO: Review of SISO communication - MIMO channel models - Classical i.i.d. and extended channels – Frequency selective and correlated channel models - Capacity of MIMO channels - Ergodic and Outage Capacity - Capacity bounds - Influence of channel properties on capacity.

UNIT – II

MIMO Diversity and Spatial Multiplexing: Space Time Diversity Aspects - Sources and types of diversity - analysis under Rayleigh fading – Diversity and Channel knowledge - MIMO Spatial multiplexing - Space Time receivers - ML - MMSE - ZF – Sphere decoding - BLAST receivers - DMG tradeoff in MIMO systems.

UNIT – III

Space Time Block Codes: Alamouti's code for two transmit antennas - Comparison with dual-branch receive diversity STBC based on real/complex orthogonal designs - Code Design Criteria for quasi-static Channels (Rank, Determinant and Euclidean Distance).

UNIT – IV

Orthogonal Designs: Generalized Orthogonal Designs - Quasi-Orthogonal Designs - Performance Analysis. Representation of STTC- shift register, generator matrix, state-transition diagram, trellis

UNIT – V

Space Time Trellis Codes: Diagram - Code construction. Delay diversity as a special case of STTC- Performance Analysis.

Learning Resources:

1. Paulraj R. Nabar and D. Gore, "Introduction to Space Time Wireless Communications," Cambridge University Press, 2003.
2. B.Vucetic and J. Yuan, "Space-Time Coding," John Wiley, 2003.
3. E.G. Larsson and P. Stoica, "Space-Time Block Coding for Wireless Communications," Cambridge University press.
4. H. Jafarkhani, "Space-Time Coding: Theory and Practice," Cambridge University Press.
5. D. Tse and P. Viswanath, "Fundamentals of Wireless Communication," Cambridge University Press.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

GLOBAL NAVIGATION SATELLITE SYSTEMS

UNIT – I

GPS fundamentals: INS, Trilaiteration, Hyperbolic navigation, Transit, GPS principle of operation, architecture, operating frequencies, orbits, Keplerian elements. Solar and Sidereal days, GPS and UTC Time

UNIT – II

GPS Signals: Signal structure, C/A and P-Code, ECEF and ECI coordinate systems and WGS 84 and Indian datums, Important components of receiver and specifications, link budget.

UNIT – III

GPS Error Models: Ionospheric error, Tropospheric error, Ephemeris error, Clock errors, Satellite and receiver instrumental biases, Antenna Phase center variation, multipath; estimation of Total Electron Content (TEC) using dual frequency measurements, Various DOPs, UERE. Spoofing and Anti-spoofing. : Future GPS satellites, new signals and their benefits GPS integration – GPS/GIS, GPS/INS, GPS/pseudolite, GPS/cellular.

UNIT – IV

GPS data processing, DGPS and Applications: RINEX Navigation and Observation formats, Code and carrier phase observables, linear combination and derived observables, Ambiguity resolution, cycle slips, Position estimation. principle of operation of DGPS, architecture and errors,

UNIT – V

Other Constellations and Augmentation systems Other satellite navigation constellations GLONASS and Galileo IRNS System. : Relative advantages of SBAS and GBAS, Wide area augmentation system (WAAS) architecture, GAGAN, EGNOS and MSAS. Local area augmentation system (LAAS) concept.

Learning Resources:

1. B.Hofmann Wollenhof, H.Lichtenegger, and J.Collins, "GPS Theory and Practice", Springer Wien, new York, 2000.
2. Pratap Misra and Per Enge, "Global Positioning System Signals, Measurements, and Performance," Ganga-Jamuna Press, Massachusetts, 2001.
3. Ahmed El-Rabbany, "Introduction to GPS," Artech House, Boston, 2002.
4. Bradford W. Parkinson and James J. Spilker, "Global Positioning System: Theory and Applications," Volume II, American Institute of Aeronautics and Astronautics, Inc., Washington, 1996.

RADAR SIGNAL PROCESSING

UNIT-I

Introduction: Classification of Radars based on functions, principles of operation etc., performance measures and interplay between Radar parameters, Target parameters and Environment parameters. Classical Detection and Estimation Theory, Binary Hypotheses Testing, Likely hood Ratio Test, Neymon square, MAP, Maximum Likelihood Estimation of parameters, Cramer-Rao Bounds, Chemo of Bounds.

UNIT – II

Representation of Signals, K-L expansion, Equivalent Low-pass representation of Band pass signals and noise. Detection of Slowly Fluctuating point Targets in white noise and coloured noise. Swerling Target models. Optimum receivers. Correlator and Band pass Matched Filter Receivers. PD – PF performance; Coherent and non-coherent Integration sub-optimum Reception. Radar Power – Aperture product.

UNIT – III

Range and Doppler Resolution : Ambiguity function and its properties. Local and Global Accuracy. Signal Design. LFM. Polyphase coded signals Detection of a Doppler shifted slowly fluctuating point target return in a discrete scatterer environment.

UNIT – IV

Dobly dipersive Fading Target and Clutter models-Scattering function description. Land clutter-pulse length limited and Beam width limited clutter. Sea clutter.

UNIT – V

Optimum / Sub optimum reception of Range Spread / Doppler Spread / Doubly spread targets in the presence of noise and clutter. Introduction to Adaptive Detection and CFAR Techniques.

Learning Resources:

1. Di Franco. JV and Rubin, WL., "Radar Detection", Artech House, 1980.
2. Gaspare Galati (Ed), "Advanced Radar Techniques and Systems", Peter Perigrinus Ltd., 1993.
3. Ramon Nitzberg, "Radar Signal Processing and Adaptive Systems", Artech House, 1999.
4. August. W Rihaczek, "Principles of High Resolution Radar", Artech House, 1996.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

ADAPTIVE SIGNAL PROCESSING

UNIT – I

Approaches to the development of adaptive filter theory. Introduction to filtering, smoothing and prediction. Wiener filter theory, introduction; Error performance surface; Normal equation; Principle of orthogonality; Minimum mean squared error; example.

UNIT – II

Gradient algorithms; Learning curves; LMS gradient algorithm; LMS stochastic gradient algorithms; convergence of LMS algorithms.

UNIT – III

Applications of adaptive filter to adaptive noise canceling, Echo cancellation in telephone circuits and adaptive beam forming.

UNIT – IV

Kalman Filter theory; Introduction; recursive minimum mean square estimation for scalar random variables; statement of the Kalman filtering problem: the innovations process; Estimation of state using the innovations process; Filtering examples.

UNIT – V

Vector Kalman filter formulation. Examples. Application of Kalman filter to target tracking.

Learning Resources:

1. Sophoclas, J. Orphanidies, "Optimum signal processing an introduction", McMillan, 1985.
2. Simon Haykins, "Adaptive signal processing", PHI, 1986.
3. Bernard Widrow, "Adaptive signal processing", PHI,1986.
4. Bozic. SM., Digital and kalman Filtering.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

CODECS FOR MULTIMEDIA APPLICATIONS

UNIT – I

Introduction to multimedia: components of multimedia; overview of multimedia software tools;

Graphics and Image Data Representations: Graphics/image data types, popular file formats;

Fundamental Concepts in Video: analog and digital video.

Basics of Digital Audio – Storage requirements for multimedia applications; Need for Compression - Taxonomy of compression techniques

UNIT – II

Digital audio: audio compression techniques; μ-Law and A-Law, companding, ADPCM.

Speech compression: waveform codecs; source codecs; hybrid codecs; Shorten: lossless speech compressor, MPEG-1 audio layers

UNIT – III

Image Transforms – orthogonal transforms- DCT, JPEG, progressive image compression- JBIG, JBIG2 standards , Vector quantization, Differential lossless compression –DPCM Wavelet based

compression- Filter banks, DWT, Multiresolution decomposition, SPIHT and EZW Coders, JPEG 2000 standard

UNIT –IV

Video signal components - Video compression techniques – MPEG Video Coding– Motion

Compensation – H.261 , H.263 Standard , .MPEG4 and H.264 codecs.

UNIT –V

PLL, Image Processing, FSK modems, Voice detection and reverse play back, multi-rate filters, Current trends in digital signal processors.

Learning Resources:

1. David Salomon, "Data Compression – The Complete Reference," Springer Verlag New York Inc.,3rd Edition, 2008.
2. L. Hanzo, P. J. Cherriman and J. Streit, "Video Compression and Communications From Basics toH.261, H.263, H.264,MPEG4 for DVB and HSDPA-Style Adaptive Turbo Transceivers," Second Edition, IEEE Communications Society, John Wiley & Sons Ltd, 2007.
3. Peter Symes, "Digital Video Compression," McGraw Hill Pub., 2004.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SOFTWARE DEFINED AND COGNITIVE RADIO

UNIT – I

Introduction to SDR: What is Software-Defined Radio, The Requirement for Software-Defined Radio, Legacy Systems, The Benefits of Multi-standard Terminals, Economies of Scale, Global Roaming, Service Upgrading, Adaptive Modulation and Coding, Operational Requirements, Key Requirements, Reconfiguration Mechanisms, , Handset Model, New Base-Station and Network, Architectures, Separation of Digital and RF, Tower-Top Mounting, BTS Hoteling, Smart Antenna Systems, Smart Antenna System Architectures, Power Consumption Issues, Calibration Issues, Projects and Sources of Information on Software Defined Radio,

UNIT – II

Basic Architecture of a Software Defined Radio: Software Defined Radio Architectures, Ideal Software Defined Radio Architecture, Required Hardware Specifications, Digital Aspects of a Software Defined Radio, Digital Hardware, Alternative Digital Processing Options for BTS Applications, Alternative Digital Processing Options for Handset Applications, Current Technology Limitations, A/D Signal-to-Noise Ratio and Power Consumption, Derivation of Minimum Power Consumption, Power Consumption Examples, ADC Performance Trends, Impact of Superconducting Technologies on Future SDR Systems.

UNIT – III

Signal Processing Devices and Architectures: General Purpose Processors, Digital Signal Processors, Field Programmable Gate Arrays, Specialized Processing Units, Tilera Tile Processor, Application-Specific Integrated Circuits, Hybrid Solutions, Choosing a DSP Solution. GPP-Based SDR, Non real time Radios, High-Throughput GPP-Based SDR, FPGA-Based SDR, Separate Configurations, Multi-Waveform Configuration, Partial Reconfiguration, Host Interface, Memory-Mapped Interface to Hardware, Packet Interface, Architecture for FPGA- Based SDR, Configuration, Data Flow, Advanced Bus Architectures, Parallelizing for Higher Throughput, Hybrid and Multi-FPGA Architectures, Hardware Acceleration, Software Considerations, Multiple HA and Resource Sharing, Multi-Channel SDR.

UNIT – IV

Cognitive Radio : Techniques and signal processing History and background, Communication policy and Spectrum Management, Cognitive radio cycle, Cognitive radio architecture, SDR architecture for cognitive radio, Spectrum sensing Single node sensing: energy detection, cyclostationary and wavelet based sensing- problem formulation and performance analysis based on probability of detection Vs SNR. Cooperative sensing: different fusion rules, wideband spectrum sensing- problem formulation and performance analysis based on probability of detection Vs SNR.

UNIT V

Cognitive Radio: Hardware and applications: Spectrum allocation models. Spectrum handoff, Cognitive radio performance analysis. Hardware platforms for Cognitive radio (USRP, WARP), details of USRP board, Applications of Cognitive radio

Learning Resources:

1. "RF and Baseband Techniques for Software Defined Radio" Peter B. Kenington, ARTECH HOUSE, INC, 2005.
2. "Implementing Software Defined Radio", Eugene Grayver, Springer, New York Heidelberg Dordrecht London, ISBN 978-1-4419-9332-8 (eBook) 2013.
3. "Cognitive Radio Technology", by Bruce A. Fette, Elsevier, ISBN 10: 0-7506-7952-2, 2006.
4. "Cognitive Radio, Software Defined Radio and Adaptive Wireless Systems", Hüseyin Arslan, Springer, ISBN 978-1-4020-5541-6 (HB), 2007.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DETECTION AND ESTIMATION THEORY

UNIT – I

Classical Detection Theory: Binary hypothesis testing; Baye's, Minimax and Neyman – Pearson tests. Composite hypothesis testing.

UNIT – II

Signal Detection in Discrete Time : Models and Detector structures; Detection of deterministic signals in independent noise; Detection in Gaussian noise. Detection of signals with random parameters. Detection of stochastic signals. Performance evaluation of detection procedures.

UNIT – III

Parameter Estimation: Bayesian Parameter Estimation; MMSE, MMAE and MAP estimation procedures. Non random parameter estimation, general structure. Exponential families; completeness theorem. The information inequality. Maximum likelihood Estimation (MLE). Asymptotic properties of MLE's

UNIT – IV

Signal Estimation in discrete – Time: The discrete – time Kalman – Bucy filter. Linear estimation; Orthogonality Principle. Wiener – Kolmogrov filtering; Causal and non-causal filters.

UNIT – V

Signal Detection in Continuous Time : Detection of deterministic signals in Gaussian noise; Coherent detection. Detection of signals with unknown parameters.

Learning Resources:

1. H.V. Poor, "An Introduction to Signal Detection and Estimation", Springer – Verlag, 2nd edition, 1998.
2. M.D. Srinath & P.K. Rajasekaran, "An introduction to statistical signal processing with applications", Prentice Hall, 2002.
3. H.L. Vantrees, "Detection, Estimation & Modulation Theory", Part-I, John Wiley & Sons, 1968.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

CODING THEORY AND TECHNIQUES

UNIT – I

Introduction: Digital communication system, Wireless channel statistical models, BER performance in AWGN and fading channels for different modulation schemes, BER performance of CDMA, FH – CDMA in AWGN and fading channels, capacity of fading channels with CSI, Diversity reception, channel coding Theorem, Channel coding gain.

UNIT – II

Block Coding: Galois fields, polynomials over Galois fields, RS codes, Decoding Techniques for RS codes, LDPC encoder and decoder, Performance analysis of RS and LDPC codes. BCH codes.

UNIT – III

Convolution codes: Linear convolution encoders, Structural properties of Convolution codes, Viterbi decoding technique for convolution codes – Soft / Hard decision, concatenation of block codes and convolutional codes, performance analysis, concept of Trellis coded modulation.

UNIT – IV

Turbo Codes: Parallel concatenation, Turbo encoder, Iterative decoding using BCJR algorithm, Performance analysis.

UNIT – V

Space – Time Coding: MIMO systems, MIMO fading channels, rate gain & diversity gain, transmit diversity, Alamouti scheme, OSTBC codes, Linear space – time codes, trellis space – time codes, Space – time codes with no CSI

Learning Resources:

1. S.B. Wicker, Error control systems for Digital communication and storage, Prentice-hall 1995. E. Biglieri, Coding for Wireless Channels, Springer,2007.
2. K.L.Du & M.N.S.Swamy, Wireless Communication Systems: From RF Subsystems to G Enabling Technoligies, Cambridge,2010.
3. J.G. Proakis & M. Salehi, Digital Communications, Mc Graw-Hill, 2008.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SATELLITE AND MICROWAVE COMMUNICATION

UNIT – I

Introductory concepts: Transmission problem, simplified transmission system, the decibel and basic derived decibel unit, Neper, practical transmission, speech, SNR, Noise figure and noise temperature, EIRP and conversion factors, CCITT modulation plan, loading of FDM system, pilot tones, noise calculation, through super group techniques, compandors, characteristics of carrier equipment.

UNIT – II

Line-of-sight communication systems: Link engineering, propagation characteristics in free space, path calculations, feeding, diversity reception, noise power ratio and its measurements, frequency planning. Path and link reliability, rainfall and other precipitation attenuation, radio link repeaters, antenna towers and masts, plain reflectors as passive repeaters, noise planning on radio links.

UNIT – III

Tropospheric scatter communication system: Introduction, phenomenon of tropospheric scatter, tropospheric fading, path loss calculations, aperture to medium coupling loss take of angle, equipment configuration, isolation, inter modulation, typical tropospheric scatter parameters. Frequency assignment. Earth station technology: The satellite earth space window, path loss considerations of the up-link and down path calculations.

UNIT – IV

Earth station, G/T, C/N, link calculation, C/N for the complete link, and design of communication systems via satellites, Modulation, Multiplexing and multiple access techniques: TDMA, FDMA, CDMA, SSMA, SPADE.

UNIT – V

Reliability, Redundancy, Quality assurance, Echo control and Echo suppression, introductory concepts of VSATS, GIS, GPS and Future trends, Pay load engineering – Definition, constraints, specification and configurations.

Learning Resources:

1. Roger L Free man, "Telecommunication transmission handbook", John Wiley, 4th Edition, 1998.
2. T.Pratt & C.W. Bostian, "Satellite Communication Systems", PHI, 1st edition, 1986.
2. B.G.Evans, Satellite communication system edited, 3rd edition, IET, U.K., 2008.
3. Dennis Roddy, "Satellite Communication Systems", Mc Graw Hill publications, 4th Edition, 2006.
4. Wayne Tomasi "Advanced Electronics Communication System" Pearson Education, 6th Edition, April 2003.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

SMART ANTENNAS FOR MOBILE COMMUNICATIONS

UNIT – I

Cellular Radio concepts – Spread Spectrum CDMA – Antenna Systems – Radio wave propagation – fading – Cellular CDMA – IS-95 CDMA system work – Reverse Traffic Transmission – Forward Channel Signal – Evaluation of CDMA 2000.

UNIT – II

Introduction to Smart Antennas – Spatial processing for wireless systems – Fixed beam forming networks – Switched beam systems – Adaptive Antenna Systems – Wide band Smart Antennas – Digital Radio Receiver techniques - Array calibrations.

UNIT – III

Smart Antennas Techniques for CDMA: Non Coherent CDMA – Coherent CDMA – Multi user spatial processing – Re sectoring using Smart Antennas – Down link beam forming for CDMA.

UNIT – IV

CDMA System Range and Improvements using Spatial Filtering – Range extensions in CDMA – Spatial filtering at IS-95 base station – Reverse channel performance – Spatial filtering at WLL subscriber unit – Range and Capacity Analysis.

UNIT – V

Optimal Spatial Filtering and Adaptive Algorithms – Array performance in Multipath – under loaded , over loaded adaptive arrays – Adaptive algorithms for CDMA – Multi Target Decision Directed Algorithms – Estimation Algorithms – RF position location systems.

Learning Resources:

1. Joseph C. Liberti Jr., Theodore S Rappaport, "Smart Antennas for wireless communications IS-95 and third generation CDMA applications", PTR – PH publishers, 1st edition, 1989.
2. T.S Rappaport, "Smart Antennas Adaptive arrays algorithms and wireless position location", IEEE press 1998, PTR – PH publishers 1999.
3. Garg, "IS-95 CDMA and CDMA 2000, "Cellular / PCs systems implementation", Pearson Education, 2002.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

IMAGE AND VIDEO PROCESSING

UNIT – I

Fundamentals of Image Processing and Image Transforms: Basic steps of Image Processing System, Sampling and Quantization of an image, relationship between pixels. Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Wavelet Transforms: Continuous Wavelet Transform, Discrete Wavelet Transforms.

UNIT – II

Image Processing Techniques: Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering. Image Segmentation: Segmentation concepts, Point, Line and Edge Detection. Thresholding, Region Based segmentation.

UNIT – III

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, Wavelet coding, JPEG Standards.

UNIT – IV

Basic concepts of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT – V

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

Learning Resources:

1. Gonzaleze and Woods, Digital Image Processing , 3rd ed., Pearson.
2. Yao Wang, Joem Ostermann and Ya–quin Zhang,Video processing and communication, 1st Ed., PH Int.
3. M. Tekalp, Digital Video Processing, Prentice Hall International.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DATA AND COMPUTER COMMUNICATION NETWORKS

UNIT – I

Data Communications and Networks Overview: Data Communications Model Communication Tasks, Basic concepts of Networking and Switching, Networking configurations, Protocols and Architecture, Key Elements of a Protocol, Protocols in Simplified Architecture, Protocol Data Units (PDU), Operation of a Protocol Architecture, Operation of a Protocol Architecture, Standardized Protocol Architectures, OSI and TCP/IP Architectures, Comparisons between OSI and TCP/IP, TCP/IP Addressing Concepts, concepts of Frequency, Spectrum and Bandwidth, Modem, Codec and Shannon Capacity.

UNIT – II

Line Configuration, Interfacing, Characteristics of Physical Layer Interface, Flow Control, Sliding Window Flow Control, Error control, CRC, ARQ Protocols, Data Link Control, Bit stuffing, HDLC Operation; Hierarchy of FDM schemes, WDM Operation, TDM Link Control, Hierarchy of TDM, DS-1 Transmission Format, SONET/SDH Frame Formats. Asymmetrical Digital Subscriber Line, xDSL.

UNIT – III

Circuit Switching and Packet Switching: Circuit Switching concepts, Circuit Switching applications, Circuit Switch Elements, Three Stage Space Division Switch, Blocking and Non-blocking switching, Time Division Switching, Control Signaling Functions, In Channel Signaling, Common Channel Signaling, Introduction to Signaling System Number 7 (SS7), Packet Switching Principles, Datagram and Virtual Circuit switching, Effects of variable packet size, X.25, X.25 Protocol Control Information. Routing: Routing in Circuit Switched Network, Routing in Packet Switched Network, Routing Strategies, Least Cost Algorithms, Bellman-Ford Algorithm.

UNIT – IV

LAN Architecture. Topologies, Choice of Topology, Ring and Star Usage, MAC and LLC, Generic MAC Frame Format, Bridge, Bridge Operation, Bridges and LANs with Alternative Routes, Spanning Tree, Loop resolution in bridges, Hubs, Two Level Star Topology, Layer 2 Switches, Wireless LAN, Multi cell Wireless LANs, IEEE 802.11 Architecture, IEEE 802.11 Medium Access Control logic.

UNIT – V

ATM, Architecture of ATM, Congestion Control and Quality of Service in ATM, Internetworking, IPv4, IPv6 comparison , Transport layer protocols, UDP Operation, TCP features, Flow Control, Error Control, Congestion Control, Network Management System, SNMP, SIP, and H.323 architectures, Security in the Internet, IP Security, Firewalls.

Learning Resources:

1. William Stallings, "Data and Computer Communications", Eigth Edition, Pearson Prentice Hall, 2007.
2. Behrouz A. Forouzan, "Data Communications and Networking", Fourth Edition, Tata Mc Graw Hill, 2007.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

DSP PROCESSORS – ARCHITECTURE

UNIT – I

Introduction to DSP Processors: Differences between DSP and other μp architectures, their comparison and need for special ASPs , RISC & CISC CPUs .

UNIT – II

Overview of DSP processor design: fixed point DSPs – Architecture of TMS 320C 5X, C54X Processors, addressing modes, Assembly instructions, Pipelining and on-chip peripherals. Floating point DSPs: Architecture of TMS 320 – IX.

UNIT – III

Data formats, F.P. operations, addressing modes, instructions, pipelining and peripherals.

UNIT – IV

DSP interfacing & software development tools: I/O interfacing with A/D converters, PCs, Dual port RAMS, EPGAs, DSP tools – Assembler, debugger, c-compiler, linker, editor, code composer studio.

UNIT – V

Applications using DSPs adaptive filtering, spectrum analysis, Echo cancellation modems, voice synthesis and recognition. Brief ideas of AD, Motorola DSP CPUs and their comparison with TI CPUS.

Learning Resources:

1. C. Marren & G. Ewess, "A Simple Approach to Digital Signal Processing", WILEY Inter-science, 1996.
2. K. Shin, "DSP Applications with TMS 320 Family", Prentice Hall, 1987.
3. B. Ventakaramani, M. Bhaskar, "Digital Signal Processes, Architecture Processing and Applications", Tata Mc Graw Hill, 2002.

M.E. (ECE) Program

COMMUNICATION ENGINEERING AND SIGNAL PROCESSING

STATISTICAL SIGNAL PROCESSING

UNIT – I

Optimum Linear Filters: Representation of stationary random process – Rational power spectra, Filter parameters and autocorrelation sequence. Forward and backward predictors, Reflection coefficients, AR Process and Linear Prediction. Solution of normal equations – Levinson & Durbin Algorithms, Schur Algorithm. Properties of linear prediction error filters. AR Lattice and ARMA Lattice – Ladder filters. FIR and IIR Wiener filtering and prediction.

UNIT – II

Power Spectrum Estimation: Estimation of Spectra from finite duration observation of a signal. Periodogram. DFT in power spectrum estimation. Non-parametric methods – Bartlett's welch's and Blackman-Turkey methods; Computational requirements and performance characteristics. Parametric methods – Relation between auto correlation sequence and model parameters. Methods for AR model parameters. Yule – walker, Burg and unconstrained, Least squares methods. Sequential estimation methods. Selection of AR model order; Moving average (MA) and ARMA models. Capon's minimum variance method. Pisarenko's harmonic decomposition method. Eigen structure methods – Music and ESPIRIT. Order selection criteria.

UNIT – III

Array Signal Processing: Array fundamentals – Spatial signals, Signal models, Spatial sampling. Conventional beam forming-Spatial matched filter, Tapered Beam forming. Optimum Beam forming, Eigen Analysis, Interference cancellation, sidelobe canceller. Performance considerations for optimum beam forming. Basic ideas of direction of arrival estimation using a uniform linear array. Maximum likelihood estimate. Pisarenko's method. MUSIC.

UNIT – IV

Adaptive Filters: Applications of adaptive filters-Prediction, System modeling, Interference cancellation, Channel equalization. Adaptive direct form FIR filters – MMSE extension, LMS algorithm, properties of LMS algorithm, Recursive Least Squares (RLS) algorithm and its properties. Adaptive Lattice – Ladder filters, properties of lattice – Ladder algorithm.

UNIT – V

Introduction. Moments, cumulant and polyspectra. Higher Order Moments (HOM) and LIT systems, HOM"s of linear signal methods. Blind deconvolution. Blind equalization algorithm. Conventional estimators for HOS. Parametric method for estimation of HOS – MA, AR & ARMA methods. Ceptra of HOS. Phase and magnitude retrieval from the bispectrum.

Learning Resources:

1. John G. Proakis et.al, "Introduction to Digital Signal Processing", PHI, 1997.
2. D.G. Manolakis, Ingle & S.M. Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, Int. edition, 2000.
3. John G. Proakis, Rader, et.al, "Algorithms for Statistical Signal Processing", Pearson Education, Asia Publishers, Indian edition, 2002.
4. S. Kay: Modern Spectral Estimation, "Theory & Applications", PH publication, 1st edition, 1987.
5. Simon Haykins, "Array Signal Processing", P.H. Publication 1985. (Chapters 2,3 and 4).

VASAVI COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Scheme of Instruction and Examination

M.E. (ECE EMBEDDED SYSTEMS AND VLSI DESIGN) Program

Four Semester Course (Regular)

S. No.	Subject	Periods per week		Duration (Hours)	Max. Marks		Credits
		L/T	D/P		SEM. Exam	Sessional	
Semester – I							
1.	Core	4	--	3	70	30	3
2.	Core	4	--	3	70	30	3
3.	Core / Elective	4	--	3	70	30	3
4.	Core / Elective	4	--	3	70	30	3
5.	Core / Elective	4	--	3	70	30	3
6.	Elective	4	--	3	70	30	3
7.	Lab – I	--	3	--	--	50	2
8.	Lab – II	--	3	--	--	50	2
9.	Seminar – I	--	3	--	--	50	2
Total		**24**	**9**	**--**	**420**	**330**	**24**
Semester – II							
1.	Core	4	--	3	70	30	3
2.	Core	4	--	3	70	30	3
3.	Core / Elective	4	--	3	70	30	3
4.	Core / Elective	4	--	3	70	30	3
5.	Core / Elective	4	--	3	70	30	3
6.	Elective	4	--	3	70	30	3
7.	Lab – III	--	3	--	--	50	2
8.	Lab – IV	--	3	--	--	50	2
9.	Seminar – II	--	3	--	--	50	2
Total		24	9	--	420	330	24
Semester – III							
1.	Dissertation + Project Seminar*	--	-- 6	--	--	-- 100**	-- 6
Total		--	6	--	--	100**	6
Semester – IV							
1.	Dissertation	--	--	Viva-voce	Grade***	-	10
Total		--	--	--	--	--	10

List of Subjects for ME (ECE) Program
Specialization in
EMBEDDED SYSTEMS AND VLSI DESIGN

Syllabus Ref. No	Subject
CORE SUBJECTS	
EC 5010	Micro Controllers for Embedded Systems Design
EC 5020	Digital IC Design
EC 5030	Analog IC Design
EC 5040	Mixed Signal IC Design
EC 5050	Embedded Real Time Operating Systems
EC 5060	VLSI Physical Design
EC 5011	Design and Simulation Laboratory-I
EC 5012	Embedded Systems Laboratory
EC 5013	Design and Simulation Laboratory-II
EC 5014	Embedded Systems Applications Laboratory
EC 5015	Seminar – I
EC 5016	Seminar – II
EC 5017	Project Seminar
EC 5018	Dissertation
ELECTIVE SUBJECTS	
EC 5070	Low Power VLSI Design
EC 5080	Design For Testability
EC 5090	Physics of Semiconductor Devices
EC 5100	Principles of VLSI System Design
EC 5110	Advanced Computer Organization
EC 5120	CPLD & FPGA Architectures and Applications
EC 5130	VLSI Technology
EC 5140	MEMS
EC 5150	System on Chip Architecture
EC 5160	Scripting Languages for Embedded Systems
EC 5170	VLSI Signal Processing
EC 5180	Graph Theory and Its Applications to VLSI
EC 5190	System Design and Reliability
EC 5200	Hardware-Software Co-design
EC 5210	Electromagnetic Interference & Compatibility
EC 5220	Design of Fault Tolerant Systems
EC 5230	Microwave Integrated Circuits
EC 5240	Optimization Techniques

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

MICROCONTROLLERS FOR EMBEDDED SYSTEMS DESIGN

UNIT – I

Introduction to Embedded Systems: Review of Microprocessors and their features. Differences between Microprocessors and Microcontrollers, Application areas of Embedded Systems, Categories of Embedded Systems. Overview of Embedded System Architecture, Challenges & Trends of Embedded Systems, Hardware Architecture, Software Architecture.

UNIT – II

C51 Architecture, Instruction Set, Addressing Modes, Timers and Counters, Serial Communication, Interrupt Programming in Embedded-C. Interfacing with External Memory, Expansion of I/O Ports with PPI (8255).

UNIT – III

C51 Real World Interfacing using Embedded C: ADC0804/08, DAC, LCD, Keypad, RTC, DC Motor, Stepper Motor and PWM programming.

UNIT – IV

Introduction to RISC concepts with ARM as CPU, ARM7 (LPC2148) engine Architecture, AMBA Bus, Registers, Programming Modes, Importance of Thumb Mode, CPSR, SPSR, Pipeline, Exceptions, Interrupts and vector table; Core Extensions, ARM Revisions, ARM processor families. ARM Programming Model.

UNIT – V

Embedded Software Development Tools: Host and Target Machines, cross compiler, assemblers, linkers, loaders and locators for Embedded Software
Debugging Techniques: Testing on Host Machine, JTAG, Instruction Set Simulators, Logic Analyzers; Comparative Case Study on GSM based Embedded System design with C51 Vs ARM7.

Learning Resources:

1. Mazidi M.A and Mazidi J.G, "The 8051 Microcontroller and Embedded Systems", Pearson 2007.
2. Andrew Sloss, Dominic Symes & Chris Wright, "ARM System Developer's Guide: Designing and Optimizing System Software", The Morgan Kaufmann Series 2004
3. Raj Kamal, Embedded Systems – Architecture, Programming and Design, 2nd Edition, TMH, 2008.
4. David.E.Simon, "An Embedded Software Primer" Pearson Education.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

DIGITAL IC DESIGN

UNIT – I

Building blocks for digital design: multiplexer, demultiplexer, decoder, encoder, comparator, adders, building blocks with memory: clocked building blocks, register-building blocks, RAM, ROM, PLA, PAL.

UNIT – II

Hardware description languages: hierarchical modeling concepts, modules, module instances, design and stimulus blocks: gate level, data flow, behavioral modeling techniques (Verilog), switch level modeling, delays.

UNIT – III

Combinational circuits: design of CMOS logic circuits based on the Boolean expressions. Differential CMOS circuits. Static CMOS digital latches, static random-access memory cell, d-ram cell, dynamic CMOS latches.

UNIT – IV

Synchronous and asynchronous system design techniques and their minimization, Gray - code counter, BiCMOS logic gates. Pseudo - NMOS and dynamic pre-charging. Domino-CMOS logic, no race logic, single-phase dynamic logic, differential CMOS logic, dynamic differential logic.

UNIT – V

Top down design, Finite State Machine (FSM), case studies (traffic signal controller), synchronization failure and meta stability, Algorithmic State Machines (ASMS), synthesis and test benches- using Verilog.

Learning Resources:

1. Ken Martin, "Digital Integrated Circuit Design", Oxford University Press 2000.
2. John F Wakerly, "Digital Design Principles & Practices", Pearson Education & Xilinx Design Series, 3rd Ed., 2002.
3. Samir Palnitkar, "Verilog HDL- A Guide to Digital Design and Synthesis", Prentice Hall India, 2000.
4. PROSSER AND WINKEL, The Art of Digital Design, Prentice Hall, 1994.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
ANALOG IC DESIGN

UNIT – I

Introduction: What are electronic devices and circuits - Types of electrical signals - Characteristics of analog signals - Analog functions - Devices characteristics needed to perform these functions. Discrete component approach to analog circuit - Integrated circuit approach, silicon as base material.

Integrated circuit – Components for ICs - Resistors, Capacitors, inductors diodes, BJTS, MOSFETS - Their IC architectures, limitations, circuits design philosophies - Different families of circuits device models.

Basic analog circuits - Amplifiers - Different type of loads - Biasing techniques - current mirrors - Coupling techniques between stages.

UNIT – II

Biasing techniques: Basic current mirror architecture - Specifications of current mirrors - Cascode current mirrors - Wide swing current mirrors Wilson current mirror - Degenerate current sources - peaking current sources for very low current biasing - enhanced output impedance current mirrors, Sensitivity analysis of current. Mirrors: Voltage references - VBE, VT and Zenner diode based references, Band gap reference

UNIT – III

Single stage amplifiers CS, CG, CD amplifiers with resistive, diode, current source, and current mirror loads – performance analysis of these circuits – input, output, current and voltage gains at low frequencies swing, frequency response and phase response of these amplifiers, Multistage amplifiers and biasing and swing problems. Cascode amplifiers - Folded cascade amplifiers - Swing analysis. Differential amplifiers, biasing and analysis of performance, Specifications - common and differential mode gain - common mode rejection ratio power rejection ratio, swing differential input differential output amplifier, differential input single ended output amplifier variable gain amplifiers Noise in amplifiers.

UNIT – IV

Operational amplifiers - characteristics and specifications - Two and three stage Op-Amps - analysis of gain, frequency and phase response - Coupling problems, fully differential amplifiers - Cacodes, folded cascodes - common mode feedback, and circuits, active cascade Op-Amp - current differential amplifiers – current feedback Op-Amps, - Gilbert Cells. OTAS.

UNIT – V

Oscillators and mixers: Basics of oscillators - Feedback oscillators, negative resistance oscillators, (two port oscillators), ring oscillators - Differential ring oscillators, LC oscillators, relaxation oscillators, voltage controlled oscillators, Tuning delay and frequency.

Learning Resources:

1. Paul.R. Gray & Robert G. Mayor, Analysis and Design of Analog Integrated Circuits, John Wiley & sons. 2004.
2. David Johns, Ken Martin, Analog Integrated Circuit Design,John Wiley&sons 2004.
3. Behzad Razavi, Design of Analog CMOS Integrated Circuits, TMH, 2002.
4. Jacob Baker.R.et.al.CMOS Circuit Design,IEEE Press, Prentice Hall, India, 2000.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

MIXED SIGNAL IC DESIGN

UNIT – I

Introduction: concepts involved in mixed signal circuits - Analog & digital operations by the same circuit - Digital and analog circuits on the same substrate - Problems of covering both the types of circuits on the same substrate processes involved in a circuit which has analog / digital signals at the input and digital / analog of the output – mimicking analog components by digital operations (switched capacitor circuits).

Mixed signal functions - comparators sampling and sample and hold operations - Analog to Digital conversion and Digital / Analog conversion – phase and delay locked loops.

UNIT – II

Switched Capacitor Circuits (SCR) - switched capacitor resistor analysis of current and voltage waveforms - S.C.RS in series and parallel - Power dissipation in SCRFET switches charge in injection and clock feed though effects - limitations o f SCRs. Applications of SCR for (i) filters (ii) amplifiers / buffers, Integrators, Voltage multipliers, peak detectors, modulators etc.

Comparators: Basic architecture of a comparator specifications of a comparator op amp based comparator - limitations - modified comparators for improving performance Latched comparators for high speed applications Bi-polar comparators - BiCMOS comparators.

UNIT – III

Sample and hold circuits - specifications MOS sample and hold circuits - clock feed through and charge injection problems - S/H circuits with transmission gates - high input impedance S/H circuit - S/H circuits with improved slewing - Diode bridge based S/H circuits advantages and disadvantages of bridge based S/H circuits.

Data converters: Data converter fundamentals performance characteristics - Quantization noise.

UNIT – IV

Data converters, architecture: ideal A/D and D/A converters - Nyquist rate and over sampled D/A converters, philosophy and architectures of Nyquist rate D/A and A/D converters - philosophy and architectures of over sampled converters

Nyquist rate D/A converters: Decoder based converters, binary scaled converters, thermometric code converters, hybrid converters. Nyquist rate A/D converter: Integrating converters, successive approximation converters, Flash or parallel converters two step A/D converter, Cyclic A/D converter, pipe lined A/D converter - VCO based A/D converter.

UNIT – V

Architectures of over sampled A/D converter - 1 bit A/D and D/A converters Σ - Δ modulator, noise shaping and noise shaped A/D converter idle tones and dithering - system level description of over sampled A/D and D/A converters

Phase locked loop: What is phase locked loop and its importance in communication and instrumentation electronics - Basic architecture of a PLL - Analog PLL - Digital PLL - Locking limitations - Dynamics of PLL - lock range - Capture range - phase - frequency locked loop- charge pump based PLL - components of PLLs, frequency locked loop - Delay locked loop - applications of PLLs.

Learning Resources:

1. Paul.R. Gray & Robert G. Mayor, Analysis and Design of Analog Integrated Circuits, John Wiley & sons. 2004.
2. David Johns, Ken Martin, Analog Integrated Circuit Design, John Wiley & sons. 2004.
3. Behzad Razavi, Design of Analog CMOS Integrated Circuits, Tata Mc Grah Hill. 2002.
4. Jacob Baker.R.et.al., CMOS Circuit Design, IEEE Press, Prentice Hall, India, 2000.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

EMBEDDED REAL TIME OPERATING SYSTEMS

UNIT – I

Concept of Embedded Operating Systems, Differences between Traditional OS and RTOS; Architecture of RTOS , Kernels – classifications, importance of scheduler in OS: objectives and functions; Hard versus Soft Real-time systems – examples, Jobs & Processes, timing constraints. Preemptive Vs Non preemptive kernels

UNIT – II

Task Priorities, Scheduling, Inter task Communication & Synchronization – Definition of Context Switching, Foreground ISRs and Background Tasks. Critical Section – Reentrant Functions, Inter Process Communication (IPC) – IPC through Semaphores, Mutex, Mailboxes, Message Queues or Pipes and Event Flags.

Scheduling Algorithms – RMS, Preemptive EDF scheduling – principle, comparisons.

UNIT – III

Brief Review of Unix Operating Systems; Linux Kernel 2.4 architecture – File system, Concepts of Process – creation, Process Control Block (PCB); process Vs thread; Concurrent Execution. Process Management in Linux – forks Vs Vfork; process state transitions, zombie state, Memory Management Algorithms, Shell programming. Comparison of Linux 2.6 kernel with 2.4

UNIT – IV

Device Drivers – Definition; advantages of Modules; kernel space Vs user space; Concurrency and Race Conditions; classification of device drivers - character drivers, block drivers and net drivers; shell commands for drivers; IOCTLS and Tasklets

UNIT – V

Communicating with Hardware; Interrupt Handling; Debugging Techniques; Comparison of RTOS – VxWorks, µC/OS-II and RT Linux for Embedded Applications

Learning Resources:

1. Jean J. Labrosse, "Embedded Systems Building Blocks: Complete and Ready-to-Use Modules in C", CMP Publishers Jan 1999.
2. Robert Love, "Linux Kernel Development" (3rd Edition), Novell Press 2010.
3. Jane W.S.Liu, Real Time Systems, Pearson Education, Asia, 2001.
4. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, "Linux Device Drivers", 3rd Edition,O'Reilly Media Publishers
5. Real Time Systems, C.M.Krishna and G.Shin, McGraw-Hill Companies Inc., McGraw Hill International Editions, 1997.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

VLSI PHYSICIAL DESIGN

UNIT – I

Scope of physical design – Components of VLSI – Various layers of VLSI – Typical structures of BJTS, MOSFETS, Resistors, capacitors, inductors, interconnects, brief review of technology, cost and performance analysis.

UNIT – II

Basic concepts of Physical Design - layout of basic structures – wells, FET, BJT, resistors, capacitors, contacts, vias and wires (Interconnects). Mask overlays for different structures. Parasitics – latch up and its prevention. Device matching and common centroid techniques for analog circuits

UNIT – III

Design rules – fabrication errors, alignment sequence and alignment inaccuracies, process variations and process deltas, drawn and actual dimensions and their effect on design rules– scalable design rules. Scalable CMOS (SCMOS) design rules, layout design, and stick diagrams, Hierarchical stick diagrams.

UNIT – IV

Cell concepts – cell based layout design – Wein-berger image array – physical design of logic gates – NOT, NAND and NOR – design hierarchies. System level physical design, large scale physical design, interconnect delay modeling, floor planning, routing and clock distribution.

UNIT – V

CAD Tools: Layout editors, Design rule checkers, circuit extractors – Hierarchical circuit extractors – Automatic layout tools, silicon compilers, modeling and extraction of circuit parameters from physical layout.

Learning Resources:

1. Preas, M. Lorenzatti, "Physical Design and Automation of VLSI Systems", The Benjamin-Cummins Publishers, 1998.
2. M. Shoji, "CMOS Digital Circuit Technology", Prentice Hall, 1987.
3. John P. Uyemura, Introduction to VLSI Circuits and Systems, John Wiley & sons, Inc.
4. Modern VLSI Design (System on Chip), Woyne Wolf, Pearson Education, 2002.
5. R. Jacob Baker; Harry W.Li., David E. Boyce, CMOS Circuit Design, Layout and Simulation, IEEE Press, Prentice Hall of India.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

DESIGN AND SIMULATION LABORATORY-I

Note: all the experiments are to be carried out independently by each student with different specifications. At least 12 experiments are to be carried out.

Design and simulation of combinational circuits
Design and simulation of sequential circuits
Design and simulation of mixed signal circuits
Microcontroller programming
Toggling the LEDs,
Serial data transmission,
LCD and Key pad interface

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EMBEDDED SYSTEMS AND VLSI DESIGN
EMBEDDED SYSTEMS LABORATORY

List of Experiments using Embedded C/Embedded C++:

To toggle LEDs connected to GPIOs of AT89S52 with some intentional Delay.
To design & implement 4x3 matrix Keypad Device Driver for ASCII mapping.
To design & implement 2x16 LCD Device Driver for displaying below text:
Line-1: "Welcome@ESD Lab!"
Line-2:"Enter to Proceed"
To Configure Timer0 and Timer1 for intended delay without interrupts.

To design & demonstrate the UART drivers for data transmission and data reception at 9600bps full duplex baud.
To design & implement the concept of writing Interrupt Service Routine (ISR) for external interrupt INT0, INT1.
To design & implement the concept of mixing of external ISRs with Internal ISRs and understanding the ISR handling process.
To design & implement LED Seven Segment driver with adjustable delay.
To design & implement User Centric template Menu designs in Embedded C
To design & implement User Centric template Menu designs in Embedded C++.

Suggested tools for use:

Hardware Target CPU	–	AT89S52
Embedded Software Development	–	Keil µVision4 IDE
Embedded Debugger	–	Keil µVision4 Debugger
Hardware Simulator	–	Proteus

Note: The experiments will be decided and modified if necessary and conducted by the faculty member concerned.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
DESIGN AND SIMULATION LABORATORY-II

Note: all the experiments are to be carried out independently by each student with different specifications. At least 12 experiments are to be carried out.

Synthesis of combinational circuits (4 to 6 MSI digital blocks).
Synthesis of sequential circuits (4 to 6 MSI digital blocks).
Schematic simulation, layout, DRC, LVS, parasitic extraction for cells (inverter, NAND gate, NOR gates).
Programming using real time operating systems
Multi tasking using round robin scheduling
IPC using message queues
IPC using semaphore
IPC using mail box

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
EMBEDDED SYSTEMS APPLICATIONS LABORATORY

List of Experiments using Embedded– C/Embedded C++:
Stepper Motor Interfacing
DC motor interfacing
RTC Interfacing
Watchdog Programming
SRAM CY62256 32KBSRAM interfacing
ADC0804/ADC0808 interfacing
SAR DAC0804 interfacing

Porting RTX51 Tiny RTOS and scheduling of tasks.
Porting RTX51 Full RTOS and scheduling of fast tasks, standard tasks & ISRs

Suggested tools for use :

Hardware Target CPU	–	AT89S52
Embedded Software Development	–	Keil µVision4 IDE
Embedded Debugger	–	Keil µVision4 Debugger
Hardware Simulator	–	Proteus
RTOS	–	RTX51 Tiny & RTX51 Full

Note: The experiments will be decided and modified if necessary and conducted by the lecturer concerned.

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EMBEDDED SYSTEMS AND VLSI DESIGN

SEMINAR – I & SEMINAR-II

Oral presentation and technical report writing are two important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in the advanced fields of Communication Engineering and related topics.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects for a seminar presentation.

Literature survey
Organization of the material
Presentation of OHP slides / LCD presentation
Technical writing

Each student required to:
Submit a one page synopsis before the seminar talk for display on the notice board.
Give a 20 minutes time for presentation following by a 10 minutes discussion.
Submit a detailed technical report on the seminar topic with list of references and slides used.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule shall not be entertained.

For award of sessional marks, students are to be judged by at least two faculty members on the basis of an oral and technical report preparation as well as their involvement in the discussions.

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EMBEDDED SYSTEMS AND VLSI DESIGN
PROJECT SEMINAR

The main objective of the Project Seminar is to prepare the students for the dissertation to be executed in 4th semester. Solving a real life problem should be focus of Post Graduate dissertation. Faculty members should prepare the project briefs (giving scope and reference) at the beginning of the 3rd semester, which should be made available to the students at the departmental library. The project may be classified as hardware / software / modeling / simulation. It may comprise any elements such as analysis, synthesis and design.

The department will appoint a project coordinator who will coordinate the following:
Allotment of projects and project guides.
Conduct project - seminars.
Each student must be directed to decide on the following aspects
Title of the dissertation work.
Organization.
Internal / External guide.
Collection of literature related to the dissertation work.

Each student must present a seminar based on the above aspects as per the following guidelines:

Submit a one page synopsis before the seminar talk for display on the notice board.
Give a 20 minutes presentation through OHP, PC followed by a 10 minutes discussion.
Submit a report on the seminar presented giving the list of references.

Project Seminars are to be scheduled from the 3rd week to the last week of the semester.
The internal marks will be awarded based on preparation, presentation and participation.

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EMBEDDED SYSTEMS AND VLSI DESIGN
DISSERTATION

The students must be given clear guidelines to execute and complete the project on which they have delivered a seminar in the 3rd semester of the course.

All projects will be monitored at least twice in a semester through student's presentation. Sessional marks should be based on the grades/marks, awarded by a monitoring committee of faculty members as also marks given by the supervisor.

Efforts be made that some of the projects are carries out in industries with the help of industry coordinates.

Common norms will be established for documentation of the project report by the respective department.

The final project reports must be submitted two weeks before the last working day of the semester.
The project works must be evaluated by an external examiner and based on his comments a viva voice will be conducted by the departmental committee containing of HOD, two senior faculty and supervisor.

+ Excellent /Very Good / Good/Satisfactory / Unsatisfactory

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

LOW POWER VLSI DESIGN

UNIT – I

Introduction and need of low power design, sources of power dissipation, MOS transistor leakage components, SOI technology, FinFET, Back gate FET, power and energy basics, power dissipation in CMOS circuits, Energy-delay product as a metric, design strategies for low power.

UNIT – II

Power Estimation Techniques: Circuit Level – Modeling of Signals, Signal Probability Calculations, Statistical techniques; High Level Power Analysis – RTL Power Estimation, Fast Synthesis, Analytical Approaches, Architectural Power Estimation.

UNIT – III

Power Optimization Techniques – I: Dynamic Power Reduction – Dynamic Power Component, Circuit Parallelization, Voltage Scaling Based Circuit Techniques, Circuit Technology – Independent Power Reduction, Circuit Technology Dependent Power Reduction; Leakage Power Reduction – Leakage Components, Design Time Reduction Techniques, Run-time Stand-by Reduction Techniques, Run-time Active Reduction Techniques Reduction in Cache Memories.

UNIT – IV

Power Optimization Techniques – II: Low Power Very Fast Dynamic Logic Circuits, Low Power Arithmetic Operators, Energy Recovery Circuit Design, Adiabatic – Charging Principle and its implementation issues.

Software Design for Low Power: Sources of Software Power Dissipation, Software Power Estimation, Software Power Optimizations, Automated Low-Power Code Generation, Co-design for Low Power.

UNIT V

Introduction to bio-medical signals – ECG, EEG, EMG; Amplifiers for bio-signals, Frequency Ranges of Various bio-Signals, Leakage current reduction in medical devices, Signal conditioning and data acquisition.

Learning Resources:

1. Kaushik Roy and Sharat Prasad, Low-Power CMOS VLSI Circuit Design, Wiley Inter-science Publications, 2000.
2. Christian Piguet, Low Power CMOS Circuits Technology, Logic Design and CAD Tools, 1st Indian Reprint, CRC Press, 2010.
3. David Prutchi and Michael Norris, Design And Development of Medical Electronic Instrumentation, John Wiley & Sons, 2005.
4. J. Rabaey, Low Power Design Essentials, 1st Edition, Springer Publications, 2010.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

DESIGN FOR TESTABILITY

UNIT – I

Introduction to Test and Design for Testability (DFT) Fundamentals.
Modeling: Modeling digital circuits at logic level, register level and structural models. Levels of modeling.
Logic Simulation: Types of simulation, Delay models, Element evaluation, Hazard detection, Gate level event driven simulation.

UNIT – II

Fault Modeling – Logic fault models, Fault detection and redundancy, Fault equivalence and fault location. Single stuck and multiple stuck – Fault models. Fault simulation applications, General techniques for Combinational circuits.

UNIT – III

Testing for single stuck faults (SSF) – Automated test pattern generation (ATPG/ATG) for SSFs in combinational and sequential circuits, Functional testing with specific fault models. Vector simulation – ATPG vectors, formats, Compaction and compression, Selecting ATPG Tool.

UNIT – IV

Design for testability – testability trade-offs, techniques. Scan architectures and testing – controllability and absorbability, generic boundary scan, full integrated scan, storage cells for scan design. Board level and system level DFT approaches. Boundary scan standards. Compression techniques – different techniques, syndrome test and signature analysis.

UNIT – V

Built-in self-test (BIST) – BIST Concepts and test pattern generation. Specific BIST Architectures – CSBL, BEST, RTS, LOCST, STUMPS, CBIST, CEBS, RTD, SST, CATS, CSTP, BILBO. Brief ideas on some advanced BIST concepts and design for self-test at board level. Memory BIST (MBIST): Memory test architectures and techniques – Introduction to memory test, Types of memories and integration, Embedded memory testing model. Memory test requirements for MBIST. Brief ideas on embedded core testing.

Learning Resources:

1. Miron Abramovici, Melvin A. Breur, Arthur D. Friedman, Digital Systems Testing and Testable Design, Jaico Publishing House, 2001.
2. Alfred Crouch., Design for Test for Digital ICs & Embedded Core Systems, Prentice Hall.
3. Robert J. Feugate, Jr., Steven M. Mentyn, Introduction to VLSI Testing, Prentice Hall, Englehood Cliffs, 1998.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

PHYSICS OF SEMICONDUCTOR DEVICES

UNIT – I

Properties of Semiconductors: Crystal Structure Energy Bands, Carrier Transport Phenomena. (Mobility of Carriers, Resistivity and Hall Effect, Generation – Recombination Processes). High Field Phenomena. Gunn Effect and Negative Resistance Characteristics. Basic Equation for Describing Current Flow.

UNIT – II

Bipolar Devices: Ideal P-N Junctions, V-I Characteristics, Effect of Generation – Recombination Processes. Effect of High Injection. Junction Breakdown, Depletion and Diffusion Capacitance. Hetero Junctions. Bipolar Transistor – Characteristics – Equivalent Circuit - Ebers - Moll Model – Gummel Poon Model, Microwave and High Frequency Transistor Structures – Breakdown of Transistors including Secondary Breakdown.

UNIT – III

Field Effect Transistors – JFET, MESFET – Characteristics.
MOSFET and MISFET: MOS Diode – Capacitance Vs Voltage Curves. Interface Trapped Charges – oxide Charge. V-I Characteristics of MIS Diodes with Thin Insulating Films. MOS/MISFET – Different Types – Basic device Characteristics – Sub-threshold Region Characteristics – Buried Channel Devices.

UNIT – IV

Short Channel Effects – On sub-threshold Current, On Threshold Voltage – On the Structures – Shallow Junctions – Breakdown Voltage – Band Gap Engineering – Thin Film Transistor – Silicon On Insulator (SOI) Devices.

UNIT – V

Floating Gate Devices for Non-volatile Memories. MIOS Devices – Gallium Arsenide Devices – Gunn Devices (or Transferred Electron Devices TEDS) – Functional Devices for Microwave Oscillators. LEDS and Laser Diodes.

Learning Resources:

1. S.M. Sze, Physics of Semiconductor Devices, John Wiley & Sons, 1981.
2. Dewitt G. ONG., Modern MOS Technology: Processes, Devices and Design,Mc. Graw Hill Book Company. 1984.
3. CHEN , VLSI Hand book, CRC Press, IEEE Press, 2000.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
PRINCIPLES OF VLSI SYSTEM DESIGN

UNIT – I

Introduction to VLSI System design hierarchical design – design abstraction – different levels of abstraction and domains. Computer aided design VLSI design flow– technology implications and economics, issues connected with technology defect densities yield and die size, components of chips cost.

UNIT – II

Static and dynamic CMOS circuits, circuit characterizations and performance estimation: Resistance, Capacitance and Inductance – delay estimations power dissipation static and dynamic, design margining – reliability issues.

UNIT – III

CMOS design methods: Structured design strategies – Hierarchy, regularity modularity, chip design options: Programmable logic, logic structures: gate arrays, sea – of gate and gate array and standard cell based designs- standard cell libraries including I/O and ESD protection structures, design re- use and full custom mask design.

UNIT – IV

CMOs sub system design: Adders and Subtractors fast adders like carry by pass carry select and carry look ahead adders Multipliers, array and fast multipliers – Parity Generators - Zero-One Detectors – Binary Counters – Multiplexers – shifters – memory elements

UNIT – V

CMOs System case study: Core of RISC Micro Controller ALU address architectures, Instruction sets pipelining major blocks of the processor and 6 Bit Flash A/D Converter – high speed comparators and thermometer code converter.

Learning Resources:

1. Weste Kamran Eshraghian, Principles of CMOS VLSI design – a Systems Perspective by NEILHE, Pearson Education Series, Asia, 2002.
2. Wolf, Modern VLSI Design, Pearson Education Series, 2002.
3. Jean M. Rabey, " Digital Integrated Circuits", Prentice Hall India, 2003

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

ADVANCED COMPUTER ORGANIZATION

UNIT – I

Processor Design: CPU Organization, Data Representation, Instruction Formats, Data Path Design: Fixed Point Arithmetic and Floating Point Arithmetic, Instruction Pipelining, Super Scalar techniques, Linear pipeline processors, Super scalar and super pipeline design, Multi vector and SIMD computers.

UNIT – II

Control Unit Design: Basic Concepts: Hardwired Control Unit Design approach, Micro-programmed Control Unit Design Approach, Micro program sequencer, Case studies based on both the approaches.

UNIT – III

Memory Organization: Internal memory, computer memory system overview, the memory Hierarchy, Random access memories, Cache memory, Elements of cache design, Virtual memory- protection and examples of virtual memory, Replacement Policies.

UNIT – IV

I-O Organization: Accessing I/O Devices, Programmed I-O, Interrupts, DMA, Bus Arbitration; Synchronous bus and asynchronous bus, Interface circuits, Parallel port, Serial port, standard I/O interfaces, IO Processor, PCI bus, SCSI bus, USB bus protocols.

UNIT – V

Parallel Computer Systems: Instruction Level Parallelism (ILP) – Concept and Challenges, Dynamic Scheduling, Limitations on ILP, Thread Level Parallelism, Multi-processors – Characteristics, Symmetric and Distributive Shared Memory Architecture, Vector Processors and Super computers.

Learning Resources:

1. William Stallings, Computer Organization and Architecture designing for Performance, 7th edition, PHI, 2007.
2. Carl Hamacher, Vranesic, Zaky, Computer Organization, 5th edition, MGH.
3. Hayes John P; Computer Architecture and organization; 3rd Edition, MGH, 1998.
4. John L. Hennessy and David A. Patterson, Computer Architecture – A quantitative Approach, 3rd Edition, Elsevier, 2005.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
CPLD & FPGA ARCHITECTURES AND APPLICATIONS

UNIT – I

Programmable logic: Programmable read only memory (prom), Programmable Logic Array (PLA), Programmable Array Logic (PAL). Sequential Programmable Logic Devices (SPLDs). Programmable Gate Arrays (PGAs), CPLD and FPGA, design flow using FPGA, programming technologies.

UNIT – II

FPGAs: Field Programmable Gate Arrays – Logic blocks, routing architecture, Logic cells and features of commercially available FPGA's- XILINX XC4000, Virtex-II FPGA's, XILINX SPARTAN II, Alteras Act1, Act2, Act3 FPGA's, Actel FPGA's, AMD FPGA.

UNIT – III

CPLD's: complex programmable logic devices, logic block, I/O block, interconnect matrix, logic blocks and features of Altera flex logic 10000 series CPLD's , max 7000 series CPLD's, AT & T – ORCA's (Optimized Reconfigurable Cell Array), Cypres flash 370 device technology, lattice PLSI's architectures.

UNIT – IV

Placement: objectives, placement algorithms: Mincut-Based placement, iterative improvement placement, simulated annealing.
Routing: objectives, segmented channel routing, Maze routing, Routability estimation, Net delays, computing signal delay in RC tree networks.

UNIT – V

Digital Front End and back End tools for FPGAs & ASICs, FPGA implementation steps.
Verification: introduction, logic simulation, design validation, timing verification.
Testing concepts: failures, mechanisms and faults, fault coverage, ATPG methods, programmability failures.

Learning Resources:

1. P.K. Chan & S. Mourad, Digital Design Using Field Programmable Gate Array, Pearson Education 2009.
2. S. Trimberger, Edr., Field Programmable Gate Array Technology, Kluwer Academic Publications, 1994.
3. J. Old Field, R. Dorf, Field Programmable Gate Arrays, John Wiley & Sons, Newyork, 1995.
4. S. Brown, R. Francis, J. Rose, Z.Vransic, Field Programmable Gate array, Kluwer Publn, 1992.
5. Manuals from Xilinx, Altera, AMD, Actel.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
VLSI TECHNOLOGY

UNIT – I

Introduction – Integrated Circuits Review of history of VLSI technology progress–. Electronic Functions – Components – Analog and Digital ICs. Basic Devices in ICs – Structures Resistors – Capacitors – Inductors. Diodes – Bipolar Junction Transistors – Field Effect Transistors. Isolation techniques in MOS and bipolar technologies.

UNIT – II

Monolithic ICs – Silicon as the Base Material and its advantages, various Layers of ICs – Substrate – Active Layer -Oxide/Nitride Layers – Metal/Poly Silicon Layers – Functions of Each of the Layers. Process Flow for Realization of Devices. Description of Process Flow for Typical Devices viz., FET and BJT.

UNIT – III

Silicon Wafer Preparation – Electronic Grade Silicon – CZ and FZ Methods of Single Crystal Growth – Silicon Shaping – Mechanical Operations, Chemical Operations – Prefabrication Processes.

Epitaxy: Growth Dynamics – Process Steps. Vapour phase, Solid phase and Molecular Beam Epitaxial Processes. Epitaxial Reactors.

Oxide Growth: Structure of SiO2, Growth Mechanism and Dynamics – Oxide Growth by Thermal method.

UNIT – IV

Deposition techniques Chemical Vapour Deposition (CVD) and associated methods like LPCVD and PECVD. PVD thermal evaporation and sputtering. Step coverage issues.

Lithography: Steps involved in Photolithography – Quality of the Pattern – photo resists and their characteristics, optical exposure systems contact and projection systems, steppers, X-ray – Electron Beam Lithography.

Etching: Chemical, Electro Chemical – Plasma (Dry Etching) Reactive Plasma Etching.

UNIT – V

Ion implantation: Range and Penetration Depth – Damage and Annealing – Ion Implantation machine.

Diffusion: Constant and Infinite Source Diffusions – Diffusion Profiles – Diffusion Systems – Multiple Diffusions and Junction Formations. Packaging: die and Bonding and Packaging, Testing. Clean rooms and their importance in VLSI technology

Learning Resources:

1. S.M. Sze, VLSI Technology, Mc Grawhill International Editions.
2. CY Chang and S.M. SZe , VLSI Technology, Tata Mc Graw-Hill Companies Inc.
3. J.D. Plummer, M.D. Deal and P.B. Griffin ,The Silicon VLSI Technology Fundamentals, Practice and modeling, Pearson Education 2009
4. Stephen A, The Science and Engineering of Microelectronic Fabrication, Campbell Oxford 2001.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
MEMS

UNIT – I

Introduction, Basic Structures of MEM Devices – (Canti Levers, Fixed Beams diaphragms). Broad Response of MEMS to Mechanical (force, pressure etc.) Thermal, Electrical, Optical and Magnetic stimuli, Compatibility of MEMS with VLSI Applications in Electronics, Broad Advantages and Disadvantages of MEMS from the point of Power Dissipation, Leakage etc.

UNIT – II

Review of Mechanical Concepts like Stress, Strain, Bending Moment, Deflection Curve. Differential equations describing the Deflection under Concentrated Force, Distributed Force, Deflection Curves for Canti Levers – Fixed beam. Electrostatic Excitation – Columbic Force between the Fixed and Moving Electrodes. Deflection with voltage in C.L, Deflection Vs Voltage Curve, Critical Deflection, Description of the above wrt. Fixed Beams. Fringe Fields – Field Calculations using Laplace Equation. Discussion on the Approximate Solutions – Transient Response of the MEMS.

UNIT – III

Two Terminal MEMS – capacitance Vs Voltage Curve – Variable Capacitor. Applications of Variable Capacitors. Two Terminal MEM Structures. Three Terminal MEM structures – Controlled Variable Capacitors – MEM as a Switch and Possible Applications

UNIT – IV

MEM Circuits & Structures for Simple GATES – AND, OR, NAND, NOR, Exclusive OR, simple MEM Configurations for Flip-Flops Triggering, Applications to Counters, Converters. Applications for Analog Circuits like Frequency Converters, Wave Shaping. RF Switches for Modulation. MEM Transducers for Pressure, Force Temperature. Optical MEMS.

UNIT – V

MEM Technologies: Silicon Based MEMS – Process Flow – Brief Account of Various Processes and Layers like Fixed Layer, Moving Layers, Spacers etc., Etching Technologies. Metal Based MEMS: Thin and Thick Film Technologies for MEMS. PROCESS flow and Description of the Processes. Status of MEMS in the Current Electronics scenario.

Learning Resources:

1. Gabriel.M. Reviez, R.F. MEMS Theory, Design and Technology, Thon Wiley & Sons, 2003.
2. Thimo Shenko, Strength of Materials, CBS Publishers & Distributors.
3. K. Pitt, M.R. Haskard, Thick Film Technology and Applications, 1997.
4. Wise K.D. (Guest Editor), "Special Issue of Proceedings of IEEE", Vol.86, No.8, Aug 1998.
5. Ristic L. (Ed.) Sensor Technology and Devices, Artech House, London 1994.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

SYSTEM ON CHIP ARCHITECTURE

UNIT – I

Introduction to Processor Design: Abstraction in Hardware Design, MUO a simple processor, Processor design trade off, Design for low power consumption. ARM Processor as System-on- Chip: Acorn RISC Machine – Architecture inheritance – ARM programming model – ARM development tools – 3 and 5 stage pipeline ARM organization – ARM instruction execution and implementation – ARM Co-processor interface.

UNIT – II

ARM Assembly Language Programming: ARM instruction types – data transfer, data processing and control flow instructions – ARM instruction set – Co-processor instructions. Architectural Support for High Level Language: Data types – abstraction in Software design – Expressions – Loops – Functions and Procedures – Conditional Statements – Use of Memory.

UNIT – III

Memory Hierarchy: Memory size and speed – On-chip memory – Caches – Cache design- an example – memory management.
Architectural Support for System Development: Advanced Microcontroller bus architecture – ARM memory interface – ARM reference peripheral specification – Hardware system prototyping tools – Armulator – Debug architecture.

UNIT – IV

Architectural Support for Operating System: An introduction to Operating Systems – ARM
System control coprocessor – CP15 protection unit registers – ARM protection unit – CP15
MMU registers – ARM MMU Architecture – Synchronization – Context Switching input and output.

UNIT – V

System in Package Design: Advantages and disadvantages between SoC, SiC and board level design; SiP Design flow, System Planning, Chip-Package co-design, System Optimization; SiP Design Layout, Simulation, Verification; Gaps in SiP Design, Power optimization tools, Parasitic extraction tools, Signal Integrity.
Examples of SiP.

Learning Resources:

1. Steve Furber, ARM System on Chip Architecture, 2nd ed., Addison Wesley Professional, 2000.
2. Ricardo Reis, Design of System on a Chip: Devices and Components, 1st ed., Springer, 2004.

3. Jason Andrews, Newnes, Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) , BK and CDROM.
4. Prakash Rashinkar, System on Chip Verification – Methodologies and Techniques, Peter Paterson and Leena Singh L ,Kluwer Academic Publishers, 2001.
5. System in Package (SiP) – A review, Technical Review-I, R&D Cell, Vasavi College of Engineering, Ibrahimbagh, Hyderabad, Telangana.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
SCRIPTING LANGUAGES FOR EMBEDDED SYSTEMS

UNIT – I

Overview of scripting languages-PERL, file handles, operators, control structures, regular expressions, built in data types, operators, statements and declarations-simple, compound, loop statements, global and scoped declarations.

UNIT – II

Pattern matching-regular expression, pattern matching operators, character classes, positions, capturing and clustering.

UNIT – III

Subroutines- syntax, semantics, proto types, format variables, references, data structures- arrays of arrays, hashes of arrays, hashes of functions.
Inter process communication-signals, files, pipes, sockets.

UNIT – IV

Threads- process model, thread model, Perl debugger- using debugger commands, customization, internals and externals, internal data types, extending Perl, embedding Perl, exercises for programming using Perl.

UNIT – V

Other languages: Broad features of other scripting languages SKILL, CGI, java script, VB script.

Learning Resources:

1. Larry Wall, Tom Christiansen, John Orwant, "programming perl", oreilly publications, 3rd edition.
2. Randal L, Schwartz Tom Phoenix, "Learning PERL", Oreilly publications.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
VLSI SIGNAL PROCESSING

UNIT – I

Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms. Pipelining and Parallel Processing: Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power, Retiming: Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques

UNIT – II

Folding and Unfolding, Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems, Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT – III

Systolic Architecture Design: Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT – IV

Fast Convolution: Introduction – Cook-Toom Algorithm – Winograd algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT – V

Low Power Design: Scaling Vs Power Consumption –Power Analysis, Power Reduction techniques – Power Estimation Approaches, Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing

Learning Resources:

1. Keshab K. Parthi, VLSI Digital Signal Processing- System Design and Implementation –1998, Wiley Inter Science.
2. Kung S. Y, H. J. While House, T. Kailath, VLSI and Modern Signal processing, 1985, Prentice Hall.
3. Jose E. France, Yannis Tsividis, Design of Analog – Digital VLSI Circuits for Telecommunications and Signal Processing –1994, Prentice Hall.
4. Medisetti V. K ,VLSI Digital Signal Processing , IEEE Press (NY), USA, 1995.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
GRAPH THEORY & ITS APPLICATIONS TO VLSI

UNIT – I

Introduction: Basic definitions, results and examples relating to Graph theory, self-complementing graphs and properties of graphs, Trees, Spanning tree & directed graphs.

UNIT – II

Definitions of strongly, weakly, unilaterally connected graphs and deadlocks. Metric representation of graphs. Classes of graphs: standard results relating to characterization of Hamiltonian graphs, standard theorems

UNIT – III

Self-centered graphs and related theorems. Chromatic number vertex and edge – application to coloring, linear graphs, Euler's formula.

UNIT – IV

Graph algorithms: DFS – BFS algorithms, min. spanning tree and max. spanning tree algorithm. Directed graphs algorithms for matching, properties flow in graph and algorithms for max flow. PERT-CPM, complexity of algorithms, P-NP – NPC – NP hard problems and examples.

UNIT – V

Linear integer and dynamic programming: Conversions of TSP, max. flow, shortest path problems. Branch bound methods, critical path and linear programming conversion. Floor shop scheduling problem, personal assignment problem, dynamic programming - TSP – best investment problems.

Learning Resources:

1. C. Papadimitriou & K. Steiglitz, Combinational Optimization Prentice Hall, 1982.
2. H. Gerej, Algorithms for VLSI Design Automation, John Wiley, 1992.
3. B. Korte & J. Vygen, Combinational Optimization, Springer Verilog, 2000.
4. G.L. Nemhauser & AL Wolsey, Integer & Combinatorial Optimization, John Wiley,1999.
5. W.J. Cook et al, "Combinational optimization", John Wiley,2000.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
SYSTEM DESIGN AND RELIABILITY

UNIT – I

System design aspects- Structure of systems in general-hardware, software components, testability of systems, and design of systems from testability point of view.

UNIT – II

System Reliability: Electronic system reliability prediction, Reliability in electronic system design; software errors, software structure and modularity, fault tolerance, software reliability, prediction and measurement, hardware/software interfaces. Test environments, testing for reliability and durability, failure reporting,

UNIT – III

Concepts of MTBF Maintainability and Availability. Maintainability and its equation. Factors Affecting maintainability. Measures of, Maintainability, Mean Down Time, Availability Intrinsic availability equipment availability & Mission availability. Replacement processes and Policies.

UNIT – IV

Reliability of electronic components, component types and failure mechanisms,: Evaluation of reliability of electronic components like integrated circuits. Life cycle of electronic components, bath tub curve. Accelerated life tests for components, reliability screening procedures, burn in test. Standards for reliability evaluation and screening at component level.

UNIT – V

System level reliability testing, - Reliability evaluation and screening procedures at system level. Life tests for systems, accelerated testing reliability costs, Standards for system level reliability evaluation and screening.

Learning Resources:

1. Kailash C. Kapur, Michael Pecht, Reliability Engineering, Wiley, 2014.
2. Patrick D.T. O' Connor, David Newton and Richard Bromley, Practical Reliability Engineering, 4/e , John Wiley & Sons, 2002.
3. Elmer Eugene Lewis, Introduction to Reliability Engineering, 2/e, Wiley International, 1996.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN

HARDWARE – SOFTWARE Co-DESIGN

UNIT –I

Co- Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology. Co- Synthesis Algorithms: Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT –II

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure.
Target Architectures:
Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT –III

Compilation Techniques and Tools for Embedded Processor Architectures:
Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT –IV

Design Specification and Verification:
Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification

UNIT –V

Languages for System – Level Specification and Design-I:
System – level specification, design representation for system level synthesis, system level specification languages, Languages for System – Level Specification and Design-II: Heterogeneous specifications and multi language co-simulation, the cosyma system and lycos system.

Learning Resources:

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf –2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, 2002, Kluwer Academic Publishers.
3. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont - 2010 – Springer

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

UNIT – I

Introduction and Sources of EMI: EMI/EMC concepts and definitions, Sources of EMI, conducted and radiated EMI, Transient EMI, Time domain Vs Frequency domain EMI, Units of measurement parameters, Emission and immunity concepts, ESD.

UNIT – II

Types of Electromagnetic Coupling: Conducted, Radiated and Transient Coupling, Common Impedance Ground Coupling, Radiated Common Mode and Ground Loop Coupling, Radiated Differential Mode Coupling, Near78 Field Cable to Cable Coupling, Power Mains and Power Supply coupling.

UNIT – III

EMI Measurements: EMI Shielded Chamber, Open Area Test Site, TEM Cell, GTEM cell Sensors/ Injectors/ Couplers, LISN, voltage probe, Current probe Test beds for ESD and EFT.

UNIT – IV

EMI Mitigation Techniques: Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting.

UNIT – V

EMC System Design: PCB Traces Cross Talk, Impedance Control, Power Distribution Decoupling, Zoning, Motherboard Designs and Propagation Delay Performance Models.

Learning Resources:

1. V.P.Kodali, "Engineering EMC Principles, Measurements and Technologies", IEEE Press, 1996
2. Henry W.Ott, "Noise Reduction Techniques in Electronic Systems", 2nd Edition, John Wiley and Sons, NewYork. 1988.
3. C.R.Paul, "Introduction to Electromagnetic Compatibility", John Wiley and Sons, Inc, 2006.
4. Bernhard Keiser, "Principles of Electromagnetic Compatibility", Artech house, 3rd Ed, 1986.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
DESIGN OF FAULT TOLERANT SYSTEMS

UNIT – I

Fault Tolerant Design: Basic concepts: Reliability concepts, Failures & faults, Reliability and Failure rate, Relation between reliability and mean time between failure, maintainability and availability, reliability of series, parallel and parallel-series combinational circuits.

Fault Tolerant Design: Basic concepts-static, dynamic, hybrid, triple modular redundant system (TMR), 5MR reconfiguration techniques, Data redundancy, Time redundancy and software Redundancy concepts.

UNIT – II

Self Checking circuits & Fail safe Design: Self Checking Circuits: Basic concepts of self checking circuits, Design of Totally self checking checker, Checkers using m out of n codes, Berger code, Low cost residue code.

Fail Safe Design: Strongly fault secure circuits, fail safe design of sequential circuits using partition theory and Berger code, totally self checking PLA design.

UNIT – III

Design for Testability: Design for testability for combinational circuits: Basic concepts of Testability, Controllability and observability, The Reed Muller's expansion technique, use of control and syndrome testable designs.

Design for testability by means of scan: Making circuits Testable, Testability Insertion, Full scan DFT technique- Full scan insertion, flip-flop Structures, Full scan design and Test, Scan Architectures-full scan design, Shadow register DFT, Partial scan methods, multiple scan design, other scan designs.

UNIT – IV

Logic Built-in-self-test: BIST Basics-Memory-based BIST,BIST effectiveness, BIST types, Designing a BIST, Test Pattern Generation-Engaging TPGs, exhaustive counters, ring counters, twisted ring counter, Linear feedback shift register, Output Response Analysis-Engaging ORA's, One's counter, transition counter, parity checking, Serial LFSRs, Parallel Signature analysis, BIST architectures-BIST related terminologies, A centralised and separate Board-level BIST architecture, Built-in evaluation and self test(BEST), Random Test socket(RTS), LSSD On-chip self test, Self –testing using MISR and SRSG, Concurrent BIST, BILBO, Enhancing coverage, RT level BIST design-CUT design, simulation and synthesis, RTS BIST insertion, Configuring the RTS BIST, incorporating configurations in BIST, Design of STUMPS, RTS and STUMPS results.

UNIT – V

Standard IEEE Test Access Methods: Boundary Scan Basics, Boundary scan architecture- Test access port, Boundary scan registers, TAP controller, the decoder unit, select and other units, Boundary scan Test Instructions-Mandatory instructions, Board level scan chain structure-One serial scan chain, multiple-scan chain with one control test port, multiple-scan chains with one TDI,TDO but

multiple TMS, Multiple-scan chain, multiple access port, RT Level boundary scan-inserting boundary scan test hardware for CUT, Two module test case, virtual boundary scan tester, Boundary Scan Description language.

Learning Resources:

1. Fault Tolerant & Fault Testable Hardware Design- Parag K.Lala, 1984,PHI.
2. Digital System Test and Testable Design using HDL models and Architectures - Zainalabedin Navabi, Springer International Edition.
3. Digital Systems Testing and Testable Design-Miron Abramovici, Melvin A.Breuer and Arthur D. Friedman, Jaico Books.
4. Essentials of Electronic Testing- Bushnell & Vishwani D.Agarwal, Springers.
5. Design for Test for Digital IC's and Embedded Core Systems- Alfred L. Crouch, 2008, Pearson Education.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
MICROWAVE INTEGRATED CIRCUITS

UNIT – I

MIC Technology – Thick film and Thin film technology. Hybrid MIC's. Monolithic MIC technology.

UNIT – II

Analysis of stripline and microstripline. Method of conformal Transformation. Characteristic parameters of strip. Microstrip lines. Microstrip Circuit Design. Impedance transformers. Filters, Lumped constant Microstrip circuits.

UNIT – III

Coupled Microstrips and Directional couplers. Even and odd mode analysis. Theory of couled microstrip Directional couplers. Calculations for a coupled pair of Microstrips. Branch line couplers.

UNIT – IV

Lumped Elements for MIC's Design and fabrication of lumped elements, circuits using lumped elements.

UNIT – V

Nonreciprocal components for MIC's Microstrip on Ferrimagnetic substrates, Microstrip circulators. Isolators and phase shifters. Design of microstrip circuits – high power and low power circuits.

Learning Resources:

1. Gupta KC, and Amarjit Singh, Microwave Integrated circuits, Wiley Eastern,1974.
2. Leo Young, Advances in Microwaves, Academic Press.
3. Bharathi Bhat,and S.K. Koul "stripline-like transmission lines for microwave integrated circuits, New age international ,2007.

M.E. (ECE) PROGRAM
EMBEDDED SYSTEMS AND VLSI DESIGN
OPTIMIZATION TECHNIQUES

UNIT – I

Use of optimization methods. Introduction to classical optimization techniques, motivation to the simplex method, simplex algorithm, sensitivity analysis.

UNIT – II

Search methods - Unrestricted search, exhaustive search, Fibonocci method, Golden section method, Direct search method, Random search methods, Univariate method, simplex method, Pattern search method.

UNIT – III

Descent methods, Gradient of function, steepest decent method, conjugate gradient method. Characteristics of constrained problem, Direct methods, The complex method, cutting plane method.

UNIT – IV

Review of a global optimization techniques such as Monte Carlo method, Simulated annealing and Tunneling algorithm.

UNIT – V

Generic algorithm - Selection process, Crossover, Mutation, Schema theorem, comparison between binary and floating point implementation.

Learning Resources:

1. SS Rao, "Optimization techniques", PHI, 1989.
2. Zhigmiew Michelewicz, "Genetic algorithms + data structures = Evaluation programs", Springer Verlog - 1992.
3. Merrium C. W., "Optimization theory and the design of feedback control systems", McGraw Hill, 1964.
4. Weldo D.J., "Optimum seeking method", PHI, 1964.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
M.E. (EEE) Program
SCHEME OF INSTRUCTION & EXAMINATION

M.E. (Power Systems & Power Electronics)
Four-Semester Course (Full-Time)

S. No	Syllabus Ref. No	Subject	Periods Per Week		End Exam Duration(Hrs.)	Max. Marks		Credits
			L/T	D/P		Sem. Exam	Sessional	
SEMESTER-I								
1	EE5010	Core	4	-	3	70	30	03
2	EE5020	Core	4	-	3	70	30	03
3	EE5030	Core	4	-	3	70	30	03
4		Elective	4	-	3	70	30	03
5		Elective	4	-	3	70	30	03
6		Elective	4	-	3	70	30	03
7	EE5221	Computer Simulation Lab	-	3	-	-	50	02
8	EE5236	Seminar - I	-	3	-	-	50	02
		Total	**24**	**06**		**420**	**280**	**22**
SEMESTER-II								
1	EE5040	Core	4	-	3	70	30	03
2	EE5050	Core	4	-	3	70	30	03
3	EE5060	Core	4	-	3	70	30	03
4		Elective	4	-	3	70	30	03
5		Elective	4	-	3	70	30	03
6		Elective	4	-	3	70	30	03
7	EE5241	PSPE Lab	-	3	-	-	50	02
8	EE5256	Seminar - II	-	3	-	-	50	02
		Total	**24**	**06**		**420**	**280**	**22**

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
M.E. (EEE) Program
SCHEME OF INSTRUCTION & EXAMINATION

M.E. (Power Systems & Power Electronics)
Four-Semester Course (Full-Time)

S. No	Syllabus Ref. No	Subject	Periods Per Week		End Exam Duration(Hrs.)	Max. Marks		Credits
			LT	DT		Sem. Exam	Sessional	
SEMESTER-III								
1	EE5266	Project Seminar* + Dissertation	-	6	-	-	100**	06
		Total	**-**	**6**	-	-	-	**06**
SEMESTER-IV								
1	EE5276	Dissertation	-	6	Viva-Voce	Grade ***	-	06
		Total	**-**	**6**	-	-	-	**06**

Note: Six core subjects, Six elective subjects, Two laboratory courses and Two seminars should normally be completed by the end of Semester-II.
*One Project seminar presentation
** To be awarded by the Viva Committee with Guide and two internal faculty.
*** Excellent/Very Good/Good/ Satisfactory/Unsatisfactory

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
M.E. (Power Systems & Power Electronics)

List of Theory and Practical Subjects

Core Subjects		
1	EE5010	Power Semi-Conductor Devices Circuits
2	EE5020	Advanced Synchronous Machine Theory
3	EE5030	Application of Power Electronics to Power Systems
4	EE5040	Distribution System Planning and Automation
5	EE5050	Power System Stability
6	EE5060	Power Electronics Controlled Electric Drives

Practicals		
1	EE5221	Computer Simulation Lab
2	EE5236	Seminar - I
3	EE5241	Power System Power Electronics Lab
4	EE5256	Seminar - II
5	EE5266	Project Seminar
6	EE5276	Dissertation Work

Elective Subjects		
1	EE5070	Machine Modeling and Analysis
2	EE5080	Advanced Computer methods in Power Systems
3	EE5090	Modern Control Theory
4	EE5100	Advanced Power System Protection
5	EE5110	Real Time Applications in Power Systems
6	EE5120	High Voltage D.C. Transmission
7	EE5130	Artificial Neural Networks
8	EE5140	Renewable Energy Sources
9	EE5150	Reliability Modeling in Power Systems
10	EE5160	Power Quality Engineering
11	EE5170	Energy Management
12	EE5180	Advanced Microprocessors Systems
13	EE5190	Digital Control Systems
14	EE5200	AI Applications to Power Systems
15	EE5210	High Voltage Engineering
16	EE5220	Programmable Logic Controllers And Their Applications
17	EE5230	Microcontrollers

M.E. (Power Systems & Power Electronics)
POWER SEMI-CONDUCTOR DEVICES & CIRCUITS (CORE)

UNIT I

Switching characteristics: Power MOSFETs and IGBTs, limitations and Safe Operating Areas (SOAs), —Latching in IGBTs. Thyristors-Converter & Inverter grade, GTO, RCT, MCT.

UNIT II

Switch Mode D.C-D.C Converters: Step-down converter (Buck)—Step-up converter (Boost) — Buck-Boost converter Control of D.C-D.C converters — Cuk converter.

UNIT III

Switch Mode D.C-A.C Inverters: Pulse width modulated switching schemes — sinusoidal PWM and Square wave PWM of Single phase Inverters and Three phase Voltage source Inverters — Effect of Blanking time on output voltage in PWM Inverters.

UNIT IV

Resonant Converters: Classification — Basic resonant circuit concepts, Load resonant! Resonant switch converters — Resonant D.C Link Inverters with Zero-voltage switching — High frequency Link Integral half-Cycle converters.

UNIT V

Power supply Applications: overview of switching power supplies – DC-AC converters with electrical isolation, electrical isolation in the feed back loop, fly-back converters forward converters, push pull converters – full bridge converters, power supply protection, applications

Learning Resources:

1.Mohan, Undeland, Robbins, Power Electronics, John Wiley, 1996.
2.Rashid M.H., Power Electronics, Prentice Hall of India, 1994.
3.Singh M.D and Khanchandani K.B, Power Electronics, Tata McGraw Hill, 1998.
4.Sen P.C, Power Electronics, Tata McGraw Hill Pvt. Ltd., New Delhi.

M.E. (Power Systems & Power Electronics)
Advanced Synchronous Machine Theory (Core)

UNIT I

The Synchronous machine - Park's transformation — Flux linkage equations — Voltage equations — Current formulation of state space equations — Per-unit conversion — Normalizing Voltage and torque equations — Torque and power — Equivalent circuits of synchronous machine — Flux linkage state space model — Treatment of saturation Synchronous machine connected to infinite bus — Current , Voltage and flux linkage models.

UNIT II

Sub-transient and transient reactances and time constants — Simplified models of the synchronous machine — Steady state equations and phasor diagrams — Machine connected to infinite bus with local load at machine terminals - Determining steady state conditions.

UNIT III

Linear models of the synchronous machine - Linearization of the generator state space current, voltage and flux linkage models.

UNIT IV

Linearization of the load equation for the one machine problem -- Simplified linear models — Effect of loading — State space representation of simplified model.

UNIT V

Representation of excitation systems, Different models of excitation systems — IEEE, 1, 2 & 3 systems — Representation of loads.

Learning Resources:

1. Kimbark, E.W., Power System Stability, Vol. III, Dover, New York, 1968.
2. P.M.Anderson & A.A.Foud, Power System Control & Stability, Iowa State University Press, U.S.A. 1977.
3. Yao-Nan-Yu, Power System Dynamics, Academic Press, 1983.

M.E. (Power Systems & Power Electronics)
Application of Power Electronics to Power Systems (Core)

UNIT 1

General System considerations and FACTS: Transmission Interconnections, Flow of Power in an AC System, Power Flow and Dynamic Stability Considerations of a Transmission Interconnection, principles of series and shunt compensation, Basic Types of FACTS Controllers, Benefits from FACTS, Application of FACTS.

UNIT II

Shunt Compensators: Objectives of Shunt Compensation, Midpoint Voltage Regulation for Line Segmentation, End of Line Voltage Support to Prevent Voltage Instability, improvement of Transient Stability, Power Oscillation Damping, Static Var Compensators, SVC and STATCOM, The Regulation Slope, Transfer Function and dynamic Performance, Transient Stability Enhancement and Power Oscillation Damping

UNIT III

Series Compensators: Objectives of Series Compensation, concept of series capacitive compensation, voltage stability, improvement of transient stability, power oscillation damping, GTO thyristor controlled series capacitor, thyristor controlled series capacitor, SSSC.

UNIT IV

Combined Compensators: Introduction, unified power flow controller, basic operating principles, independent real and reactive power flow control, control structure, basic control system for P and Q control.

UNIT V

Mitigation of Harmonics: Power quality problems, harmonics, harmonic creating loads, harmonic power flow, and mitigation of harmonics, filters, passive filters, active filters, shunt, series and hybrid filters.

Learning Resources:

1. Narain G. Hingorani, Laszlo Gyugyi, Understanding FACTS, IEEE press
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, Electrical Power Systems Quality, McGraw Hill,2003
3. Y.H.Song, A.T.Johns, Flexible A.C.Transmission System, IEE, London, 1999

M.E. (Power Systems & Power Electronics)
Distribution System Planning and Automation (Core)

UNIT I

Distribution System Planning: Introduction, Distribution system Planning: Factors effecting planning, present techniques, planning models, planning in the future, future nature of distribution planning, Role of computer in Distribution planning. Load characteristics and Load models – Wye connected loads, Delta connected loads.

UNIT II

Sub Transmission lines & Substations: Types of sub- transmission, Distribution substation, bus schemes, substation location, rating of substation, calculation of voltage drops with primary feeders, Derivation of the K constant, Application curves, Interpretation of the Percentage Voltage drop formula.

UNIT III

Primary Feeders: Types of primary feeders, Primary feeder loading, Tie-lines, Distribution feeder exit — rectangular and radial type development, Design of radial primary feeders — Voltage drop calculations by A,B,C,D constants, Uniformly distributed load, Non uniformly distributed load. Distribution Feeder Analysis – the ladder Iterative technique.

UNIT IV

Secondary Feeders: Secondary voltage levels, Present design practice, Secondary Banking, Economic design of secondaries, Total annual cost equation, Voltage drop and Power loss calculations. Distribution system voltage regulation: Quality of services, voltage control, Application of capacitors in Distribution system.

UNIT V

Distribution Automation: Distribution Automation, project planning, Definitions, communication, sensors, Supervisory Control and Data Acquisition Systems (SCADA), Consumer Information Service(CIS), Geographical Information System (GIS), Automatic Meter Reading (AMR), Automation system.

Learning Resources:

1. Ganen Turan, Electric Power Distribution System Engineering, CRC Press, 2007 2nd Edition
2. William.Kersting, Distribution Modelling & Analysis – CRC Press – third edition - 2002
3. A.S. Pabla, Electric Power Distribution, Tata Mc Graw Hill, 5 Edition, 2005.

M.E. (Power Systems & Power Electronics)
Power Systems Stability(Core)

UNIT I

Steady state stability: Basic concept of stability-Types of stability- Stability criteria for single and multi-machine systems — Concept of voltage stability — Characteristics of network, generator and load, for voltage stability.

UNIT II

Transient stability: The swing equation for single and multi-machine system — Basic assumptions — Different methods of solution of swing equation — Solution by indirect methods — Runge- gutta method - Swing curve — Determination of critical time and critical angle.

UNIT III

Hydraulic power and governor models — IEEE standard models — Models for steam turbine. Improvement of Transient stability- potential energy function for SVC, SSSC & UPFC.

UNIT IV

Low frequency oscillation and supply controls: Transfer function of low frequency oscillation studies — Improving system damping with supplementary excitation — Design of supplementary excitation system — State equation for single machine system — Improving system model with governor control.

UNIT V

Sub Synchronous oscillation: Turbine generator torsional Characteristics, Torsional interaction with power system controls. Sub Synchronous resonance. Damping schemes.

Learning Resources:

1. Yao-Nan-Yu, Power System Dynamics, Academic Press, 1983.
2. Prabha Kunder, Power System Stability & Controi, Tata Mc Graw Hill edition. 2006.
3. KR Padiyar, FACTS Controllers in Power Transmission & Distribution New AGE International Publishers First edition 2007.
4. Stagg and Elabiad, Computer Methods in Power systems - McGraw Hill., 1968.

M.E. (Power Systems & Power Electronics)
Power Electronics Controlled Electric Drives (Core)

UNIT I

Review of Power Converters: Commutation in Thyristor power converters – Principle of natural commutation – Principle of forced commutation – Discontinuous conduction in converters- DC choppers – Force commutated inverters – Frequency conversion – Inverter voltage control – Harmonic neutralization – Current source inverters – Phase controlled cyclo-converters – AC Voltage controller.

UNIT II

DC Motor Control: General considerations – Evaluation of a dc drive performance – Forced commutation schemes to improve the performance of the drives – Features and Steady state analysis of a separately excited dc motor fed from chopper – Current limit control – Regenerative braking of dc motors – Steady state performance of dc motors on phase controlled rectifiers –Dual converters – Reversible drives – State space model and digital simulation of dc motors.

UNIT III

Induction Motor Control: Speed control of induction motors – Analysis of induction motor on non-sinusoidal voltage waveforms – Analysis of current source inverter fed induction motor –Variable frequency operation of induction motors – Analysis of induction motor fed from AC voltage controller – Chopper controlled resistance in the rotor circuit of an induction motor – Static slip energy recovery schemes employing converter cascades in the rotor circuit – Dynamic behavior and Stability of induction motor fed from variable frequency supply.

UNIT IV

Microprocessors in the Control of Electrical Drives: Applications of microprocessors in variable speed drives (Block Diagram and Flowchart Approach only) – DC motor speed control using microprocessor – Microprocessor based firing scheme for a dual converter – Induction motor speed control – Synchronous motor speed control – Stepper Motor Control.

UNIT V

Brushless DC Motor and Switched Reluctance Motor Drives: Switched reluctance motor drive – Normalized torque-speed characteristics – Speed Control Schemes – Control Circuits – Brushless DC Motor – Construction – Working Principle – Control Schemes.

Learning Resources:

1. Vedam Subramanyam, Thyristor Control of Electric Drives, Tata MGraw Hill Publishing Co., New Delhi, 2003.
2. S.B.Dewan, G.R.Slemon, A.Straughen, Power Semi Conductor Drives, Wiley Interscience, 1984.
3. B.K.Bose, Power Electronics and AC Drives – Prentice Hall, 1986.

M.E. (Power Systems & Power Electronics)
Machine Modeling and Analysis (Elective)

UNIT I

Basic Principles for Electric Machine Analysis: Magnetically coupled circuits, Electromechanical energy conversion, Basic Two pole DC Machine – primitive 2 axis machine – Voltage and Current relationship – Torque equation.

UNIT II

Theory of DC Machines: Mathematical model of separately excited DC Motor, DC Series Motor, DC shunt motor and D.C. Compound Motor in state variable form – Transfer function of the motor.

UNIT III

Reference Frame Theory: Equations of transformation - Change of variables, Stationary circuit variables Transformed to the Arbitrary Reference Frame, Commonly used reference frames, Transformation between reference frames, Transformation of a balanced set, Balanced steady state phasor Relationships, Balanced steady state equations, Variables observed from various frames.

UNIT IV

Theory of Symmetrical Induction Machines: Voltage and torque equations in machine variables, Equations of transformation for Rotor circuits, Voltage and torque equations in arbitrary reference frame variables, Analysis of steady state operation- state-space model of induction machine in‘d-q’ variables, Free Acceleration Characteristics, Dynamic Performance-during sudden changes in load-during a 3 phase fault at the machine terminals.

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UNIT V

Theory of Synchronous Machines: Voltage and Torque equations in machine variables, Stator Voltage equations in Arbitrary Reference Frame Variables, Voltage Equations in Rotor Reference Frame Variables: park’s Equations, Torque Equations in Substitute Variables, Analysis of steady state operation, Dynamic performance - During sudden changes in Input Torque - During a 3 phase fault at the machine terminals.

Learning Resources:

1. Paul C. Krause, Oleg Wasynczuk, Scott D.Sudhoff, “Analysis of Electric Machinery and drive systems” John Wiley and Sons, 2nd Edition, 2006
2. C.V. Jones, “Unified Theory of Electrical Machines” Butterworths Publishers.
3. P.S. Bhimbra, “Generalized Theory of Electrical Machines”, Khanna publishers, 2002.
4. J. Meisel, “Principles of Electromechanical Energy Conversion” McGraw Hill, 1966.

M.E. (Power Systems & Power Electronics)
Advanced Computer Methods in Power Systems (Elective)

UNIT I

Network graph, Incidence Matrices – Element node incidence matrix - Bus incidence matrix -Branch path incidence matrix - Basic and Augmented cut set incidence matrices - Basic and Augmented branch incidence matrices - Basic and Augmented loop incidence matrices - Primitive network - Formation of Y Bus, YBR & Z loop by singular transformation.

UNIT II

Matrix representation of power systems, Triangularization, Gaussian elimination method, LU, LOU factorization, Table of factors, optimal ordering. Algorithm for formation of ZBus matrix. Concept of branch and link addition -modification of bus impedance matrix for changes in the network, Z bus -sparse vector method.

UNIT III

Concepts of load flow -classification of buses, Representation of fixed tap setting and on load tap changing transformers, load flow solution using Gauss -Seidel, Newton-Raphson methods, Treatment of voltage controlled buses -Acceleration factors, Decoupled and fast decoupled method,- Flow chart and comparison of different methods.

UNIT IV

Representation and performance equation of 3 phase network elements -Three phase network elements with balanced and unbalanced excitation -Transformation matrices -Symmetrical and Clarke's components -Algorithm for formation of 3-phase bus impedance matrix -Modification of three phase ZBUS charges in network.

UNIT V

Basic assumption in short circuit studies -System representation - General equations for short circuit study in phase variables and Symmetrical components for fault current and node voltage –Short circuit calculations for balanced three phase network using ZBUS - Fault impedance and admittance matrices -Analysis of 3 phase, line to ground and double line to ground faults -Flow chart for short circuit study.

Learning Resources:

1. Stagg & EI-Abiad. Computer methods in Power System Analysis, Tata McGraw Hill, 1968.
2. Kusic Gearge L -Computer Aided Power System Analysis, - Prentice Hall, 1986.
3. M.A.Pai -Computer techniques in Power System Analysis, Tata McGraw Hill, 2006.

M.E. (Power Systems & Power Electronics)
Modern Control Theory (Elective)

UNIT I

Review of state variable representation of systems - Controllability and Observability — Model control of single input — single output systems (SISO), Controllable and Observable companion forms — Effect of state feedback on Controllability and Observability, Pole placement by State feed back.

UNIT II

Classification of Non-linearities - Phenomenon exhibited by the nonlinearities - Limit cycles - Jump resonance Sub-harmonic oscillations - Phase plane analysis - Singular points - Construction of phase plane trajectories - Isocline method - Delta method - Measurement of time on phase plane trajectories.

UNIT III

Concept and definition of stability - Lyapunov stability - Lyapunov's first and second methods - Stability of linear time invariant systems by Lyapunov's second method - Generation of Lyapunov functions- Variable gradient method - Krasooviski's method.

UNIT IV

Formulation of optimal control problems - Calculus of variations — Fundamental concepts — Functionals — Variation of functionals — Fundamental theorem of calculus of variations - Boundary conditions - Constrained minimization — Dynamic programming – Hamilton Principle of optimality, Jacobi Bellman equation – potryagins minimum principle.

UNIT V

Introduction to adaptive control, types of adaptive control systems. Design of model reference adaptive control systems using M/T rule and Lyapunov stability theory.

Learning Resources:

1. IJ Nagarath , M.Gopal Control Systems Engineering fifth edition - , New Age International Rablishess, 1984 Wiley Eastern Ltd.
2. Ogata K, Modern Control Engineering, Prentice Hall, 1997.
3. Donald E Kirk, optimal control thery An introduction
4. Karl J Astrom Bjron wihenmark, Adaptive control second edition – Peasson education

M.E. (Power Systems & Power Electronics)
Advanced Power System Protection (Elective)

UNIT I

Static relays- Comparators and static relay characteristics: Relays as comparators –Amplitude and Phase comparison schemes – General equation for comparators for different types of relays – Static comparators – Coincidence circuits – Phase splitting methods–Hall effect comparators – Operating principles – Use of level detectors – Time delay circuits – Filters – Thyristors – Triggering circuits and DC power supplies.

UNIT II

Static relay hardware: Operating principles: Static time current relays directional units based on phase and amplitude comparison– Differential relays – Distance relays – Quadrilateral relay – Elliptical relay – Relay response – Principle of R-X diagram – Convention for superposing relay and system characteristics – Power swings, Loss of synchronism and its effect on distance relays.

UNIT III

Generator, motor and transformer protection: Generator protection against short circuits using differential relays against inter-phase fault – Combined split-phase and overall differential relays – Protection against stator open circuits – Rotor and Stator overheating, Loss of excitation protection and field & ground fault protection. Digital protection scheme based upon second harmonic current induced in the rotor field circuit.

UNIT IV

Transformer differential protection: Effect of magnetizing in rush currents – Grounding transformers – Bus protection with differential relays. Line protection: 3 zone protection using distance relays – Switched schemes – Auto-reclosing – Single and multi-shot auto reclosing – Single pole and three pole auto reclosing.

UNIT V

Pilot wire and carrier protection: Circulating current scheme – Balanced Voltage scheme – Translay scheme – Half wave comparison scheme – Phase comparison carrier current protection –carrier transfer scheme – carrier blocking scheme – Digital protection EHV/ UHV transmission line based upon traveling wave phenomena.

Learning Resources:

1. Badriram and Viswakarma D.N., Power System Protection and Switchgear — Tata McGraw Hill, 2004.
2. L.P.Singh, Digital Protection, Wiley Eastern Ltd., 1994.
3. Warrington A.R. Van C, Protective Relays ,Vol I & II Chapman & Hall, London and John Wiley & Sons, 1977.
4. Mason C.R. The art and science of Protective Relaying, Wiley & Sons, 1956.

M.E. (Power Systems & Power Electronics)
Real Time Applications in Power Systems (Elective)

UNIT I

Power Flow Studies: Introduction, power flow problem, formulation of power flow equation, computational aspects of power flow problem, Gauss-Seidel iterative technique, Gauss elimination(Triangular factorization) method, Power flow solution using Zbus matrix, power flow solution by Newton-Raphson method, decoupled load flow, fast decoupled load flow, power flow control by regulating the operating conditions.

UNIT II

Contingency Analysis Techniques: Security in a power system, approximations in contingency analysis, simulation of addition and removal of multiple lines in a power system, simulation of tie lines in inter connected power systems, network reduction for contingency analysis, contingency analysis, approximate power flow method for simulating contingencies.

UNIT III

State Estimation Techniques: Data acquisition, role of a state estimator, rationale of state estimation, method of least squares for state estimation, estimation of power system state varables by the weighted least square estimation(WLSE) technique, statistical errors and bad data recognition, power system state estimator in noisy environment, composition of the Jacobian matrix H and the measurement vector Z

UNIT IV

Power System Security: Introduction, challenges for secure operation, methods of enhancing security, reliability criterion, enhancement of stability controls, online dynamic security assessment, management of system reliability, Future trends in dynamic security assessment, real time monitoring and control

UNIT V

Load Forecasting Technique: Forecasting methodology, estimation of average and trend terms, estimation periodic components, estimation of Ys(k): Time series approach, estimation of stochastic component: kalman filters approach, long term load predictions, reactive load forecast

Learning Resources:

1. T.K.Nagsarkar, M.S.Sukhija, Power system analysis, Oxford publications
2. Prabha Kundur, Power system stability and control, TataMcGrawHill Edition, 2006
3. J.Arrillaga, C.P.Arnold, Computer modeling of electric power systems, John Wiley 1983

M.E. (Power Systems & Power Electronics)
High Voltage D.C. Transmission (Elective)

UNIT I

Comparison of AC and DC Transmission systems, Applications of DC Transmission, Description of DC Transmission Systems, Modern trends in HVDC Technology. Static power conversion - Principle -Ideal / real commutation process - Rectifier operation - Inverter operation - Power factor and reactive power - Converter harmonics, Smoothing reactors.

UNIT II

Harmonic elimination - Design of ac. Filters- D.C. side filters - Alternative methods of harmonic elimination - Control of H.V.D.C. converters and systems - Individual phase control - Equidistant firing control - D.C. system control - Characteristics and direction of D.C power flow.

UNIT III

Fault development and protection - Converter disturbances -A.C system faults - Over current protection - Transient over-voltages - Harmonic over voltages excited by A.C disturbances - Fast transients generated on the D.C system - Surges generated on the a system insulation co-ordination. DC Circuit breakers.

UNIT IV

AC – DC system interactions: System models, Torsional, harmonic interactions with HVDC systems. Reactive power control: Requirements in steady state, Sources of reactive power and control during transients.

UNIT V

Study of MTDC systems, Multi-infeed DC systems, Types of MTDC systems, Existing a.c.transmission facilities converted for use with d.c. - Generator rectifier units- Forced commutation - Compact converter stations - Microprocessor based digital control.

Learning Resources:

1. Arrillaga J., High Voltage Direct Current Transmission, Peter Peregrinus Ltd., London. 1983.
2. Padiyar KR., HVDC Power Transmission Systems, New Age International, New Delhi, 2010.

M.E. (Power Systems & Power Electronics)
Artificial Neural Networks (Elective)

UNIT I

Neural and Fuzzy Intelligence: Fuzziness as multi-valence - Bivalent paradoxes as fuzzy midpoints - Sets as points in cubes - Subset hood and probability- The dynamical system approach to machine intelligence - Brain as a dynamical system - Neural networks as trainable dynamical system - Intelligent behaviour as adaptive model free estimation - Generalization and creativity - Learning as change- Rules vs. principles - Symbolic vs. numeric processing - Structured numerical estimators.

UNIT II

Neural Network Theory: Neurons as functions - Signal monotonicity Biological activities and signals - Neuron fields - Neuronal dypamic systems - Common signal functions - Pulse coded signal functions- Additional neuron dynamics - Additive neural feedback - Additive activation models - Bivalent BAM theorem - Hoptield model.

UNIT III

Synaptic Dynamics: Unsupervised learning - Learning laws - Probability spaces and random processes - Signal Hebbian learning- Competitive learning - Differential Hebbian learning - Supervised learning - The perceptrons - LMS algorithm - Back propagation algorithm - AVQ algorithm - Global stability of feedback neural networks.

UNIT IV

Fuzzy Logic: Fuzzy sets and systems - Geometry of fuzzy sets - Fuzzy entropy theorem- Entropy subset - Hood theorem - Fuzzy and neural function estimators - FAM system architecture - Uncertainty and estimation - Types of uncertainty - Measure o. fuzziness - Classical measures of uncertainty - Measure sol dissonance -Confusion and non- specificity. Fuzzy logic structure - Knowledge base defuzzification - Fuzzy logie, in control - Pattern recognition - Planning and Diagnosis.

UNIT V

Fuzzy Logic and ANN Application: Application to load forecasting - Load flow, Fault detection and Unit commitments - LF control - Economic dispatch.

Learning Resources:

1. Bart Kusko, Neural Networks and Fuzzy System - Prentice Hall of India, 1994.

M.E. (Power Systems & Power Electronics)
Renewable Energy Sources (Elective)

UNIT I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H2°2 Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells — Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT II

Solar energy - Solar radiation and its measurements - Solar Energy collectors - Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy.

UNIT III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT IV

Energy from the Oceans - Ocean Thermal Electric conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages energy - Geo-thermal Energy - Types of Geo-thermal Energy Systems - Applications of Geo-thermal Energy. of wave

UNIT V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifies.

Learning Resources:

1 Rai G.D, Non-Conventional Sources of Energy, Khanfla Publishers, New Delhi, 1999.
2. El-Wakil, M0M., Power Plant Technology. McGraw Hill, 1984.

M.E. (Power Systems & Power Electronics)
Reliability Modeling in Power Systems (Elective)

UNIT I

Introduction: The Concept of reliability – Reliability Indices – Power System reliability-Component Reliability – Non-repairable components – Hazard Models – System Reliability – network methods – Logic Diagrams – Monotonic Structures.

UNIT II

Generating Capacity Reserve Evaluation: Planning for reliability – Outage definitions – Construction of reliability models –– probability of capacity deficiency – Loss of load method – Loss of energy method – Frequency and duration method – Two level representation of the daily load - Merging the generation and load models – Multilevel representation of the daily load – Comparison of the reliability indices – Generation expansion planning.

UNIT III

Operating Reserve Evaluation: General concepts – PJM method –Outage replacement rate – Generation model – Unit commitment risk – Modified PJM method – Area risk curves – Modelling rapid start units – Modelling hot reserve units – Unit commitment risk – Security function approach – Security function model – Response risk – Evaluation techniques – Effect of distributing spinning reserve – Effect of Hydro – electric units.-interconnected systems

UNIT IV

Generation and Transmission Systems: Introduction – Radial configurations – Conditional probability approach – Network configurations – State selection – Systems and load point indices – Application to practical systems – Data requirements for composite system reliability evaluation – concepts – deterministic data – Stochastic data – Independent outages – Dependent outages – Common mode outages – station originated outages.

UNIT V

Distribution Systems: Introduction – Basic evaluation techniques – state space diagrams – approximate methods – Network reduction method – Failure modes and effects analysis – Temporary and transient failures – concepts – evaluation techniques – Common mode failures – Evaluation techniques – Sensitivity analysis – Total loss of continuity(TLOC) – Partial loss of Continuity(PLOC) – PLOC criteria – Extended load – duration curve – Effect of transferable loads – General concepts – Evaluation techniques – Economic considerations

Learning Resources:

1. Endrenyi, Relaibility Modeling in Electrical Power Systems, Johnwiley & Sons,1978.
2. Roy Billiton, Ronold N.Allan, : Relaibility Evaluation of Power Systems, Plenum press, springer international edition
3. E.Balaguruswamy, Relaibility Engineering.

M.E. (Power Systems & Power Electronics)
Power Quality Engineering (Elective)

UNIT I

Introduction: Power Quality (PQ),PQ problems , Sags, Swells, Transients, Harmonics, Interruptions, Flicker ,Voltage fluctuations, Notch. PQ Issues, Assessing PQ: Remedies -Customer side of meter, Utility side of the meter. Power quality monitoring – Monitoring considerations, Historical Perspective of PQ Measuring Instruments, PQ measurement equipment, Assessment of PQ measurement data, Application of intelligent systems, PQ monitoring standards.

UNIT II

Voltage Sag Analysis: Voltage sag characteristics - Methodology for computation of voltage sag magnitude and occurrence — Accuracy of sag analysis — Duration & frequency of sags — Faults behind transformers — Effect of pre-fault voltage — Simple examples — Voltage dip problems, fast assessment methods for voltage sags in distribution systems.

UNIT III

PQ Consideration in Industrial Power Systems: Adjustable speed drive (ASD) systems and applications — Sources of power system harmonics — Mitigation of harmonics — Characterization of voltage sags experienced by three-phase ASD systems — Types of sags and phase angle jumps — Effects of momentary voltage dips on the operation of induction and synchronous motors .

UNIT IV

Harmonics: Harmonic distortion, Voltage versus current distortion, Harmonics versus Transients, Harmonic Indices, Harmonic sources from commercial loads, Harmonic sources from industrial loads, Locating Harmonic sources, System response characteristics, Effects of Harmonic distortion, Inter harmonics, Devices for controlling harmonic distortion.

UNIT V

Transient Overvoltages – Sources of Transient Overvoltages. Wiring and Grounding: Resources, Definitions, Reasons for Grounding, Typical wiring and grounding problems, Solutions to wiring and grounding problems.

Learning Resources:

1. Math H.J. Bollen, Understanding Power Quality Problems, IEEE Press, 1999.
2. Roger C.Dugan, Mark F.McGranaghan, Surya Santoso, H.Wayne Beaty, Electrical Power Systems Quality, Second Edition, Tata McGraw-Hill Edition.
3. C.Sankaran, Power Quality, CRC Press, 2002.

M.E. (Power Systems & Power Electronics)
Energy Management (Elective)

UNIT I

Essentials of Energy Management: Introduction – Scope of Energy Management – Necessary Steps of Energy Management Programme – General Principles of Energy Management – Qualities and Functions of an Energy Manager – The Language of the Energy Manager. Method of investment appraisal – Rate of return method - Pay back method – Net present value method (NPV) - Internal rate of return method (IRR)– Capital budgeting.

UNIT II

Energy Auditing: Introduction – Objective of Energy Audit – Control of Energy – Uses of Energy – Energy Conservation Schemes – Energy Index – Cost Index – Pie Chart – Sankey Diagram – Load Profile – Types of Energy Audit – General Energy Audit – Sankey Questionnaire – Sample Questionnaire – Energy Audit Case Studies

UNIT III

Energy Conservations: Introduction – Indian Energy Conservation Act, 2001(EC Act) – The Electricity Act 2003 – Rules for Efficient Energy Conservation of Energy and Materials – Technologies for Energy Conservation – Design of EC – Energy Flow Networks – Critical Assessment of Energy Use – Formulation of Objectives and Constraints.

UNIT IV

Improvement of Energy Efficiency: Waste Heat – Advantages of Recuperators – Air Preheaters and Economizers – Furnaces – Fans and Blowers – Compressors – Pumps – Energy Audits – Case studies, Tips for energy conservation in domestic and industrial sectors

UNIT V

Electrical Energy Management: Introduction – Power Factor Control – Tariff – Energy Efficient Motors – Case Study – Energy Efficient Lighting – Life cycle Cost Analysis (LCC analysis) – Equivalent Annual Worth(EAW) – Break Even Analysis.

Learning Resources:

1. KV Sharma,P.Venkataseshaiah: Energy management and conservation IK International publishing house Pvt. Ltd.
2. Guide book for national certification examination for energy managers and energy auditors, Books1,2,3 &4-Bureau of Energy Efficiency, Ministry of power, Govt. of India
3. Turner W.C.: Energy management handbook

M.E. (Power Systems & Power Electronics)
Advanced Microprocessor Systems (Elective)

UNIT I

8086 Microprocessor Architecture - Segmented Memory - Addressing Modes - Instruction Set - 8086 Assembly Language Programming - 8087 Numerical Data Processor Architectural details - Data types - Floating point Operations - 8087 Instructions.

UNIT II

Architectural details of 80386 Microprocessor - Special registers - Memory management -Operation in protected mode and virtual 80386 mode - Memory paging mechanism - Special instructions of 80386 - Architectural details of 80486 - Special registers - Additional instructions - Comparison of 80386 and 80486 processors.

UNIT III

Introduction to Pentium Processor - Architectural features - Comparison with the workstations - Branch prediction logic - cache structure. - Special Pentium Registers. Memory management - virtual mode of operation - Comparison with the previous processors. Features of Pentium-II, Pentium-III and Pentium Pro-processors.

UNIT IV

RISC Microprocessors – RISC Vs CISC – RISC Properties – DEC Alpha AXP Architecture - Power PC – Architecture - Programming Model – Data Types – Addressing Modes – Instruction Set. Sun SPARC – Architecture – Data Types – Instruction Sets - Features of MIPS, AMD Microprocessors

UNIT V

Motorola Microprocessors – 68000 Microprocessor – Architecture – Registers – Addressing Modes – Features of 68020 – 68030 – 68040 Microprocessors.

Learning Resources:

1. Barry B Brey "Intel Microprocessors : 8086/88, 80186/188, 80286, 80386, 80486, Pentium, Pentium – II, Pentium – III and Pentium – IV, Architecture, Programming & Interfacing", Pearson Education, 2003.
2. Badri Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill.
3. A.K. Ray & K.M. Bhurchandi, "Advanced Microprocessors & Peripherals, Architecture, Programming & Interfacing", Tata McGraw Hill.

M.E. (Power Systems & Power Electronics)
Digital Control Systems (Elective)

UNIT I

Review of Z – Transforms: Introduction - Linear difference equations - Pulse response - Z - transforms, Theorems of Z – Transforms - Inverse Z – transforms - Modified Z- Transforms. Z-Transform method for solving difference equations - Pulse transforms function - Block diagram analysis of sampled data systems - mapping between s-plane and z-plan - Primary strips and Complementary Strips.

UNIT II

State Space Analysis : State Space Representation of discrete time systems - Pulse Transfer Function - Matrix solving discrete time state space equations - State transition matrix and it's Properties - Methods for Computation of State Transition Matrix - Discretization of continuous time state - space equations.

UNIT III

Controllability and Observability : Concepts of Controllability and Observability - Tests for controllability and Observability -Duality between Controllability and Observability - Controllability and Observability conditions for Pulse Transfer Function.

Stability Analysis (Discrete): Stability Analysis of closed loop systems in the Z-Plane. Jury stability test - Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. Stability analysis using Liapunov theorems.

UNIT IV

Design of Discrete Time Control System by Conventional Methods: Design of digital control based on the frequency response method - Bilinear Transformation and Design procedure in the w-plane - Lead, Lag and Lead-Lag compensators and digital PID controllers – Design of digital control through deadbeat response method.

UNIT V

State Feedback Controllers and Observers(Discrete): Design of state feedback controller through pole placement - Necessary and sufficient conditions - Ackerman's formula - State Observers - Full order and Reduced order observers - Min/Max principle, Linear Quadratic Regulators - Kalman filters - State estimation through Kalman filters - Introduction to adaptive controls.

Learning Resources:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH
3. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
4. Digital Control Engineering, M.Gopal

M.E. (Power Systems & Power Electronics)
AI Applications to Power Systems (Elective)

UNIT I

Fundamentals of Genetic Algorithms: Introduction to GAs, Encoding, Fitness Function, Premature Convergence, Basic Operators, Selection, Tournament Selection, Truncation Selection, Linear Ranking Selection, Exponential Ranking Selection, Elitist Selection, Proportional Selection, Crossover, Mutation

UNIT II

Fundamentals of Particle Swarm Optimization Techniques : Introduction, Basic Particle Swarm Optimization, Background of Particle Swarm Optimization, Original PSO, Variations of Particle Swarm Optimization, Discrete PSO, PSO for MINLPs, Constriction Factor Approach (CFA), Hybrid PSO (HPSO), Lbest Model,

UNIT III

Ant Colony Search Algorithms : Introduction, Ant Colony Search Algorithm, Behavior of Real Ants, Ant Colony Algorithms, The Ant System, The Ant Colony System, The Max-Min Ant System, Major Characteristics of Ant Colony Search Algorithms, Distributed Computation: Avoid Premature Convergence, Positive Feedback: Rapid Discovery of Good Solution,, Use of Greedy Search and constructive Heuristic Information

UNIT IV

Differential Evolution: Introduction, Evolutionary Algorithms, Basic EAs, Virtual Population-Based Acceleration Techniques, Differential Evolution, Function Optimization Formulation, DE Fundamentals, Initial Population, Mutation and Recombination to Create New Vectors, Selection and the Overall DE, Key Operators for Differential Evolution, Encoding, Mutation, Crossover, Other Operators, An Optimization Example.

UNIT V

Applications to power systems: Distribution Network Expansion, Dynamic Planning of Distribution System Expansion: Reactive Power Planning at Generation–Transmission Level, Benders Decomposition of the Reactive Power Planning Problem, Solution Algorithm, Reactive Power Planning at Distribution Level, Application Examples, Optimal Power Flow Under Contingent Condition with Line Capacity Limit, Optimal Power Flow for Loss Minimization

Learning Resources:

1. Kwang Y. Lee and Mohamed A. El-Sharkawi, "Modern heuristic optimization techniques" IEEE press, Wiley-Interscience Publication
2. Soliman, Soliman Abdel-Hady, Mantawy, Abdel-Aal Hassan, "Modern Optimization Techniques with Applications in Electric Power Systems" Springer publications
3. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic algorithms" Springer publications

M.E. (Power Systems & Power Electronics)
High Voltage Engineering (Elective)

UNIT I

Conduction and Breakdown of Gaseous Insulating Material: lionization processes and current growth – Townsend's criterion for breakdown – Breakdown in electronegative gases – Time lags for breakdown – Paschen's law – Corona discharges – Breakdown in non – uniform fields – Practical considerations for selecting gases for insulation purposes.

UNIT II

Conduction and Breakdown in Liquid and solid Dielectrics : Various mechanisms of breakdown in liquid dielectrics - Liquid dielectrics used in practice – Various processes – Breakdown in solid dielectrics – Solid dielectrics used in practice.

UNIT III

Generation of High Voltages and Currents : Generation of High DC Voltages using voltage multiplier circuits – Van de Graff generator. Generation of high alternating voltages using cascade transformers – Production of high frequency AC high voltages – Standard impulse wave shapes – Marx circuit – Generation of switching surges – Impulse current generation – Tripping and control of impulse generators.

UNIT IV

Measurement of High voltages and Currents: High DC Voltage measurements techniques – Methods of measurements for power frequency AC voltages – sphere gap measurements technique – potential divider or impulse voltage measurements – measurements of high DC., AC and impulse currents – Use of CRC for impulse voltage and current measurements.

UNIT V

High voltages Testing: Tests on insulators – testing on bushings – testing of isolators and circuit breakers – cable testing of transformers surge diverter testing – Radio interference measurement – Use of I.S.S. of testing.

Learning Resources:

1. M.S Naidu and V.Kamaraju, High voltage Engineering, Tata McGraw Hill, 1982.
2. E.Kufferl and M.Abdullah, High voltage Engineering, Pergamon Press, 1970.

M.E. (Power Systems & Power Electronics)
Programmable Logic Controllers and their Applications(Elective)

UNIT-I:
PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT-II:
PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT-III:
PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT-IV:
Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT-V:
Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions.

Learning Resources:
1. Programmable Logic Controllers – Principle and Applications by John W Webb and Ronald A Reiss Fifth edition, PHI
2. Programmable Logic Controllers – Programming Method and Applications by JR Hackworth and F.D Hackworth – Jr- Pearson, 2004.

M.E. (Power Systems & Power Electronics)
Microcontrollers (Elective)

UNIT - I

Introduction and 8051 Architecture: Introduction to microcontrollers, comparing microprocessors and microcontrollers, 4,8,16 and 32 bit microcontrollers, Development systems for Microcontrollers, Architecture, Architecture of 8051, pin configuration of 8051 microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts.

UNIT - II

Moving Data and Logical Operations: Introduction, Addressing modes, External Data moves, Code Memory Read-only Data Moves, PUSH and POP Op-codes, Data Exchanges, Logical Operations; Introduction, Byte-Level Logical Operations, Bit-Level Logical Operations, Rotate and Swap Operations.

Unit - III

Arithmetic Operations, Jump and Call Op-codes: Introduction, Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Jump and Call op-codes, introduction, The jump and call program range, Jumps, Calls and Subroutines, call and returns, Interrupts and Returns.

Unit - IV

8051 Microcontroller Design: Introduction, A microcontroller specification, A microcontroller Design, Testing the Design, Timing subroutines, Lookup Tables for the 8051, Serial Data Transmission.

Unit - V

Applications and Serial Data Communication: Introduction, Keyboards, Displays, pulse Measurement, D/A and A/D Conversions, Multiple Interrupts, Serial data Communication, Introduction, Network Configurations, 8051 Data Communication Modes.

Learning Resources:

1. Kennth J. Ayala, The 8051 Microcontroller Architecture Program and Applications, 2nd edition, Penram International Publications, 1996.
2. Mohammed Ari Mazidi and Janci Gillispie, The 8051 Microcontroller andEmbedded Systems, Pearson Education Asia, New Delhi, 2003.

M.E. (Power Systems & Power Electronics)

Computer Simulation Laboratory

List of Experiments

1. Load flow studies
2. Short circuit studies
3. Transient stability studies
4. Simulation of IGBT inverters
5. Distribution load flow studies
6. Simulation of Facts controllers
7. Simulation of thyristor converters
8. Simulation of Resonant converters
9. Load forecasting and unit commitment
10. Simulation of reactive power compensation
11. Simulation of Buck, Buck-Boost converters
12. Simulation of single -area and Two -area Systems
13. Economic Load Dispatch with thermal power plants
14. Simulation of V/F controller for 3-phase induction motor
15. Economic Load Dispatch with Hydro thermal power plants

Power Systems & Power Electronics Lab

Part-A (Power Systems)

1. To measure negative sequence and zero sequence reactance of synchronous machine
2. To measure Direct axis and quadrature axis reactance's of synchronous machine
3. To Study The Single Line To Ground Fault
4. To Study Line To Line Fault
5. To study Three-phase fault
6. To study Microprocessor based Over current relay
7. To study Percentage Differential Relay
8. To study Over Voltage Relay
9. To study Under Voltage Relay
10. To measure positive and zero sequence reactance's of three-phase transformer

Part-B (Power Electronics)

1. Three phase step down cyclo-converter
2. Three phase controlled rectifier with R and RL loads
3. Three phase half controlled rectifier with R and RL loads
4. Speed control of three phase slip ring induction drive using static Kramer's drive
5. Three phase Mc-Murray Bed-ford inverter
6. Three phase IGBT inverter
7. Closed loop control of permanent magnet dc drive
8. Single phase dual converter
9. Rotor resistance control of slip ring induction motor
10. Speed control of dc motor using chopper

Note: At least five experiments should be conducted in each part

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

MASTER OF COMPUTER APPLICATIONS (MCA)

SCHEME OF INSTRUCTION & EXAMINATION

MCA I YEAR I-SEMESTER

S. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction			Scheme of Examination			
			Periods per week			End Sem Exam hrs	Maximum Marks		Credits
I YEAR I SEMESTER			L	T	P		End Sem Exam	Sessionals	
1	HS 5010	Communicative English - I	2	-	-	2	35	15	2
2	CA 5020	Discrete Mathematics	4	1	-	3	70	30	3
3	HS 5030	Managerial Economics and Accountancy	4	1	-	3	70	30	3
4	CA 5040	Computer Programming and Problem Solving	4	1	-	3	70	30	3
5	CA 5050	Management Information Systems	4	1	-	3	70	30	3
6	CA 5060	Computer Organization	4	1	-	3	70	30	3
Practicals									
7	HS 5311	English Language Training Lab – I	-	-	2	2	25	25	1
8	CA 5321	Programming Lab-I (C&C++ Lab)	-	-	9	3	50	25	3
9	CA 5331	Programming Lab-II (EIT Lab)	-	-	3	3	50	25	2
		TOTAL	**22**	**05**	**14**	**25**	**510**	**240**	**23**

MASTER OF COMPUTER APPLICATIONS (MCA)

SCHEME OF INSTRUCTION & EXAMINATION

MCA I YEAR II-Semester

S. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction			Scheme of Examination			
			Periods per week			End Sem Exam hrs	Maximum Marks		Credits
			L	T	P		End Sem Exam	Sessi-onals	
1	HS 5510	Communicative English – II	2	-	-	2	35	15	2
2	CA 5520	Probability and Statistics	4	1	-	3	70	30	3
3	CA 5530	Object Oriented Programming using JAVA	4	1	-	3	70	30	3
4	CA 5540	Data Structures	4	1	-	3	70	30	3
5	CA 5550	Software Engineering	4	1	-	3	70	30	3
6	CA 5560	Computer Networks	4	1	-	3	70	30	3
Practicals									
7	HS 5811	English Language Training Lab – II	-	-	2	2	25	25	1
8	CA 5821	Programming Lab-III OOP (JAVA) Lab	-	-	6	3	50	25	3
9	CA 5831	Programming Lab-IV (DS Lab)	-	-	6	3	50	25	3
		TOTAL	**22**	**05**		**14**	**25**	**510**	**240**

MCA I YEAR I-SEMESTER
COMMUNICATIVE ENGLISH - I

UNIT – 1 : Importance of Communication- barriers to communication- surmounting the barriers- awareness of non- verbal communication

UNIT – 2: Listening Skills – sub-skills of listening - Barriers to Listening - strategies for effective listening- Practice Tests (with Audio/ Visual)

UNIT – 3 : Oral Communication – speaking skills and strategies for general conversations and public Speaking - Situational Dialogues - Public Speaking Skills – Conditional Sentences and responses– Self Introduction in given contexts – Functional Grammar & Usage – Roots, Prefixes and Suffixes – tenses - question tags – articles - prepositions - active-passive voice- Words often mis-spelt or confused – Mispronounced words – Practice Sessions- Practice Sessions - Tests.

UNIT – 4 : Reading skills- reading for gist/ for details/ guessing meaning from context- importance of loud reading and silent reading.

UNIT – 5 : Writing Skills – Paragraph Writing – Letter Writing – Email Writing – Punctuation –Sentence Usage to improve writing skills –types of sentences- Practice Sessions – Tests

LEARNING RESOURCES:

Prescribed textbook:

Technical communication – Principles and Practice (2nd Edition2014) – Meeenakshi Raman and Sangeeta Sharma – Oxford University Press

References:

1. Teaching listening comprehension, Penny UR, CUP
2. Teaching reading as a foreign language, Christine Nuttal, Macmillan
3. Essential Business grammar and practice, Michael Duckworth,OUP
4. Activities using Resources, Heather Westrop, Ioanna Baker, OUP
5. Business vocabulary in use, Bill Mascal, CUP
6. Oxford practice grammar (with CD-Rom John Eastwood (Intermediate), OUP

MCA I YEAR I-SEMESTER
DISCRETE MATHEMATICS

UNIT - I: Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems.
Boolean Algebra: Switching Functions, Logic gates, Don't Care Condition.
Set Theory: Sets and Subsets, Set operations and the Laws of Set theory, Counting and Venn Diagrams.

UNIT –II: Properties of Integers: The well-ordering principle, Recursive definitions, The Division Algorithm, Euclidean Algorithm, Fundamental theorem of arithmetic.
Functions: Cartesian Product, Functions, Onto Functions, Special Functions, Pigeonhole Principle, Composition and Inverse Functions, Computational Complexity.
Relations: Partial Order Relations, Lattices, Equivalence Relations and Partitions.

UNIT – III: Principle of Inclusion and Exclusion: Principles of Inclusion and Exclusion, Generalization of principle, Derangements, Rooks Polynomial, Arrangements with Forbidden Positions.
Generating Functions: Introductory examples, Definitions and examples. Partition of Integers, Exponential generating function, Summation operator.

UNIT-IV: Recurrence Relations: First-order linear recurrence relation, Second-order linear homogeneous recurrence relations with constant coefficients, Non-homogeneous recurrence relations, Divide-and-conquer algorithms.
Algebraic Structures: Definition, Examples and properties.
Groups: Definition, Examples and elementary properties, Homomorphism, Isomorphism and Cyclic groups.

UNIT – V: Graph Theory: Definitions and examples, Subgraphs, Complements and graph isomorphism, Vertex degree, Planar graphs: Hamiltonian paths and Cycles, Graph coloring.
Trees: Definitions, Properties and examples, Rooted Trees, Spanning Trees and Minimum Spanning Trees.

LEARNING RESOURCES:
Text Books:

1. Ralph P.Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education, 4th Edition, 2003.

References:

1. Kenneth H Rosen,"Discrete Mathematics & its Applications" TMHl,6th Ed 2007.
2. J.P.Tremblay & R.Manohar, "Discrete Mathematical Structures with Applications to Computer science", Mc Graw Hill, 1987.
3. Joe L.Mott, A.Kandal & R. Manohar, "Discrete Mathematics for Computer scientists, & Mathematicians", Prentice Hll N.J., 1986.
4. Kevin Ferland, "Discrete Mathematics", Houghton Mifflin Company, 2009.
5. http://nptel.iitm.ac.in

MCA I YEAR I-SEMESTER
MANAGERIAL ECONOMICS AND ACCOUNTANCY

UNIT – I : Meaning and Nature of Managerial Economics: Managerial Economics its usefulness to Engineers, Fundamental Concepts of Managerial Economics, Scarcity, Marginalism, Equi-marginalism, opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

UNIT – II: Consumer Behaviour: Law of Demand, Determinants, Kinds; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand forecasting, Law of Supply, concept of Equilibrium. (Theory questions and small numerical problems can be asked).

UNIT – III: Theory of Production and Markets: Production Function, Law of Variable Proportion, ISOquants, Economics of Scale, Cost of Production (types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price-Output determination under Perfect Competition and Monopoly (theory and problems can be asked).

UNIT – IV: Capital Management: Its Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT – V: Book-Keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance, Concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.
(theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

LEARNING RESOURCES:

Text Books:

1. Mehta P.L., "Managerial Economics – Analysis, Problems and Cases", Sulthan Chand & Son's Educational publishers, 2011.
2. Maheswari S. N. "Introduction to Accountancy", Vikas Publishing House, 2005.
3. Panday I.M. "Financial Management" Vikas Publishing House, 2009.

References:

1. Micro Economics by M. L.Seth.
2. Financial Accounting by Jain & Narang.
3. Financial Management by Khan & Jain.

MCA I YEAR I-SEMESTER
COMPUTER PROGRAMMING AND PROBLEM SOLVING

UNIT – I: Introduction to computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development.
Introduction to C Language: Background, C programs, Identifiers, Types, Variables, Constants, Operators, Input/Output, Expressions, Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion, Statements, Selection: making decisions, repetition.

UNIT – II:Functions: Designing Structured Programs, Functions in C, User-defined functions, Inter-function communication, Standard Functions, Scope, Recursion.
Arrays: Concepts, Using Arrays in C, Inter-function communication, Two Dimensional Arrays, Multidimensional Arrays. Application:- Linear, Binary Search, Selection, Bubble Sort and Insertion Sort.
Pointers: Introduction, Pointers for inter- function communication, pointers to pointers, Compatibility, LValue and RValue, Arrays and Pointers, Array of Pointers, Memory allocation functions.

UNIT – III: Strings: Concepts, C strings, String Input/Output Functions, Arrays of Strings, String Manipulation functions.
Enumerated, Structure and Union Types: The Type definition, Enumerated types, Structures, Unions, Pre-Processor Directives.
Text Input/Output Files in C: Files, Streams, Standard Library Input/Output Functions, Formatting Input/Output Functions, Character Input/Output Functions.

UNIT – IV: Introduction to C++: Introduction, simple program, standard library, header files, inline functions, references and reference parameters, default arguments, empty parameter lists, unary, scope resolution operator, function overloading, function templates.
Classes and data abstraction: Class scope, accessing class members, interface, constructors, destructors, const objects and member functions, this pointer, new and delete operators, static class members.
Operator overloading: Fundamentals, restrictions, overloading unary / binary operators.

UNIT – V: Inheritance: Base and derived classes, casting base class pointers to derived class pointers, using member functions overriding, public, protected and private inheritance, constructors and destructors in derived classes.
Virtual Functions: Abstract base class, polymorphism, dynamic binding, virtual destructors.
Stream Input/Output: Streams, Stream Output, Stream Input
Templates: Introduction, class templates, templates and inheritance, templates and static members.
Exception Handling: Try, throw, catch.

LEARNING RESOURCES:

Text Books:

1. Behrouz A. Forouzan, Richard F Gilberg, "Computer Science – A Structured Approach Using C", 3rd Edition, Cengage Learning 2007. (For Units I, II, III)
2. Walter Savitch, "Problem Solving with C++", 7th edition, Pearson Education Publishing, 2013. (For Units IV, V)

References:

1. Harry.H. Cheng, "C / C++ for Engineers and Scientist – An Interpretive Approach", TMH, 2010.
2. Ds. Malik, "C++ Programming Language", Cengage Learning, 2009.
3. Kernighan BW and Ritchie DM, "the C Programming Language", 2nd Edition, PHI, 2006.
4. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2000.
5. J.R. Hanly and E.B Koffman, "Problem Solving and Program Design in C", Pearson Education, 2007.
6. http://nptel.ac.in

MCA I YEAR I-SEMESTER
MANAGEMENT INFORMATION SYSTEMS

UNIT - I: Meaning and Role of Information Systems – Definition of Information Systems, Types of Information systems. Their advantages and disadvantages. An Introduction to concepts of System and Organizations. Strategic Uses of Information Technology. Business Process in Engineering and Information Technology.

UNIT - II : Applications to Operational Information Systems to Business, Tactical and Strategic Information System to Business.

UNIT - III : Information Systems Planning, Approach to System Building, Alternative Application Development.

UNIT – IV: Managing Knowledge, Knowledge Management in the Organization, Enhancing Management Decision Making, DSS, GDSS, ESS.

UNIT - V: Management of Information Systems, Information System security and control, Ethical issues. Cyber crimes – Global Perspective, Managing Firm Infrastructure and Enterprise System. Introduction to E-commerce (what is e-commerce)

LEARNING RESOURCES:

Text Books:

1. Robert Schultheis, Mary Sumner, "Management Information Systems-The Manager's View", Tata McGraw Hill, 4th Ed, 1998 (UNIT-1,II ,III)
2. Kenneth C Laudon, Jane P Laudon "Management Information systems" Prentice Hall, 2000(UNIT-IV,V)

References:

1. Ralph Stair, George Reynolds "Principles of Information systems", Cengage Learning 2008.
2. James A, O'Brien, "Management Information Systems", Tata McGraw Hill, Sixth Edition, 2004.
3. D. P. Goyal, "Management Information Systems-Managerial Perspective", Macmillan, 3rd Edition, 2010.(FOR CASE STUDIES)
4. Lecture Series on Management Information System by Prof.Biswajit Mahanty, Department of Industrial Engineering and Management, IIT Kharagpur. (www.nptel.iitm.ac.in)
5. http://hbsp.harvard.edu/he-main/resources/documents/web-files/Turban_formatted1.pdf

MCA I YEAR I-SEMESTER
COMPUTER ORGANIZATION

UNIT – I: Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits.
Digital Components: Integrated Circuits, Decoder, Multiplexers, Registers, Shift Registers, Binary counter, Memory unit.
Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes

UNIT - II : Register Transfer and Micro operations: Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit.
Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input-Output and Interrupts, Design of Accumulator logic.

UNIT – III: Programming the Basic Computer: Introduction, Machine Language, Assembly Language, The Assembler, Programming Arithmetic and Logic Operations, Subroutines and input output Programming.
Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT – IV: Central Processing Unit : Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program control, RISC.
Parallel Processing: Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.
Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, decimal arithmetic unit and decimal arithmetic operations.

UNIT - V
Input – Output organization : Peripheral Devices, I/O output interface, Asynchronous data transfer, Modes of transfer, Priority Interrupt, DMA, Input output Processor, Serial Communication.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory, Virtual Memory.
LEARNING RESOURCES:
Text Books:
1. M.Morris Mano, "Computer System Architecture", Pearson Asia / Prentice Hall, Third edition, 1993.
References:
1. Miles Murdocca, Vincent Hecuring, "Computer Architecture and Organization" , John Wiley & Sons 2007.

2. Sivarama P Dandamudi "Fundamentals of Computer Organization and Design", Springer/Dreamtech Publishers, 2003.
3. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth Edition, 2003.
4. G.V. Anjaneyulu, " Computer Organization" , Himalya Publishing House
5. http://en.wikipedia.org/wiki/Computer_architecture
6. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/index.htm

MCA I YEAR I-SEMESTER
ENGLISH LANGUAGE TRAINING LAB – I

1. Group Discussion – Practice (12 Sessions)

2. Public Speaking Skills Practice (12 Sessions)

Prescribed Book:
Speak Well : Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati – Orient BlackSwan

MCA I YEAR I-SEMESTER
Programming Lab – I (C & C++ Lab)

Programs Using C:

1. Write a program to calculate simple formulae like area of Circle, Rectangle etc.
2. Write a program to accept a number from user and display all the prime numbers up to that number.
3. Write a program to find Sin(x) and Cos(x) using series expansion.
4. Write a program to find maximum, minimum and sum of given set of numbers.
5. Write a program to demonstrate call-by-value and call-by-reference parameter passing mechanism.
6. Write a program to implement Linear and Binary Search.
7. Write a program to implement Selection and Bubble sort.
8. Write a program to implement Matrix Multiplication using pointers.
9. Write a program to implement Recursion: Factorial, Fibonacci, GCD and Tower Hanoi.
10. Write a program to find the number of letters, words and sentences in a given string.
11. Write a program to do string manipulation without using in-built library functions.
12. Write a program to generate address labels using structures.
13. Write a program to demonstrate Sequential File Access.
14. Write a program to demonstrate Random File Access.

Programs Using C++:

15. Classes for Bank Account, Student Information, Library Catalogue
16. Design and Implement Class 'String' with a default, parameterized and copy Constructors. Provide member functions to accept and display string and friend function to concatenate and compare two strings without using operator overloading.
17. Creation of complex class with operator overloading.
18. Creation of Inheritance Hierarchy (Bank Account, Person).
19. Programs demonstrating virtual, pure virtual functions using abstract base class "shape".
20. Template functions for Min() and Max() for finding minimum and maximum in a list.
21. Program on class Templates.
22. Write a Program to implement exception handling.
23. Program demonstrating Stream and File I/O using employee class.

LEARNING RESOURCES:

Text Books:

1. Behrouz A. Forouzan, Richard F Gilberg, "Computer Science – A Structured Approach Using C", 3rd Edition, Cengage Learning 2007. (For Units I, II, III)
2. Walter Savitch, "Problem Solving with C++", 7th edition, Pearson Education Publishing, 2013. (For Units IV, V)

References:

1. Harry.H. Cheng, "C / C++ for Engineers and Scientist – An Interpretive Approach", TMH, 2010.
2. Ds. Malik, "C++ Programming Language", Cengage Learning, 2009.
3. Kernighan BW and Ritchie DM, "the C Programming Language", 2nd Edition, PHI, 2006.
4. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2000.
5. J.R. Hanly and E.B Koffman, "Problem Solving and Program Design in C", Pearson Education, 2007.
6. http://nptel.ac.in

MCA I YEAR I-SEMESTER
Programming Lab – II
ELEMENTS OF INFORMATION TECHNOLOGY LAB

Lab work/Programs:

1. Identify and describe the relationships and role of the components of the "logical" diagram of the computer. (e.g. processor, RAM, ROM, BIOS, input, output, storage).
2. Relate the "logical" diagram of a computer system to the "physical" system by identifying physical components of a computer and describing their purpose.(e.g. the processor, memory chips, mother board, disk drives and controller cards such s AGP board, network cards, sound card, as well as parallel and serial ports etc).
3. Assemble the computer which they will use and load the OS with partitions for Windows and Linux, configure for network connection.
4. Troubleshoot his/her PC from time to time.
5. Install/Uninstall SW/HW on his/her PC from time to time.
6. Identify and distinguish between various types of application software by describing and using them (e.g. word processor, spreadsheet, database, browser, mailers etc.).
7. **MS Word:** Create documents with standard formatting commands, single/multi column, insert pictures/objects, drawings, hyperlinks, header/footer, tables, No macros.
8. **MS Power Point:** Create presentations with preset animations, using different layouts, backgrounds, slide master, insert pictures/objects, drawings, hyperlinks, header/footer, tables.
9. **MS Excel :** Creating worksheets with various kinds of data, making charts, conditional formatting, awareness of the various functions-statistical, date/time, math/trig etc. ability to explore (help) and use these functions if need be, demonstration through some common functions like sum, average, standard deviation, logical and information.
10. **HTML:** Should be able to create their web-page(title, text, frames, hyperlinks to some sites, pictures, lists, tables, fonts and colors) without using any web authoring tools.
11. Distinguish between various commercially available systems by relating the cost to features available on each system.

12. Be able to use the following list of commands in Linux:

alias	cp	ftp	man	talk	cmp
banner	date	gv	mkdir	telnet	gzip
bc	diff	gunzip	more	unzip	is
bg	dir	head	mv	vi	tar
cal	display	history	passwd	vim	ands
cat	df	id	pine	vimtutor	mail
cc	du	indent	ps	wall	chown
cd	echo	kill	pwd	wait	find
chgrp	exit	last	reboot	whereis	logout
chmod	fg	login	rm	who	tail
clear	file	logname	rmdir	whoami	zip
chfn	finger	in	shutdown	write	

13. **MS-Access:** Create database for student information, library information and inventory. Generation of queries, reports and transaction processing.

LEARNING RESOURCES:

Text Books:

1. Williams B.K. Sawyer et.al., "Using Information Technology", Sixth Edition, Tata McGraw-Hill, 2006.

References:

1. Aksoy & DeNardis "Introduction to Information Technology", Cengage Learning, 2006.
2. Dennis P. Curtin, Kim Folley et.al., "Information Technology, The breaking wave", McGraw Hill, 1998.
3. ITL Edn Solutions Ltd. "Introduction to Information Technology", Pearson Education, 2005.
4. http://office.microsoft.com/en-us/training/
5. http:// www.s3.amazonaws.com/szmanuals
6. http://www.baycongroup.com/wlesson0.htm
7. http://portal.aauj.edu/portal_resources/downloads/hardware/acomplete_illustrated_Guide_tothe_pc_hardware.pdf
8. http://faculty.ivytech.edu/~smilline/downloads/hardware.pdf

MCA I YEAR II-Semester

COMMUNICATIVE ENGLISH - II

UNIT–I: Channels of communication- styles of communication-interpersonal communication-Johari window- Assertiveness – Presentation Skills – Practice Sessions on Presentations

UNIT–II: Group Discussion Skills– Group Behaviour – Group Dynamics – GroupSpirit–Agreements & Disagreements–Adaptability-Consensus–Conclusion.

UNIT–III: Public Speaking Skills: Types of Speeches –Business Presentations-types of presentations- types of delivery-process and preparing and delivering presentations–Q & A interactive sessions.

UNIT–IV : Report writing- types of reports-structure of formal reports. letter writing and resume-Writing.

UNIT–V : Advanced grammar and vocabulary- clauses modals and common errors. Synonyms antonyms, homonyms, idioms, phrasal verbs - technical and business vocabulary. Interview Skills

LEARNING RESOURCES:
Prescribed textbook:

Technical communication – Principles and Practice (2nd Edition 2014) – Meeenakshi Raman and Sangeeta Sharma – Oxford University Press

References:

1. Teaching reading as a foreign language, Christine Nuttal, Macmillan
2. Business vocabulary in use, Bill Mascal, CUP
3. Decision maker, David Evans, CUP
4. Oxford practice grammar (with CD-Rom George Yule (Advanced), OUP

MCA I YEAR II-Semester

PROBABILITY AND STATISTICS

UNIT– I: Data Validation and Information Abstraction: Methods of collecting data efficiently (Primary data, Secondary Data – Limitations). Gathering information from data charting (Data Charting, Bar Diagram, graphs examples).

UNIT–II: Probability: Laws of Probability, Probability distributions, Discrete, Equiprobable, binomial, Poisson.

UNIT–III: Continuous Distributions: Rectangular, normal, gamma and beta.

UNIT–IV: Statistical Methods: Frequency distributions, Mathematical Expectations, Moments, Skewness and Kurtosis.

UNIT–V: Correlation and Regression, Introduction to tests of Significance, χ^2, t, F - tests.

LEARNING RESOURCES:

Text Books:

1. S.C Gupta and V.K Kapoor, "Fundamentals of Mathematical Statistics", 1989.

References:

1. William Mendenhall, Robert J. Beaver, Barbara M.. Beaver, "*Introduction to Probability and Statistics*" Thomson Brooks/Cole, Eleventh Edition, 2003.
2. Richard A.Johnson, "Probability and Statistics for Engineers", Prentice Hall of India, Seventh Edition, 2005.
3. Miller & Freund, Probability and Statistics for Engineers", 5th Edition, PHI Publications.
4. Peyton Z. Peebles, Jr., "Probability, Random Variables And Random Signal Principles", 4th Edition, Tata McGraw-Hill.
5. QEEE- recorded lectures – www.vcenet

MCA I YEAR II-Semester
OBJECT ORIENTED PROGRAMMING USING JAVA

UNIT - I : Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Oriented Concepts, Benefits of Object Oriented Development.

Java Programming fundamentals : Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes, Methods, Inheritance, Packages and Interfaces.

UNIT -II :Exceptional Handling, Multithreaded Programming, I/O basics, Reading console input and output, Reading and Writing Files, Print Writer Class, **String Handling**.

UNIT - III : Exploring java.lang, **Collections** - Overview, Collections Interfaces, Collection Classes, Iterators, RandomAccess Interface, **Maps**, Comparators, Arrays, Legacy classes and Interfaces, **String Tokenizer**, BitSet, Date, Calendar, Observable, Timer.

UNIT - IV : Java I/O classes and Interfaces, Files, Stream and Byte Classes, Character Streams, Serialization
Networking: Networking Basics, Internet address, URL, TCP/IP and Datagrams.

UNIT - V : GUI and Event Driven Programming: Applet Class, Event Handling, Delegation Event Model, Event Classes, Event Listener Interfaces, Customising Frame Windows, GUI Programming Basics, Text related GUI Components, Layout Managers, Effective use of nested panels, other GUI components, Menus and menu handling events.

LEARNING RESOURCES:

Text Books:

1. Herbert Schildt "JAVA 2: The Complete Reference" V edition 45th reprint 2009, Tata McGraw Hill.

References:

1. James M. Slack "Programming and Problem solving with Java" Thomson Learning, 2000.
2. C Thomas Wu "An Introduction to object oriented programming with Java" Tata McGraw Hill, 2005.
3. "Object Oriented programming using Java" Raj Kumar Buyya and Thamarai Selvi.
4. http://www.oracle.com/us/technologies/java/standard-edition/overview/index.html
5. http://docs.oracle.com/javase/tutorial/
6. www.buyya.com

MCA I YEAR II-Semester
DATA STRUCTURES

UNIT-I: Algorithm Specification, Performance Analysis and Measurement. Abstract Data Types and the C++ Class.
Arrays: Array as an Abstract Data Type, Sparse Matrices, Representation of Arrays.
Linked Lists: Singly Linked Lists and Chains, Representing Chains in C++, Template Class Chain, Circular Lists, Available Space Lists, Polynomials, Doubly Linked Lists.

UNIT-II: Stacks and Queues: Stack Abstract Data Type and Linked Stacks, Evaluation of Expressions. Queue Abstract Data type and Linked Queues, A Mazing Problem.

UNIT-III: Trees: Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators, Copying Binary Trees, Threaded Binary Trees, Heaps, Binary Search Trees.
Efficient Binary Search Trees: AVL Trees, Red-Black Trees.
Multiway Search Trees: m-way Search Trees, B-Trees.

UNIT-IV: **Sorting:** Insertion sort, Quick sort, Merge sort, Heap sort, Sorting on Several Keys, List and Table Sorts, Summary of Internal Sorting.
Hashing: Static Hashing, Hash Tables, Hash Functions, Secure Hash Functions, Overflow Handling, Theoretical Evaluation of Overflow Techniques

UNIT-V: Graphs: Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths.

LEARNING RESOURCES:
Text Books:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.

References:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Third Edition, Pearson Education 2007.
2. Michael T. Goodrich, Roberto Tamassia, David Mount, "Data structures and Algorithms in C++", Second Edition, John Wiley & Sons, Inc., 2011
3. D S Malik, "Data Structures Using C++", Second Edition, Cengage Learning, 2009
4. Cormen Leiserson & Rivest, "Introduction to Algorithms", 3 ed, PHI, 2009.
5. http://nptel.ac.in

MCA I YEAR II-Semester
SOFTWARE ENGINEERING

UNIT - I: The software Problem: Cost, Schedule and Quality, Scale and Change
Software Processes: Process and project, Component Software Processes, Software Development process Models, Project management Process

UNIT –II: Software Requirement Analysis and Specification: Value of a good SRS, Requirements process , Requirements specification, Functional Specification with Use Cases, Other approaches for analysis.
Software Architecture: Role of Software Architecture, Architecture Views, Component and Connector view, Architecture Styles for C and C View, Documenting Architecture Design, evaluating Architectures.

UNIT–III: Planning a Software Project: Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed scheduling,
Design: Design concepts, Function oriented Design, Object Oriented Design, Detailed Design

UNIT-IV: Coding and Unit Testing: Programming Principles and Guidelines, Incrementally developing code, managing evolving code, unit testing, code inspection
Testing: Testing Concepts, Testing Process, Black Box testing, White box testing
Product Metrics: Metrics for Analysis model, Metrics for Design Model

UNIT – V: Reengineering: Business process Reengineering, Software reengineering, Reverse engineering, Restructuring, Forward engineering, Economics of Reengineering
A Generic view of process: Software Engineering – A layered technology, A Process Framework, The Capability Maturity model Integration (CMMI), Process patterns, Process assessment, personal and Team process models, Process technology, product and process.

LEARNING RESOURCES:
Text Books:
1. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd edition, Narosa Publishing House.
2. Roger S, Pressman, Software Engineering: A Practitioner's Approach, 7th Edition, Tata Mc GrawHill.

References:
1. James F. Peters, Witold Pedrycz, Software Engineering- An Engineering Approach, John WUey Inc., 2000.
2. www.mhhe.com/pressman
3. http://nptel.iitm.ac.in

MCA I YEAR II-Semester
COMPUTER NETWORKS

UNIT–I: Data Communications: Components – Direction of Data Flow – Networks – Components and Categories – Topologies – Protocols and Standards – ISO/OSI model , TCP/IP.
Transmission Media: Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing.

UNIT–II: Datalink Layer: Error Detection and Correction, CRC, Hamming Code, Flow Control and Error Control – Stop and Wait – go back N ARQ – Selective Repeat ARQ – Sliding window – HDLC.
MAC Layer: Multiple Access: Random Access**,** Controlled Access, Channelization Wired LANs: Ethernet

UNIT – III: Network Layer: Logical Addressing: IPv4 Addresses, IPv6 addresses, Internetworking, IPv4: Datagram, fragmentation, checksum, options **IPV6**: Advantages, Packet format, Extension headers
Routing – Distance Vector Routing, Link State Routing, OSPF and BGP.

UNIT-IV: Transport Layer: Services of Transport Layer, Multiplexing.
Transmission Control(TCP) – Congestion Control , Timer Management, Quality of Services(QOS) and User Datagram Protocol(UDP)
UNIT – V: Application Layer: Domain Name Space(DNS) – SMTP – FTP – HTTP – WWW.

LEARNING RESOURCES:

Text Books:

1. Andrew S. Tanenbaum, Computer Networks, 4th Edition, Pearson Education, 2003.
2. Data Communications and Networking, Fourth Edition, Behrouz A. Forouzan.
3. Computer Networking – A Top Down Approach, Kurose & Ross, 3rd Ed. Pearson.

References:

1. W. Richared Stevens, Stephen A R-ago, Advanced Programming in the Unix Environment, 2nd Edition, Pearson Education,2005.
2. http://nptel.iitm.ac.in
3. http://www.prenhall.com/tanenbaum

MCA I YEAR II-Semester
ENGLISH LANGUAGE TRAINING LAB – II

Phonetics Lab:

1. Identification of Consonant Sounds & Vowel Sounds (6 Sessions)

2. Pronunciation of Words and Sentences - towards neutralization of accent. (6 Sessions)

IC Lab:

1. Debate – Practice Sessions (6 Sessions)

2. Power Point Presentations (6 Sessions)

Learning resources:
Speak Well : Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati - Orient BlackSwan

MCA I YEAR II-Semester
PROGRAMMING LAB – III
OOP (JAVA) LAB

1. A program to illustrate the concept of class with constructors, methods and overloading.
2. A program to illustrate the concept of inheritance and dynamic polymorphism.
3. A program to illustrate the usage of abstract class.
4. A program to illustrate multithreading.
5. A program to illustrate thread synchronization.
6. A program using String Tokenizer
7. A program using Linked list class.
8. A program using TreeSet class.
9. A program using HashSet and Iterator classes.
10. A program using Map classes.
11. A program using Enumeration and Comparator interfaces.
12. A program to illustrate usage of filter and Buffered I/o streams.
13. A program to illustrate the usage of Serialization.
14. An application involving GUI with different controls, menus and event handling.
15. A Program to implement and applet.
16. A Program to implement TCP/IP client server program.
17. A program to implement UDP client server program.

LEARNING RESOURCES:

Text Books:

1. Herbert Schildt "JAVA 2: The Complete Reference" V edition 45th reprint 2009, Tata McGraw Hill.

References:

1. James M. Slack "Programming and Problem solving with Java" Thomson Learning, 2000.
2. http://www.oracle.com/us/technologies/java/standard-edition/overview/index.html
3. http://docs.oracle.com/javase/tutorial/

MCA I YEAR II-Semester
PROGRAMMING LAB - IV
DS LAB

1. Implementation of array ADT.
2. Implementation of Linked List ADT (single, double and circular).
3. Polynomial arithmetic using linked list.
4. Implementation of Stacks (Arrays and Linked Representation).
5. Infix to Postfix Conversion, evaluation of postfix expression.
6. Implementation of Queues (Linear, Circular and DeQueue).
7. Application of Queues (Ticket reservation, Super Market).
8. Implementation of Linear and Binary Search.
9. Implementation of Hashing.
10. Implementation of Collision Resolution Techniques.
11. Implementation of Selection Sort.
12. Implementation of Insertion Sort.
13. Implementation of Shell Sort.
14. Implementation of Quick sort.
15. Implementation of Merge Sort.
16. Implementation of basic operations and traversals on Binary trees.
17. Implementation of Binary Search Trees.
18. Implementation of Heap Sort.
19. Implementation of operations on AVL Trees.
20. Implementation of Red-Black Trees.
21. Implementation of Graph Traversal Methods.
22. Implementation of Minimal Spanning Tree.

LEARNING RESOURCES:

Text Books:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.

References:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Third Edition, Pearson Education 2007.
2. Michael T. Goodrich, Roberto Tamassia, David Mount, "Data structures and Algorithms in C++", Second Edition, John Wiley & Sons, Inc., 2011
3. D S Malik, "Data Structures Using C++", Second Edition, Cengage Learning, 2009
4. Cormen Leiserson & Rivest, "Introduction to Algorithms", Third Edition, Prentice Hall India, 2009.
5. http://nptel.ac.in

FACULTY

Department of Civil Engineering

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23	Mr.G. Prabhakar	Asst. Prof.	9000230450
24	Ms.C. Divya	Asst. Prof.	9642991668
25	Ms.T. Nishitha	Asst. Prof.	9618771043

Department of ECE

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31	Mr.B. Uma Mahesh Babu	Asst. Prof.	9912616809

Department of EEE

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4	Ms. Ch. V.S.S. Sailaja	Assoc. Prof.	9949119301
5	Ms. G. Sandhya Rani	Asst. Prof. (Sr. Scale)	9494771587
6	Mr. M. Srinivasulu	Asst. Prof. (Sr. Scale)	9908610440
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10	Mr. U. Elisha	Asst.Prof.	9949632656
11	Mr. N. Uday Kumar	Asst.Prof.	8341560704
12	Mr. D. Harish Kumar	Asst.Prof.	9441677937
13	Ms.R. Sudha	Asst.Prof.	9502416753
14	Mr.P. Ravi	Asst.Prof.	9989600881
15	Mr.P. Rajasekhara Reddy	Asst.Prof.	9177207976
16	Mr.Asif Iqbal	Asst.Prof.	7702399682

Department of IT

Department Phone: 040-23146050 and 6051

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3	Ms. S. Rajyalakshmi	Asst. Prof.	9059842554
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9	Mr. M. Vishnu Chaitanya	Asst. Prof.	8686709187
10	Mr. J. Praneet Raj	Asst. Prof.	9985939949
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15	Mr.A. Shivaramakrishna	Asst. Prof.	9052622020
16	Ms.C. Swetha	Asst. Prof.	9180400975
17	Ms.K. Madhuri	Asst. Prof.	9908180408
18	Ms.B. Pavani Kumari	Asst. Prof.	9490147291
19	Mr.G. Srinivas Rao	Asst. Prof.	9966461156
20	Mr.N. Thirumalesh	Asst. Prof.	9985038051

Department of Mechanical Engineering

Department Phone: 040-23146060 and 6061

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04	Dr. T.Ramamohan Rao	Prof.	9440886144
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09	Mr. K.Veladri	Assoc.Prof.	9490684448
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11	Mr. B.Radha Krishna	Asst.Prof. (Sel.Gr.)	7702234605
12	Mr. J. Anjaneyulu	Asst. Prof. (Sr. Scale)	9490925436
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21	Mr. Venu Gopal Reddy	Asst. Prof.	9948129687
22	Mr. R. Praveen Kumar	Asst. Prof.	9985309617
23	Mr. U. Venkateshu	Asst. Prof.	7382026383
24	Dr. G.Venkata Rao	Adj. Prof.	9848159473
25	Mr. VBS Rajendra Prasad	Associate Prof.	9866351886
26	Ms. P.V.S. Subhashini	Asst. Prof.	9866802894
27	Mr.K. Santosh Kumar	Asst. Prof.	9963903196

Department of Computer Applications

Department Phone: 040-23146070 and 6071

1	Dr. P. Hemagiri Rao	Prof. & HOD	9885017940
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4	Mr. K. RamaKrishna	Asst. Prof.(Sr.Scale)	9440504846
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9	Mr. M. Jitender Reddy	Asst. Prof.	9966232282
10	Mr. M. Praveen Kumar	Asst. Prof.	9989306166
11	Mr. G. Ramesh Kumar	Asst. Prof.	9492021768
12	Mr. A.V.Ravinder Kumar	Asst. Prof.	8125877481

Department of H & SS

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4	Ms. B.Sheela Rani Simon	Asst. Prof.	9849721097
5	Ms. Molly Charles	Asst. Prof.	9703594998
6	Mr. T.Sunand Emmanuel	Asst. Prof.	9849027278
7	Mr. A.N. Guru Prasad	Asst. Prof.	9700280482
8	Mr. K. Ramana Prasad	Asst. Prof.	8332921359
9	Ms. M.Jyothi	Asst. Prof. (Sr.Scale)	9247780569

Department of Mathematics

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03	Dr. N.Vasudha	Assoc. Prof.	9441779840
04	Mr. R. Hari Kishore	Asst. Prof.	9247553181
05	Ms. C. Naga Anuradha	Asst. Prof.	9949592116
06	Mr. M. Venkateshwar Rao	Asst. Prof.	9959924151
07	Ms. V. Sri Ramani	Asst. Prof.	9390991496

Department of Physics

Department Phone: 040-23146092

01	Dr. A.S.Sai Prasad	Prof. & HoD	9959418896
02	Dr. M.Ramalingeswara Rao	Assoc. Prof.	9848516603
03	Dr. P.Venkateswara Rao	Assoc. Prof.	9885345663
04	Dr. V.Ravi Kumar	Assoc. Prof.	9866979357
05	Dr. G. Ramadevudu	Asst. Prof. (Sr. Scale)	9247802706
06	Mr. T. Satish Kumar	Asst. Prof.	9848285492

Department of Chemistry

Department Phone: 040-23146093

01	Mr. Ch.Gouri Shankar	Assoc. Prof & HOD	9441533665
02	Ms. B.K.Rama Devi	Assoc. Prof	9948090017
03	Dr. P.Venu Gopal	Assoc. Prof.	9866723518
04	Ms. P. Sukanya	Asst. Prof.	9948158437
05	Dr. K. Rajani Kumar	Asst. Prof.	9885584411
06	Dr. A. Satya Kumar	Asst. Prof.	9866318007
07	Ms. Velpula Angelina	Asst. Prof.	8977178719

Library and Sports

Department Phone: 040-23146095 and 6096

1	Mr. N.Karunakara Reddy	Librarian	9491315999
2	Mr.G.Vijaya Aditya Reddy	Asst. Physical Director	9966057678

CAMPUS PLACEMENTS

BE STUDENTS' PLACEMENT DETAILS - 2014 BATCH

Branch	CSE	ECE	EEE	IT	MECH.	CIVIL	TOTAL
Branchwise Intake	144	144	72	72	144	72	648
No. of Students registered with 60% and above Marks	119	130	59	64	119	59	550

PG STUDENTS' PLACEMENT DETAILS - 2014 BATCH

Name of the Branch	MCA	ME - VLSI	ME - Comm. Engg.	ME - CSE	ME - MECH
Branchwise Intake	55	18	18	18	18
No. of Students registered with 60% and above Marks	37	11	17	17	14

S.No.	Details	Total
1	No of students with 1 Offer(s)	250
2	No of students with 2 Offer(s)	94
3	No of students with 3 Offer(s)	69
4	No of students with 4 Offer(s)	29
5	No of students with 5 Offer(s)	5
5	No of students with 6 Offer(s)	0
Net Selections		447

STUDENTS PLACEMENT INFORMATION FOR THE ACADEMIC YEAR 2013-2014 Batch

S.No	Company	Package (Rs. Lakhs per year)	No of placements
1	Microsoft India (R & D) Private Limited	10.7	5
2	Mahindra & Mahindra Limited	6.00	4
3	Deloitte Consulting (India) Private Ltd	5.46	25
4	ELGI Equipments Limited	3.30	1
5	AMD R&D Centre India Pvt Ltd	6.00	1
6	S & P Capital IQ	6.89	4
7	FactSet	4.85	2
8	NSS Communications Pvt. Ltd	3.00	1
9	Infosys	3.25	198
10	Wipro	3.00	107
11	Cognizant	3.01	196
12	Capgemini	3.01	31
13	Cybage Software Pvt. Ltd	2.77	8
14	iGATE Global Solutions	3.01	35
15	NetCracker Technology	5.31	16
16	HSBC Software Development(India) Pvt. Ltd	3.40	3
17	Persistent Systems Limited	3.60	11
18	Teradata Corporation	6.00	4
19	ADP Private Limited	3.95	8
20	Next Sphere Technologies (India) Pvt. Ltd	1.20	2
21	Infotech Enterprises Limited	2.70	3
22	Intergraph Consulting Pvt. Ltd	4.50	6
23	Oracle India (Vertical P.G.B.U)	6.00	6
24	Pega Systems	6.00	10
25	L & T Construction	3.80	9
26	Oracle India (U.G.B.U)	6.00	5
27	FMC Technologies Inc	6.00	2
28	Tata Advanced Systems Limited	3.93	5
29	Kony Labs	7.40	1
30	Computer Science Corporation (CSC)	3.24	19
31	DEFTeam Solutions Pvt. Ltd.	3.25	5
32	IBM Global Business Services	3.40	2
33	Nalsoft India Private Limited	2.40	5
34	Sumtotal Systems	4.50	5
35	TechMahindra Limited	3.21	5
36	Franklin Templeton	3.60	1

37	iServiceGlobe	1.80	5
38	Exinent Info Solutions Pvt. Ltd	1.80	1
39	Tata Consultancy Services	3.20	2
40	Runaware Software	1.80	1
41	Verizon	4.50	1
42	Aarvee Associates	3.60	3
43	Sheela Foam Pvt. Ltd	3.20	1
44	Pixel Technology	2.00	1
45	Way2Online Interactive India Pvt Ltd	2.00	1
46	Bonaven Software Pvt.Ltd	2.00	2
47	Proflex Systems	2.20	2
48	Mold-Tek Technologies	1.80	1
49	United Online Software Development (India)	4.00	1
50	SAMSUNG R&D Institute India-Bangalore	6.50	1
51	ATC Telecom Tower Corporation Pvt. Ltd.	3.20	1
52	BHEL-GE Gas Turbine Services Pvt. Ltd	3.60	2
53	Hitachi Consulting Software Services India Pvt., Ltd.	4.00	1
54	TIBCO Software Inc	5.50	2
55	K.B Foundation	1.50	4
56	Crypsis Technologies Pvt.Ltd	1.50	1
57	Magnaquest Technologies Ltd	3.00	2
	Gross selections		**787**
	Net Selections		**447**

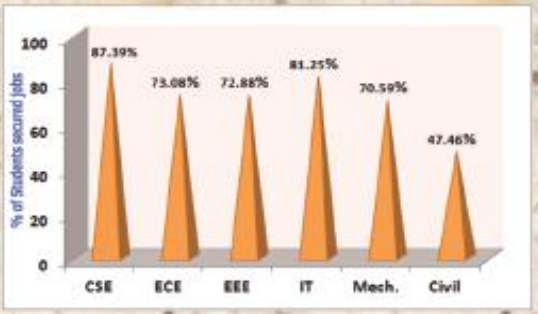
PERSONAL NOTES

Telephone Numbers

Name & Address	E-Mail	Office	Residence

Students Receiving Awards
from Vasavi Academy of Education Members

CAMPUS PLACEMENT DETAILS B.E 2014 BATCH



VASAVI COLLEGE OF ENGINEERING

(Autonomous)

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