BAPATLA ENGINEERING COLLEGE
(*Autonomous*)
BAPATLA - 522 101.

ACADEMIC REGULATIONS & SYLLABUS
(w.e.f. 2010-2011)

B.Tech

ELECTRONICS AND COMMUNICATION ENGINEERING

(Semester System)

BAPATLA ENGINEERING COLLEGE
(Autonomous)
(Affiliated to Acharya Nagarjuna University)
(Sponsored by Bapatla Education Society)
BAPATLA-522101, Guntur District, A.P.

Academic Rules & Regulations

(Effective for students admitted into first year B.Tech. from the academic year 2010-2011).

1.0 EXTENT: All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and when a doubt arises, the interpretation of the Chairman, Academic Council, Bapatla Engineering College (Autonomous) is final. As per the requirements of the Statutory Bodies, Principal, Bapatla Engineering College (Autonomous), shall be the Chairman of the College Academic Council.

2.0 ADMISSIONS:

2.1 Admission to first year of any Four Year B.Tech Programmes of study in Engineering: Admissions into first year of B.Tech Programme of Bapatla Engineering College (Autonomous) (***Subsequently referred to as*** **B.E.C**) will be as per the norms stipulated by Acharya Nagarjuna University & Govt. of Andhra Pradesh.

2.2 Admission to the Second year of any Four year B.Tech Programme of study in Engineering: Admissions into second year of B.Tech Programme of B.E.C will be as per the norms stipulated by Acharya Nagarjuna University & Govt. of Andhra Pradesh.

2.3 Admissions with advance standing: These may arise in the following cases:

1) When a student seeks transfer from other colleges to B.E.C and desires to pursue study at B.E.C in an eligible branch of study.
2) When students of B.E.C get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.
3) When a student after long discontinuity rejoins the college to complete his Programme of study for the award of a degree.
4) When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Programme of study.

These admissions may be permitted by the Academic Council of B.E.C as per the norms stipulated by the statutory bodies and the Govt. of Andhra Pradesh. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at B.E.C will be governed by the transitory regulations given in ***5.3.***

3.0 DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION: The duration of the B.Tech. Programme is four academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.

4.0 MINIMUM INSTRUCTION DAYS: Each semester shall consist of a minimum of 110 working days which includes instruction, term examinations and final examinations.

5.0 B.Tech. Programmes of study:

5.1 The Four year B.Tech Programme is offered in the following branches of study:

1) Biotechnology.
2) Chemical Engineering.
3) Civil Engineering.
4) Computer Science & Engineering.
5) Electrical & Electronics Engineering.
6) Electronics & Communication Engineering.
7) Electronics & Instrumentation Engineering.
8) Information Technology.
9) Mechanical Engineering.

5.2 Structure of the Programme:

5.2.1 Each Programme of a Discipline or branch of study shall consist of:

1) General core courses in Basic Sciences, Engineering Sciences, Humanities, Mathematics and Management.
2) Interdisciplinary courses in Engineering, to impart the fundamentals of Engineering to the student.
3) Compulsory core courses to impart broad based knowledge needed in the concerned branch of study.
4) Elective courses from either discipline or interdisciplinary areas to be taken by the student based on his/her interest and specialization preferred.
5) A Term paper and a Project approved by the Department to be submitted in the fourth year of study.

Every Programme of study shall be designed to have 45-50 theory courses and 20-25 laboratory courses and the distribution of types of courses from the above is indicated in the following table.

General Core courses	20 -35%
Interdisciplinary courses in engineering	15-25%
Compulsory Core courses in the branch of study	45-55%
Elective Courses	10-15%

Note: All components prescribed in the curriculum of any Programme of study shall be conducted and evaluated.

5.2.2 Contact hours: Depending on the complexity and volume of the course the number of contact hours per week will be determined.

5.2.3 Credits: Credits are assigned to each course as per norms mentioned in the following table.

Subject	Credits
Theory Course (3 Theory Periods/Week)	03
Theory Course (More than 3 Theory Periods/Week)	04
Laboratory Course	02
Term paper	02
Final year Project	10

5.3 Transitory Regulations: For students admitted under advance standing (mentioned in 2.3) these transitory regulations will provide the *modus operandi*.

At the time of such admission, based on the Programme pursued (case by case)

1) Equivalent courses completed by the student are established by the BOS concerned.
2) Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by B.E.C.
3) A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at B.E.C.
4) Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is merged.

5.4 Curriculum for each Programme of study:

1) The Four year curriculum of any B.Tech Programme of study in any branch of engineering is formulated based on the guidelines mentioned in 5.2 and will be recommended by the concerned Board of Studies and is approved by the Academic council of the college.
2) In case of students admitted under lateral entry, the respective regular curriculum contents from second year onwards are to be pursued by them.
3) In case of students admitted under advanced standing, the Programme curriculum will be prepared by the concerned Board of Studies and the Academic Council has to approve the same.
4) After approval from the Academic Council, Programme curriculum for the same shall be prepared and made available to all the students along with the academic regulations.

5.5 The Maximum duration permitted and cancellation of admission:

5.5.1 The maximum duration permitted for any student to successfully complete any four year B.Tech. Programme of study shall be:

1) Eight academic years in sequence from the year of admission for a normal student admitted into first year of any Programme and

2) Six academic years in sequence from the year of admission for a Lateral entry student admitted into second year of any Programme and
3) For students admitted with advanced standing, the maximum time for completion of Programme study shall be twice the period in terms of academic years in sequence, stipulated in the Programme curriculum defined at the time of admission.

5.5.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as in ***5.5.1***, his/her admission stands cancelled.

6.0 EXAMINATION SYSTEM & EVALUATION:

6.1 The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded as per section ***11.0.*** The performance of a student in each course is assessed with assignment tests, term examinations on a continuous basis during the semester called Continuous Assessment (CA) and a Final Examination (FE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.

6.2 The distribution of marks between Continuous Assessment(CA) and Final Examination(FE) to be conducted at the end of the semester will be as follows:

Nature of the course	CA	FE
Theory subjects	40	60
Drawing	40	60
Practicals	40	60
Term Paper	40	60
Project work	50	100

6.3 Continuous Assessment (CA) in Theory and Drawing subjects:

1) Ineach Semester there shall be two Term examinations and two Assignment Tests in every theory course. The duration of the Assignment Test shall be 45 minutes and that of the Term Examination shall be 90 minutes. Assignment sheets shall be given at least one week in advance of the commencement of the tests. Students shall answer the question(s) [or question(s) similar in model] from the Assignment sheet stapled to or printed on the script which is distributed in the examination hall.

   The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, Assignment Tests and the calculation of marks for CA in a theory course is given in the following table.

Weightage for different heads to calculate CA for 40 marks in a Theory course			
	Term Exams (Max. 20 marks)	Assignment Tests (Max. 15 marks)	Attendance (Max. 5 marks)
Better Performed test/exam	13	10	5
Other test/exam	7	5	

2) For drawing courses, there shall be only two Term examinations in a semester with no Assignment Tests. In case of such courses a maximum of 15 marks shall be given for day-to-day class work and a maximum of 20 marks shall be awarded to the Term examinations taking into account the performance of both the Term examinations giving weightage of 13 marks for the Term Examination in which the student scores more marks and the remaining 7 marks for the other term examination.

3) A maximum weightage of 5 marks will be given in the CA for attendance in all theory and drawing courses as indicated in ***7.1.1.***

6.4 Final Examination (FE) in Theory and Drawing subjects:

1) For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester for 60 marks, except where stated otherwise in the detailed Scheme of Instruction. Question paper setting shall be entrusted to external examiners from the panels approved by the respective Boards of Studies.

2) A minimum of 24 marks (40%) are to be secured exclusively in the final examination (FE) of theory/drawing course and a minimum total of 40 marks in FE and CA put together in a theory / drawing course is to be secured in order to be declared as passed in that course and for the award of the grade in the course.

6.5 Continuous Assessment (CA) in laboratory courses:

1) The evaluation for Laboratory course is based on CA & FE. The CA for 40 marks comprises of 20 marks for day to day laboratory work, 5 marks for record submission and 15 marks for a laboratory examination at the end of the semester.
2) In any semester, a minimum of 90 percent of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the concerned internal lab teacher and the Head of the Department to be eligible to appear for the Final Examination in that laboratory course.

6.6 Final Examination (FE) in laboratory courses:

1) For each laboratory course, the final examination (FE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam shall be for three hours. The FE is for 60 marks which include 30 marks for a lab experiment/exercise, 20 marks for Viva-voce and 10 marks for the certified record.
2) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in a laboratory course are to be secured in order to be declared as passed in the laboratory course and for the award of the grade in that laboratory course.

6.7 Evaluation of term paper:

1) A term paper is to be submitted by each student in the 7^{th} semester which would be a precursor to the project work to be done in the 8^{th} semester. The evaluation is based on CA for 40 marks, which includes a minimum of two seminars/presentations for 20 marks and the report submitted at the end of the semester which is evaluated for 20 marks.
2) The final examination (FE) shall be conducted for 60 marks by one internal and one external examiner appointed by the Principal. The FE contains Viva-voce and the demonstration of the model developed or work performed as a part of the term paper.

3) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in the term paper are to be secured in order to be declared as passed in the term paper and for the award of the grade in the term paper.

6.8 Evaluation of Project:

1) In case of the Project work, the evaluation shall be based on CA and FE. The CA for 50 marks consists of a minimum of two Seminars/ presentations for 25 marks and the Project Report submitted at the end of the semester which is evaluated for 25 marks.
2) FE shall be in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal. A minimum of 50 marks shall be obtained in FE exclusively and a minimum total of 60 marks in FE and CE put together are to be secured in order to be declared as passed in the Project and for the award of the grade.

6.9 A student who could not secure a minimum of 50% aggregate marks in CA of a semester is not eligible to appear for the Final Examinations conducted at the end of the semester and shall have to repeat that semester.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Assessment (CA), for any reason whatsoever, shall be deemed to have

scored zero marks in the respective component and no provision for make-up shall be provided.

7.0 ATTENDANCE REGULATIONS:

7.1 Regular course of study means a minimum average attendance of 75% in all the courses of study prescribed for a semester in the curriculum, computed by considering total number of hours / periods conducted in all courses as the denominator and the total number of hours / periods actually attended by the student in all courses, as the numerator.

7.1.1 A maximum of 5 marks weightage in CA in each theory/drawing course shall be given for those students who put in a minimum of 75% attendance in the respective theory/drawing course in a graded manner as indicated below:

Attendance of 75% and above but less than 80%	1 mark
Attendance of 80% and above but less than 85%	2 marks
Attendance of 85% and above but less than 90%	3 marks
Attendance of 90% and above	5 marks

7.2 Condonation of shortage in attendance may be recommended on genuine medical grounds, up to a maximum of 10% provided the student puts in at least 65% attendance as calculated in *7.1* above and provided the principal is satisfied with the genuineness of the reasons.

7.3 A student, who could not satisfy the minimum attendance requirements, as given above, in any semester, is not eligible to appear for the Final examinations and shall have to repeat that semester.

8.0 DETENTION: A student is said to have been detained and not allowed to appear for Final Examination(FE) at the end of the semester when

8.1 The student does not have a minimum 75% attendance or 65% attendance with condonation in all subjects put together in that semester or the student has not scored a minimum of 50% of marks in CA in all the courses of that semester put together.

Such a student shall have to repeat the same semester subsequently and satisfy the above requirements afresh to become eligible to appear for the Final Examination (FE), conducted at the end of the semester.

9.0 CONDITIONS FOR PROMOTION

9.1 A student not detained in the first semester of a year of study shall be promoted to second semester of that year of study.

9.2 A student shall be eligible for promotion to II year of B.Tech. Programme if he/she is not detained in the second semester of first year B.Tech. Programme irrespective of the number of backlog courses in I year B.Tech.

9.3 A student shall be eligible for promotion to III year of B.Tech. Programme if he/she is not detained in the second semester of II year B.Tech. Programme and has passed all but **three** courses of I year B.Tech. (including laboratory course).

9.4 A student shall be eligible for promotion to IV year of B.Tech. Programme if he/she is not detained in the second semester of III year B.Tech. Programme and has passed all but **three** courses of II B.Tech. (including laboratory course) and all but **one** course of I B.Tech. (including laboratory course).

10.0 Registration: Every eligible student (not detained and promoted) has to register himself /herself at the beginning of every semester indicating all the Courses taken up for pursuit by him/her during that Semester.

10.1 When a student is debarred for one or more semesters, his/her registration in the present semester is cancelled and the student is debarred from registering in future during the debarred period.

10.2 In any case while re registering in any semester, he or she will have to pay the requisite fee once again.

11.0 GRADING SYSTEM

11.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each course. The letter grades and the corresponding grade points are as given in the Table.

Table: Grades & Grade Points

Grade	Grade points	% of Marks
O	10	90% and above
A+	9	80% – 89%
A	8	70% – 79%
B+	7	60% – 69%
B	6	50% – 59%
C	5	40% – 49%
F	Failed, 0	Less than 40%

11.2 A student who earns a minimum of 5 grade points (C grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. **However it should be noted that a pass in any course/term paper/Project shall be governed by the rules mentioned in 6.0**.

12.0 GRADE POINT AVERAGE

12.1 The Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the course *i*,

G_i = grade points obtained by the student in the course.

12.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation.

12.3 To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time.

13.0 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE: A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following conditions;

1) Registered and successfully completed all the components prescribed in the Programme of study to which he/she is admitted,
2) Obtained CGPA greater than or equal to 5.0 (Minimum requirements for Pass),
3) Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and
4) No disciplinary action is pending against him/her.

14.0 AWARD OF CLASS: A candidate who becomes eligible for the award of B.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Table: CGPA required for award of Degree

Distinction	**≥ 8.0***
First Class	**≥ 7.0**
Second Class	**≥ 6.0**
Pass	**≥ 5.0**

* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the Programme**.

14.1 Grade Sheet: A grade sheet (Memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the Grades and SGPA.

14.2 **Transcripts**: After successful completion of the total Programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee. Partial transcript will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.

14.3 Candidates shall be permitted to apply for recounting/revaluation of FE scripts within the stipulated period with payment of prescribed fee.

14.4 The Governing body of B.E.C (Autonomous) has to approve and recommend to the Acharya Nagarjuna University for the award of a degree to any student.

15.0 IMPROVEMENT OF CLASS:

15.1 A candidate, after becoming eligible for the award of the Degree, may reappear for the Final Examination in any of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for CA in any course or for Final Examinations (FE) in laboratory courses (including Project Viva-voce) for the purpose of improvement.

16.0 SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular / Supplementary examinations as Supplementary candidates may have to take more than one Final Examination per day. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

17.0 INSTANT SUPPLEMENTARY EXAMINATIONS: Candidates who fail in one theory course of 4^{th} year 2^{nd} semester can appear for Instant Supplementary Examination conducted after declaration of the revaluation results of the said exam.

18.0 MALPRACTICES:

The Principal shall refer the cases of malpractices in Continuous Assessments (CA) and Final Examinations (FE) to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice committed by the student to the Principal. The Principal along with the members of the Committee is authorised to award a suitable punishment.

19.0 ADDITIONAL ACADEMIC REGULATIONS:

19.1 Any attempt to impress upon the teachers, examiners, faculty and staff of Examinations, bribing for either marks or attendance will be treated as malpractice.

19.2 When a student is absent for final examination, he/she is treated as to have appeared and obtained zero marks in that component and Grading is done so.

19.3 When a component of Continuous Assessment (CA) or Final Examination (FE) is cancelled as a penalty, he/she is awarded zero marks in that component.

20.0 AMENDMENTS TO REGULATIONS:

The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend or change the Regulations, Schemes of Examinations, and/ or Syllabi or any other matter pertained suitable to the needs of the students, society, industry without any notice.

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First Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC111 / MA01	Mathematics – I	4	1		40	60	100	4
EC112 / PH01	Engineering Physics – I	3	1		40	60	100	3
EC113 / CY01	Engineering Chemistry – I	3	1		40	60	100	3
EC114 / EN01	English Language and Communication	3	1		40	60	100	3
EC115 / CE01	Engineering Mechanics	4	1		40	60	100	4
EC116 / CS01	Computer Programming with C	4	1		40	60	100	4
EC151 / PHL01	Physics laboratory – I			3	40	60	100	2
EC152 / CYL01	Chemistry laboratory – I			3	40	60	100	2
EC153 / CSL01	Computer Programming Lab.			3	40	60	100	2
	TOTAL	21	6	9	360	540	900	27

CA: Continuous Assessment **FE:** Final Examination

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First Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC121 / MA02	Mathematics – II	4	1		40	60	100	4
EC122 / PH02	Engineering Physics – II	3	1		40	60	100	3
EC123 / CY02	Engineering Chemistry – II	3	1		40	60	100	3
EC124 / EI124	Circuit Theory	3	1		40	60	100	3
EC125 / BT01	Environmental Studies	3			40	60	100	3
EC126 / ME01	Engineering Graphics	3	3		40	60	100	3
EC161 / PHCY L01	Physics & Chemistry Laboratory –II			3	40	60	100	2
EC162 / ENL01	English Language Laboratory			3	40	60	100	2
EC163 /MEL01	Workshop			3	40	60	100	2
	TOTAL	**19**	**7**	**9**	**360**	**540**	**900**	**25**

CA: Continuous Assessment **FE:** Final Examination

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Second Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC211 /MA03	Mathematics – III	4	-		40	60	100	4
EC212	Data Structures using C	3	1		40	60	100	3
EC213 / EC02	Electronic Devices	3	1		40	60	100	3
EC214 /EI 02	Network Analysis and Synthesis	4	1		40	60	100	4
EC215 / EC03	Digital Electronics	4	1		40	60	100	4
EC216 / EC04	Electromagnetic Field Theory	4	1		40	60	100	4
EC251	Data Structures Lab			3	40	60	100	2
EC252 / ECL02	Electronic Devices Lab			3	40	60	100	2
EC253 / ECL03	Digital Electronics Lab			3	40	60	100	2
	TOTAL	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

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Second Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC221 /MA04	Mathematics – IV	4	-		40	60	100	4
EC222 / EC05	Electronic Circuits – I	4	1		40	60	100	4
EC223 / EE04	Electrical Technology	3	1		40	60	100	3
EC224	Transmission Lines & Waveguides	4	1		40	60	100	4
EC225	Signals and Systems	4	1		40	60	100	4
EC226	Electronic Measurements and Instrumentation	3	1		40	60	100	3
EC261 / ECL04	Electronic Circuits –I Lab			3	40	60	100	2
EC262	PSPICE Lab			3	40	60	100	2
EC263	Signals & Systems lab			3	40	60	100	2
	TOTAL	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

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Third Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC311/EC06	Linear Integrated Circuits and Applications	4	1		40	60	100	4
EC312/EI03	Linear Control Systems	4	1		40	60	100	4
EC313/EC07	Electronic Circuits – II	3	1		40	60	100	3
EC314	Analog Communications	3	1		40	60	100	3
EC315/EI04	Pulse and Switching Circuits	4	1		40	60	100	4
EC316/EC08	Microprocessors and Microcontrollers	3	1		40	60	100	3
EC351	Analog Communication Lab			3	40	60	100	2
EC352/ECL07	Pulse and Ics Lab			3	40	60	100	2
EC353/ECL08	Microprocessors & Microcontrollers Lab			3	40	60	100	2
	TOTAL	**21**	**6**	**9**	**360**	**540**	**900**	**27**

CA: Continuous Assessment **FE:** Final Examination

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Third Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC321/EI05	Professional Ethics and Human values	3	1		40	60	100	3
EC322	Digital Communications	4	1		40	60	100	4
EC323/EI06	Digital Signal Processing	4	1		40	60	100	4
EC324	Antenna and Wave Propagation	4	1		40	60	100	4
EC325	Object Oriented Programming with C++	3	1		40	60	100	3
EC326	Elective – I	3	1		40	60	100	3
EC361	Digital Communications Lab			3	40	60	100	2
EC362	Object Oriented Programming using C++ Lab			3	40	60	100	2
EC363/ENL02	Soft Skills Lab			3	40	60	100	2
	TOTAL	**21**	**6**	**9**	**360**	**540**	**900**	**27**

CA: Continuous Assessment **FE:** Final Examination

Elective I
EC 326 (A) Communication Systems
EC 326 (B) Computer Organization
EC 326 (C) Adaptive Control Systems
EC 326 (D) Advanced Microcontrollers

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Final Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
EC411/ME05	Industrial Management and Entrepreneurship Development	4	0		40	60	100	4
EC412/EI07	VLSI Design	4	1		40	60	100	4
EC413	Microwave Engineering	4	1		40	60	100	4
EC414	Satellite Communication	4	1		40	60	100	4
EC415	Elective - II	3	1		40	60	100	3
EC416	Open Elective	3	1		40	60	100	3
EC451	Term paper			3	40	60	100	2
EC452	Verilog HDL Lab			3	40	60	100	2
EC453	DSP Lab			3	40	60	100	2
	TOTAL	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

Elective - II
EC 415 (A) Digital Image Processing
EC 415 (B) Digital TV fundamentals
EC 415 (C) Embedded Systems
EC 415 (D) Advanced Digital Signal Processing

Open Elective:
EC100 Embedded Systems
EC200 Consumer Electronics

BAPATLA ENGINEERING COLLEGE : BAPATLA
(Autonomous)
SCHEME OF INSTRUCTION & EXAMINATION
FOR
ELECTRONICS AND COMMUNICATION ENGINEERING
w.e.f 2010-2011 (Semester System)

Final Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab/ Project	CA	FE	Total Marks	
EC421	Radar and Navigational Aids	4	-		40	60	100	4
EC422	Optical Communications	4	-		40	60	100	4
EC423	Elective –III	4	1		40	60	100	4
EC424	Elective – IV	4	1		40	60	100	4
EC461	Project Work			9	50	100	150	10
EC462	Microwave & Optical Communication Lab			3	40	60	100	2
	TOTAL	16	2	12	**250**	**400**	**650**	**28**

CA: Continuous Assessment **FE:** Final Examination

Elective III
EC 423 (A) Computer Networks
EC 423 (B) HDL Programming
EC 423 (C) Artificial Intelligence
EC 423 (D) Java Programming

Elective IV
EC 424 (A) Mobile & Cellular Communication
EC 424 (B) Fuzzy Logic
EC 424 (C) Speech Signal Processing
EC 424 (D) Neural Networks.

MATHEMATICS – I

(Common for all branches)

MA01

I B.Tech I Semester

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Matrix Algebra: Rank of a Matrix, Linear Independence, Vector Space, Solutions of Linear Systems, Inverse of a Matrix by Gauss-Jordan Elimination, Vector Spaces, Inner Product Spaces, Linear Transformations. Eigen Values, Eigen Vectors, Some applications of Eigen value problems. Symmetric, Skew-Symmetric and Orthogonal Matrices.

UNIT - II

Matrix Algebra: Complex Matrices: Hermitian, Skew-Hermitian and Unitary. Similarity of Matrices, Basis of Eigen Vectors, Diagonalization.

Differential Calculus: Rolle's Theorem, Lagrange's Mean Value Theorem and Taylor's Theorem (without Proofs), Taylor's and, Maclaurin's Series for functions of one variable. Maxima and Minima of functions of Two Variables, Lagrange's method of Multipliers.

UNIT - III

First Order Differential Equations: Basic concepts, Geometrical meaning, Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Equation, Orthogonal Trajectories of curves, Some Engineering Applications: Growth-Decay and Newton's Law of Cooling.

UNIT - IV

Linear Differential Equations of Second Order: Homogeneous Linear Equations of Second Order, Second Order Homogeneous Equations with Constant Coefficients, Case of Complex Roots, Euler-Cauchy Equations, Non-Homogeneous Equations, Solution by Undetermined Coefficients, Solution by Variation of Parameters, Applications-Modeling of Electric Circuits.

TEXT BOOK:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons.

REFERENCE BOOK:

1. George B, Thomas, Jr. and Ross L. Finney, "Calculus and Analytic Geometry", Addison Wesley.

ENGINEERING PHYSICS – I

(Common to all branches)

PH01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I (11 Periods)

OPTICS

INTERFERENCE: Two-wave interference, coherence, cosine law, Michelson interferometer and its applications, (determination of wavelengths of monochromatic light and resolution of two nearby wavelengths).

DIFFRACTION: Fresnel &Fraunhoffer diffraction, fraunhoffer diffraction due to single slit, plane diffraction grating, dispersive and resolving power of grating.

POLARISATION: Introduction, Brewester's and Malus law, double refraction, Nicol prism, quarter wave plate, half wave plate.

UNIT – II (10 Periods)

LASERS & FIBER OPTICS

LASERS: Properties of lasers**,** Spontaneous and stimulated emission, Population inversion, active medium, Solid state (Ruby) laser, Gas(He-Ne) laser, semiconductor (Ga-As) laser, Applications.

HOLOGRAPHY: Principle, recording and reproduction of holography, Applications.

FIBER OPTICS: Structure and types of optical fibers, acceptance angle, Numerical aperture, fiber optic communication and its advantages.

UNIT – III (10 Periods)

ELECTRICITY & MAGNETISM: Gauss's law in static electricity (qualitative only), Gauss's law of magnetism, circulating charges, Cyclotron-constructing, working and limitations, Hall effect and its applications, displacement current, Maxwell's equations (qualitative treatment), E M oscillations, velocity of EM waves, energy transport and the pointing vector, radiation pressure, AC circuit containing series LCR circuit-resonance condition.

UNIT – IV (11 Periods)

MODERN PHYSICS: Dual nature of light, de-Brogli's concept of matter waves, Davison-Germer electron diffraction experiment, Heisenberg's uncertainty experiment and applications (non-existence of electron in a nucleus and finite width of spectral lines), one dimensional time- independent Schrödinger wave equation, physical significance of wave function, applications of time-independent wave equation to particle in a box (one dimensional), tunneling, the scanning tunneling microscope.

TEXT BOOKS:

1. R.K Goure and S.C. Gupta, "Engineering Physics", New Delhi.
2. Halliday, Resnik, Krane, "PHYSICS", John Wiley & Sons.

REFERENCE BOOKS:

1. "Optics", A. Ghatak (TMH).
2. "Concepts of Modern Physics", AurthurBeiser (TMG).
3. "A text book of engineering physics", M.N. Avadhanulu, P.G. Kshirasagar, S.Chand& Co.,.
4. Serway and jewett, "Physics for scientist and engineers with Modern physics", 6th edition, Tomson Brooks/Cole, Indian reprint.

ENGINEERING CHEMISTRY – I

(Common to all branches)

CY01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

WATER TECHNOLOGY **(11 Periods)**

Characteristics – alkalinity – types of alkalinity and determination – hardness – types and estimation by EDTA method (problems); Domestic water treatment – disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water – requirements – disadvantages of using hard water in boilers: Scales, Sludges, Caustic embrittlement, boiler corrosion, Priming and foaming – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning –demineralization process –Lime Soda Process-desalination of brackish water by electro dialysis and reverse osmosis.

UNIT – II

POLYMERS: **(12 Periods)**

Polymers: Definition, Polymerization, types, addition and condensation polymerization, free radical polymerization mechanism.

Plastics: Classification, Preparation, Properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET.

Rubber: vulcanization of rubber, synthetic Rubbers: Buna-S, Buna-N and Polyurethane rubbers.

SURFACE CHEMISTRY:

Surface Chemistry: Solid surfaces, types of adsorption, Frendlich and Longmuir adsorption isotherm, BET adsorption equip. Calculation of surface area of solid & application adsorption: role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement; classification of colloids, Electrical & optical properties micelles, applications of colloids in industry.

UNIT – III

(11 Periods)

RENWEBLE AND NON RENWEABLE ENERGY SOURCES

Thermal and Chemical energy: Introduction to solid fuels - calorific value (lower, higher)-determination of calorific value(Bomb Calorimeter) - pulverized coal – carbonization (Bee Haive method - Otto Hoffman by product method)- Proximate and ultimate analysis of coal - Flow Chart in Thermal Power Stations.- Introduction to Geo Thermal Energy-working – applications-Introduction to Solar Cells –Solar Panels-Applications-Green House Concept - wind energy – fuel cells – hydrogen – oxygen fuel cell – batteries – alkaline batteries – lead–acid, nickel–cadmium and lithium batteries.

UNIT – IV

ENGINEERING MATERIALS **(11 Periods)**

Refractories – classification – acidic, basic and neutral refractories – properties: refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide.

Composites: definition, types, polymer matrix composites.

Lubricants – mechanism of lubrication, liquid lubricants - properties: viscosity index, flash and fire points, cloud and pour points, oiliness –solid lubricants – graphite and molybdenum sulphide.

Nanomaterials: Introduction to nano chemistry – preparation of few Nano materials: carbon nanotubes, Fullerenes etc – Properties of Nano materials and their Engineering applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002).
2. S.S. Dara & Mukkati K., “A text book of engineering chemistry”, S.Chand & Co.Ltd., New Delhi (2006).
3. “Text Books of Engineering Chemistry”, C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

REFERENCE BOOKS:

1. B.K.Sharma, “Engineering chemistry”, Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
3. “Enginering Chemistry”, J.C. Kuriacase & J. Rajaram, Tata McGraw Hill co., New Delhi 1. (2004).
4. “Chemistry of Engineering Meterials”, R.P Mani and K.N.Mishra, CENGAGE learning.
5. “Applied Chemistry – A text for Engineering & Technology”, Springar (2005).
6. “Text Book of Engineering Chemistry”, ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
7. “Engineering Chemistry”, R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

ENGLISH LANGUAGE AND COMMUNICATION

(Common to all branches)

EN01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Objective of the course: To impart Basic skills of communication in English in through intensive practice to the First year student, So as to enable them to function confidently and effectively in that language in the professional sphere of their life.

Unit – 1

Grammar: This area exposes the learners to improve the standard proficiency level, avoiding grammatical mistake in communication.

1. Tenses
2. Preposition
3. Parts of speech

Unit – 2

Writing skills: This area promotes a format and well structured sentences required in professional writing

1. Paragraph writing
2. Letter writing
3. Essay writing

Unit – 3

Vocabulary: This unit offers an extensive knowledge of words and word meaning, essential for communication and contemporary test

1. Analogies
2. Idioms and phrases and their use
3. Antonyms & Synonyms

Unit – 4

Reading skills: Reading skills enable the student to turn writing into meaning and achieve the goals of reading independently, comprehensibly and fluently

1. Reading comprehension
   i. Scanning
   ii. Skimming
   iii. Glance

TEXT BOOK:

1. "Objective English for Competitive Examination (Third edition)", Hari Mohan Prasad, Uma ReniSinha, Tata McGraw Hill.

REFFRENCE BOOKS:

1. "Effective Technical Communication", M.AshrafRizvi, Tata McGraw Hill.
2. "Cambridge Preparation Guide for TOFEL".
3. "Dictionary of Technical Terms".
4. "Cambridge Advanced Learner's Dictionary".
5. "Cambridge Idioms Dictionary".
6. "Basic Correspondence & Report Writing", Sharma, Tata McGraw Hill.
7. "Business Correspondences and Report Writing", R.C.Sharma, Krishna Mohan, Tata McGraw Hill.
8. "Dictionary of Misspelled and Easily Confused Words", David Downing, Deborah K.Williams, Tata McGraw Hill.

ENGINEERING MECHANICS

(Common to all branches except Mechanical Engineering)

CE01

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

General Principles: Mechanics, Fundamental concepts, Units of measurements, International systems of units, Numerical calculations, General procedure for analysis.

Force Vectors: Scalars and vectors, Vector operations, Vector addition of forces, Addition of a system of coplanar forces.

Equilibrium of a Particle: Condition for equilibrium of a particle, the free body diagram, coplanar force system.

Force System Resultants: Moment of a force (Scalar formation), Principle of moments, Moment of a couple (Scalar formation), and Equivalent system, Resultants of a force and couple system (Coplanar force system), further reduction of a force and couple system (Coplanar force system).

Equilibrium of a Rigid Body: Conditions for rigid body equilibrium (Equilibrium in two dimensions), Free body diagrams, Equations of equilibrium, Two and three force members.

UNIT – II

Friction: Characteristics of dry friction, Problems involving dry friction.

Center of Gravity and Centroid: Center of gravity and center of mass for system of particles, Center of gravity, center of mass and centroids for a body, Composite bodies.

Moments of Inertia: Definition of moments of inertia for areas, Parallel axis theorem for area, radius of gyration of an area, Moments of inertia of an area by integration, Moments of inertia for composite areas.

UNIT – III

Kinematics of a Particle: Introduction, Rectilinear kinematics: Continuous motion, General curvilinear motion, Curvilinear motion: Rectangular components, Motion of a projectile, curvilinear motion: Normal and tangential components, Absolute dependent motion analysis of two particles.

Kinetics of a Particle: Force and Acceleration: Newton's law of motion, The equation of motion, Equation of motion for a system of particles, Equation of motion: Rectangular coordinates, Equation of motion: Normal and tangential coordinates.

UNIT – IV

Kinetics of Particle: Work and Energy: The work of a force, Principle of work and energy, Principle of work and energy for a system of particles, Power and efficiency, Conservative forces and potential energy, Conservation of energy.

Kinetics of Particle: Impulse and Momentum: Principle of linear impulse and momentum, Principle of linear impulse and momentum for a system of particles, Conservation of linear momentum for a system of particles, Impact.

TEXT BOOK:

1. “Engineering Mechanics Statics and Dynamics”, R.C. Hibbeler and Ashok Gupta. Pearson Education.

REFERENCE BOOKS:

1. “Vector mechanics for Engineers Statics and Dynamics”, Beer and Johnston, Tata McGraw-Hill publishing company, New Delhi.
2. “Engineering Mechanics”, S. Timoshenko and D. H. Young – McGraw-Hill International Edition.
3. “Engineering Mechanics Statics and Dynamics”, J. L. Meriam and L. Kraige.
4. “Engineering Mechanics for Engineers. Statics and Dynamics”, Beer and Irving H. Shames, Pearson Education.

COMPUTER PROGRAMMING WITH C

(Common to all Branches)

CS01

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction:

Computer Fundamentals: Computer and its components, hardware/software**,** algorithm, characteristics of algorithms, flowchart, symbols used in flowchart, history of C, basic structure of a C program.

C Tokens: Character set, variables, keywords, data types and sizes, type qualifiers, numeric constants and their forms of representation, character constants, string constants, declaration and initialization of variables.

Operators & Expressions: Arithmetic operators and expressions, type-conversion rules, coercion, assignment operators and expressions, increment and decrement operators, conditional operator, statements, preprocessor directives, input/ output functions and other library functions. Relational operators and expressions, Boolean operators and expressions, operator precedence and associativity.

Control Statements: if-else statement, else-If statement and switch statement.

Programming Exercises for Unit I :

C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, filling the blanks in *a* given program. Programs using Scientific and engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, computation of electricity bill and conversion of lower case character to its upper case.

UNIT – II

Control Statements: while loop, for loop, do while loop, nested Control statements, break and continue statements.

Arrays: One-Dimensional numeric and character arrays and Two-Dimensional numeric and character arrays.

Programming Exercises for Unit - II:

To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number. To print graphic patterns of symbols and numbers and computation of statistical parameters of a given list of numbers. To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not. Transpose of a matrix, product and sum of matrices and sorting of names using arrays.

UNIT – III

Functions: Function definition, parameter passing mechanisms and simple recursion.
Scope & extent: Scope rules and storage classes.
Pointers and Dynamic Memory Allocation: Pointer variables**,** pointer arithmetic, dynamic memory allocation, array of pointers, command line arguments, passing pointer variables as parameters to functions.

Programming Exercises for Unit - III:
Functions - Insertion sort, Linear search. Recursive functions to find factorial & GCD(Greatest Common Divisor), string operations using pointers and pointer arithmetic and dynamic memory allocation. Swapping two variable values. Sorting a list of names using array of pointers and command line arguments.

UNIT – IV

Structures: Structures, array of structures, pointers to structures, unions and difference between structure and union.
Files: File handling functions for input and output.

Programming Exercises for Unit - IV:
Operations on complex numbers, matrix operations with the matrix and the size of the matrix as a structure, sorting a list of student records on register number using array of pointers and to read an input file of marks and generate a result file.

TEXT BOOK:
1. Byron Gottfried, “Programming with C”, Schaum's Outline series.

REFERENCE BOOKS:
1. Kernighan BW and Dennis Ritchie M, “C programming language”, 2nd ed, Prentice Hall.
2. Yashavant P. Kanetkar, “Let us C”, BPB Publications.
3. E.Balagurusamy, “Programming in ANSI C”, 4th ed, Tata Mcgraw-Hill.
4. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata Mcgraw-Hill.

PHYSICS LAB – I

(Common to all branches)

PH L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of curvature of a Plano convex lens by forming Newton's rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determination of numerical aperture of an optical fiber.

CHEMISTRY LAB – I

(*Common to all branches)*

CY L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

2. Volumetric Analysis:
    a. Estimation of acid content in un-known solution
    b. Estimation of Iron by Dichrometric method
    c. Estimation of Copper by Iodometric method
    d. Estimation of available chlorine in bleaching powder

3. ANALYSIS OF WATER: Estimation of :
    a. TOTAL HARDNESS BY EDTA METHOD
    b. TURBIDITY
    c. CONDUCTIVITY
    d. pH
    e. TOTAL DISSOLVED SALTS
    f. SALANITY
    g. ALKALINITY
    h. DISSOLVED OXYGEN

4. BACTERIAL COUNT: The student has to get his water sample and the teacher has to explain the analysis and the results are to be compared with the INDIAN STANDRDS.

5. CONSTRUCTION OF GALVANIC CELL: Based on the position of the metals in the electrochemical series a model electrochemical Cell is constructed and the values are determined and effect of metal ion concentration, Temperature etc. on emf are calculated.

TEXT BOOKS:

1. “Practical Engineering Chemistry”, K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. “Inorganic quantitative analysis”, Vogel.

REFERENCE BOOKS:

1. “Text Book of engineering chemistry”, R. N. Goyal and HarrmendraGoel.
2. “A text book on experiments and calculation Engg.”, S.S. Dara.
3. “Instrumental methods of chemical analysis”, Chatwal, Anand, Himalaya publications.

COMPUTER PROGRAMMING LAB

(Common to all Branches)

CS L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF PROGRAMS

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 200	0.50 per unit
201 – 400	100 plus 0.65 per unit
401 – 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Commercial Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 50	0.50 per unit
100 – 200	50 plus 0.6 per unit
201 – 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
    a) $1 + x^2/2! + x^4 / 4!+$ …up to ten terms
    b) $x +x^3/3! + x^5/5!+$ … up to 7 digit accuracy
3. Write a C program to check whether the given number is
    a) Prime or not.
    b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
    a) Mean
    b) Mode
    c) Median
    d) Variance.

NOTE: Use functions for each subtask in the following programs

5. Write a C program to read a list of numbers and perform the following operations
    a) Print the list.
    b) Delete duplicates from the list.
    c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message “Element not found in the List”.
7. Write a C program to read two matrices and compute their sum and product.
8. A menu driven program with options (using array of character pointers).
    a) To insert a student name
    b) To delete a name
    c) To print the names

9. Write a C program to read list of student names and perform the following operations
    a) To print the list of names.
    b) To sort them in ascending order.
    c) To print the list after sorting.
10. Write a C program that consists of recursive functions to
    a) Find factorial of a given number
    b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.
11. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author and the system searches the list and displays whether it is available or not. If it is not an appropriate message is displayed, if it is then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message “required copies not in stock” is displayed. Write a program for the above in structures with suitable functions.
12. Write a C program to read a data file of student’s records with fields (Regd. no. , Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

MATHEMATICS – II

(Common for all branches)

MA02

I B.Tech. II Semester

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Fourier Series: Periodic Functions, Trigonometric Series, Fourier Series, Functions of Any Period P = 2L, Even and Odd Functions, Half Range Expansions, Complex Fourier Series, Approximation by Trigonometric polynomials.

UNIT – II

Laplace Transforms: Laplace Transform, Inverse Transform, Linearity, Shifting, Transforms of Derivatives and Integrals, Differential Equations, Unit Step Function, Second Shifting Theorem, Dirac's Delta Function, Convolution theorem (without proof).

UNIT – III

Integral Calculus: Evaluation of double integrals (Cartesian & Polar), Changing the order of integration, Evaluation of triple integrals, Applications of triple integrals to find area and volume.

UNIT – IV

Vector calculus: Scalar and vector point functions, Gradient of a scalar field, Directional derivative, Divergence of a vector field, curl of a vector field, Line integrals, Line integrals independent of path, Green's theorem in the plane (without proof), Surface integrals, Triple integrals, Divergence theorem of Gauss (without proof), Applications to Engineering problems, Stokes theorem(without proof).

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.
2. "Advanced Calculus", Murray R Spiegel, Schaum's outline series.

ENGINEERING PHYSICS – II

(Common to all branches)

PH02

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Electron theory of solids & semiconductor physics (10 periods)

Electron theory of solids: Failure of classical free electron theory, quantum free electron theory, Fermi-Dirac distribution and its temperature dependence, Kronig-Penny model (Qualitative), effective mass of electron, concept of hole.

Semiconductor physics: Classification of semiconductors, P-N junction diode and its characteristics, carrier concentration in P and N type semiconductors, Equation of continuity.

UNIT – II

Magnetic, Dielectric and Ferro-electric materials (10 periods)

Origin of magnetic moment of an atom, Bohr magneton, Weiss theory of Ferro magnetism (Qualitative), Hysteresis curve, soft and hard magnetic materials, ferrites and its applications.

Dielectric materials, Types of polarizations, internal field (qualitative), Classius – Mossetti equation, Frequency dependence of polarization, Ferroelectrics and its applications.

UNIT – III

Advanced materials (12 periods)

Nano-materials: Introduction to nano-materials, Fabrication of nano-materials and carbon nano tubes (CVD and sol-gel), physical and chemical properties of nano materials, Applications of nano materials (Structural point, Storage of information, Strength point)

Superconductivity: Meissner effect, types of superconductors, elements of BCS theory, Applications of superconductors.

Opto-electronic devices: Working and applications of solar cell, LED, LCD, Photo Diode.

UNIT – IV

Analytical techniques (10 periods)

Nuclear techniques: Radio isotopes and its applications (Medical and Industrial), GM-counter, scintillation counter.

Ultrasonics: Properties of ultrasonics, General applications of ultrasonics.

Medical applications: Cardiology, Neurology, Ultrasonic imaging.

NDT: Pulse echo technique, cavitation effect, Time of flight diffraction technique.

Structure determination: Crystal planes, Bragg's law, structural analysis of crystal using X-Ray powder diffraction method.

TEXT BOOKS:

1. "Engineering physics",M.R.Sreenivasan, Newage International Publication.
2. "Engineering Physics", Palaniswamy, ScitechPulishers.
3. "Solid State Physics", Dekkar.

REFERENCE BOOKS:

1. "Material Science for scientists and Engineers", Srinivasan&Srivastava, TMH Publishers.
2. "A text book of engineering physics", M.N.Avadhanulu& P. Krushisagar, S.Chand Pub.
3. "Material Science", VijayaRangarajan.

ENGINEERING CHEMISTRY – II

(Common to all branches)

CY02

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I (11 Periods)

ELECTROCHEMISTRY

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance –potentiometer titrations (redox - Fe^{2+}vs dichromate and precipitation – Ag^{+} vs Cl^{-}titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations.

UNIT - II (11 Periods)

CORROSION AND CORROSION CONTROL

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

GREEN CHEMISTRY: Introduction-concepts-Engineering Applications.

UNIT – III (12 Periods)

LIQUID AND GASEOUS FUELS AND COMBUSTION: Petroleum based: Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking and anti-knocking Agents – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes.

Gaseous fuels- water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.

PHASE RULE AND ALLOYS: Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT – IV (11 periods)

ANALYTICAL TECHNIQUES: Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy –principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain, Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002).
2. S.S.Dara, Mukkanti K.,“A text book of Engineering Chemistry”, S.Chand& Co., Ltd., New Delhi (2006).
3. B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

REFERENCE BOOKS:

1. B.K.Sharma, “Engineering Chemistry”, Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. “Enginering Chemistry”, J.C.Kuriacase&J.Rajaram, Tata McGraw Hill, New Delhi (2004).
3. “Chemistry of Engineering Materials”, R.P Mani, K.N.Mishra, CENGAGE learning.
4. “Applied Chemistry - A text for Engineering & Technology”, – Springar (2005).
5. “Text Book of Engineering Chemistry”, ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
6. “Engineering Chemistry”, R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

CIRCUIT THEORY

(Common to ECE & EIE)

EC 124 / EI 124

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION OF CIRCUIT ELEMENTS: Basic definition of the unit of Charge, Voltage, Current, Power and Energy, Circuit concept, Active and Passive circuit elements; Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star & Delta transformation, Energy stored in Inductors and Capacitors. Kirchhoff's Voltage law and Kirchhoff's Current law.

GRAPH THEORY: Introduction to Graph Theory, Tree, Branch, Link, Cutset and loop matrices, relationship among various matrices and parameters, Mesh and Nodal Analysis.

UNIT – II

NETWORK THEOREMS: Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegan's and Millman's theorems, Application of theorems to DC circuits.

INTRODUCTION TO ALTERNATING CURRENTS AND VOLTAGES: Instantaneous, Peak, Average and RMS values of various waveforms; Crest factor, Form factor; Concept of phase and phase difference in sinusoidal waveforms; Phase relation in pure resistor, Inductor and capacitor; Impedance diagram, phasor diagram, series and parallel circuits, compound Circuits.

UNIT – III

SINUSOIDAL STEADY STATE ANALYSIS: Application of network theorems to AC circuits. Computation of active, reactive and complex powers; power factor.

RESONANCE: Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance.

UNIT – IV

TRANSIENTS AND LAPLACE TRANSFORMS: Steady state and transient response, DC and Sinusoidal response of an R-L, R-C, R-L-C circuits.

Laplace Transforms of typical signals, periodic functions, Inverse transforms, Initial and final value theorems, Application of Laplace transforms in circuit analysis.

PSPICE: Introduction to PSpice: D.C Analysis and control statements, dependent sources, DC Sweep, AC Analysis and control statements, Transient analysis.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6thEdition,TMH, 2002.
2. M.E.Vanvalkenburg, Network Analysis, 3rd Edition, PHI, 2003.
3. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 3rd Edition, TMH, 2006.

REFERENCE BOOKS:

1. Franklin F.Kuo, Network Analysis and Synthesis, 2nd Edition, John Wiley & Sons,2003.
2. MahmoodNahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.

ENVIRONMENTAL STUDIES

(Common for all branches)

BT01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness.

Ecosystems: Introduction, types, Structure and Functions of Ecosystems, Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)

Biodiversity: Definition and levels of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation and Hot Spots of Biodiversity.

Values of Biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values.

Threats to Biodiversity: Habitat loss, Extinction of Species, Poaching of wildlife

Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – II

Natural Resources: Exploitation and Related Pollution Problems

Land: Land as a resource, causes and effects of land degradation

Forest: Use of forests, causes and effects of deforestation and conservation of forests

Water: Distribution of Water Resources, floods and drought, causes, effects and control of water pollution.**Energy:** Classification of Resources, Importance of energy, causes and effects of nuclear pollution.

Causes, Effects and Control of Air Pollution and Noise Pollution.

Solid Waste Management: Urban and Industrial wastes, Composting and Vermiculture and 3 R - approach.

UNIT –III

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles. Rain water harvesting, Watershed management, Cloud Seeding, Acid rain, Ozone layer depletion, Global warming, Population Growth and its Impact on environment, Green Revolution, Resettlement and Rehabilitation program, Mining and Dams and their conflictions, Environmental Impact Assessment

UNIT –IV

Environmental acts: Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act.

International Conventions: Stockholm Conference 1972, Earth Summit 1992 and Copenhagen Conference 2009

Case Studies: Chipko movement, Narmada BachaoAndolan, Silent Valley Project, Madhura Refinery and TajMahal, Chernobyl Nuclear Diaster, Ralegaon Siddhi (Anne Hazare) and Bhopal Tragedy.

Text Book:

1. Environmental Studies by Benny Joseph,Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books:

1. Text Book of environmental studies, ErachBharucha, UGC.
2. Environmental Studies, AnubhaKaushik and C. P. Kaushik.
3. A basic course in environmental studies, S. Deswal and A. Deswal, DhanapathRai& Co.
4. Essentials of environmental studies, Kurian Joseph and R.Nagendram, Pearson Education Pt Ltd, Delhi.
5. Environmental studies, R.Rajagopalan, Oxford University Press.
6. Environmental Pollution Control Engineering, C. S. Rao, Wiley Eastern Ltd., New Age International Ltd.,
7. Introduction to Environmental Science, Anjaneyulu Y, B S Publications
8. Principles of Environmental Studies, Manoharachary C and Jayarama Reddy P, B S Publications.
9. Comprehensive environmental studies- JP Sharma, Laxmi Publications.
10. Environmental Science, 11th Edition – Thomson Series – By G Tyler Miller, Jr.
11. Environmental Science and Engineering by Dr. Suresh, K.Dhaneja, Publishers SK Kataria& Sons, New Delhi-110006.

ENGINEERING GRAPHICS

(Common to all branches)

ME01

Lectures	:	3 Periods/Week, Tutorial: 3	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures ***2x3 =6 periods***

CURVES: Conic sections – general construction methods for ellipse, parabola and hyperbola. Other methods to construct ellipse only, cycloid, involute of a circle ***4x3=12periods***

UNIT – II

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines. ***6x3=18periods***

UNIT – III

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon. ***4x3=12periods***

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions. ***5x3=15 periods***

UNIT – V

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only). **3*x3=9 periods***

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings). ***4x3=12 periods***

TEXT BOOK:

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)

REFERENCE BOOK:

1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers
2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

PHYSICS & CHEMISTRY LABORATORY – II

(Common to all branches)

PHCY L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(A Selected list of Experiments from the following)

PHYSICS LAB-II

1. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
2. Determination of room temperature using platinum resistant thermometer.
3. Draw the load characteristic curves of a solar cell.
4. Determination of Hall coefficient of a semiconductor.
5. Determination of velocity of ultrasonic wave in a given liquid using ultrasonic interferometer.
6. Draw the characteristic curves of a G.M. counter and calculate the best operating voltage.
7. Determination of voltage and frequency of an A.C. signal using C.R.O.
8. Draw the I/V characteristic curves of a P-N junction diode.
9. Determination of Forbidden energy gap of Si &Ge.
10. Determination of wavelength of laser source using Diode laser.

CHEMISTRY LAB – II

1. **PRODUCTION OF BIODIESEL**: The teacher has to perform the transesterfication reaction of FATTY ACID and the Biodiesel thus produced can be used for analysis.
2. Estimation of properties of oil:
    a. Acid Number
    b. Viscosity
    c. Saponification value
    d. Aniline point
    e. Flash and Fire points
    f. Pour and Cloud point.

3. **PREPARATION OF**:
    a. PHENOL –FORMALDEHYDE RESIN
    b. ASPIRIN
    c. Phenylbenzoate
    d. Soap
4. **SOIL ANALYSIS**: pH, Determination of Zinc, Iron and Copper.
5. **Kinetics:** To determine the rate constant of hydrolysis of methyl acetate catalyzed by an acid and also the energy of activation. (or) To study the kinetics of reaction between $K_2S_2O_8$ and KI.

Demonstration Experiments (Any two of the following) :

a. Determination of dissociation constant of weak acid-by pH metry
b. Preparation of Thiokol rubber
c. Adsorption on Charcoal
d. Heat of reaction

6. **FOOD ANALYSIS:** Determination Saturated and Unsaturated Fatty Acids, pH,etc.

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Vogels Text Book of Quantitative Chemical Analysis 6th Edition (2002).

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and HarrmendraGoel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications, 5th edition 2004

ENGLISH LANGUAGE LAB

(Common to all branches)

EN L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

OBJECTIVES

This course enables the students to expedite the process of improving communication in both formal and in formal situation. A special attention has been paid to the needs of competitive and current demands.

Introduction to communication: Difference between communication and communication skills, Types of communication, Barriers to communication.
Introduction to skills: Listening skills, writing skills, Reading skills, and Speaking skills.
Pronunciation drills: Phonetics, British English and American English.
Conversational skills: Dialogue, Telephonic Interaction.
Professional writings & skills: Resumes, Reports, Business letters and Interview skills.
Practical: Extempore Debates, Group discussion, and Oral presentation.

RECOMMENDED SOFTWARES:

Digital Language Lab - Networking Software, HiClass – Software.

English Language – Listening, Speaking Reading, Writing Skills: A lania series – English Mastery, Levels A, B (Set of 2 CDs), English Discoveries (Set 0f 12 CDs).

English Grammar / Pronunciation: Live Action English Interactive, Speech Solutions

Dictionaries: Cambridge Advanced Learner's**,** Oxford Genie & Advanced

Writing: Easy writer, Creative writing

Professional English: Telephonic English**,** English in mind

English for ETS: Barron's**,** TOEFL Mastery**,** IELTS**,** GRE

WORKSHOP

(Common to all branches)

ME L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. **Carpentry**
    a. Half Lap joint
    b. Dovetail joint
    c. Mortise &Tenon joint
2. **Welding using electric arc welding process/gas welding**
    a. Lap joint
    b. Tee joint
    c. Butt joint
3. **Sheet metal operations with hand tools**
    a. Trapezoidal tray
    b. Funnel
    c. T-joint
4. **House wiring**
    a. To control one lamp by a single switch
    b. To control two lamps by a single switch
    c. Stair-case wiring

II B.Tech. I Semester

MATHEMATICS – III

EC211 / MA 03 (CE/CH/CS/EC/EEE/EI/IT/ME)

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I **(16 Periods)**

Fourier integrals: From Fourier series to the Fourier integral, Application of the Fourier integral, Fourier Cosine and Sine integral, Evaluation of integrals, Fourier cosine and sine Transforms: Fourier Cosine Transforms, Fourier Sine Transforms, Linearity, Transforms of Derivatives, Fourier Transform: Complex form of the Fourier integral, Fourier Transform and its inverse, Linearity. Fourier Transform of Derivatives, Convolution.

UNIT – II **(16 Periods)**

Partial differential equations: Basic concepts, Modeling-Vibrating string, Wave Equation Separation of Variables Use of Fourier series, D'Alembert's Solution of the Wave Equation, Heat Equation-Solution Fourier series, Steady-State Two-Dimensional Heat Flow

UNIT – III **(16 Periods)**

Numerical Methods in general: Introduction, Solution of Equations by Iteration, newton's Method for Solving Equations f(x) = 0, Convergence of Newton's method, Interpolation: Lagrange interpolation, Newton's divided difference interpolation, Equal spacing: Newton's forward Difference formula, Newton's Backward Difference formula, Inverse interpolation, Numerical integration and Differentiation: Trapezoidal Rule, Error Bounds and Estimate for the Trapezoidal Rule, Simpson's Rule of integration, Error of Simpson's rule.

UNIT – IV **(16 Periods)**

Numerical methods in linear algebra: Linear Systems: Gauss Elimination, LU Factorization, Gauss-Seidel iteration Method, Method of least Squares, Methods of First order Differential Equations: Euler's method, Runge-Kutta methods, Methods for Elliptic Partial Differential Equations: Laplace equation, Poisson equation

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOK:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.

DATA STRUCTURES USING C

EC 212

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

Arrays, Searching and Sorting: applications of arrays, bubble sort, selection sort, quick sort, insertion sort, merge sort, radix sort, shell sort, heap sort, linear search, binary search, hashing, hashing functions.

Linked Lists: concepts of linked lists, operations performed on singly linked list, doubly linked list, circular linked list, polynomial representation, sparce matrices.

UNIT II

Stacks: Basic concepts of stacks, implementation of stacks using arrays and linked list, stack applications such as infix to postfix expression conversion, evaluation of postfix expressions.

Queues: Basic concepts of queues, implementation of queues using arrays and linked list, circular queue, applications.

UNIT III

Trees: The concept of tree, Binary tree and its representation, Binary tree traversal, Binary search tree, Counting the number of nodes in a binary search tree, Searching for a target key in a binary search tree, deletion of a node from a binary search tree, AVL trees, operation performed on AVL trees, Splay trees, B trees, B+ trees.

UNIT IV

Graphs: Representations of graphs, Computing in-degree and out-degree of a node of a graph using adjacency matrix representation, Depth first traversal, Breadth first traversal, connected component of a graph, Depth first spanning tree, Breadth first spanning tree, Minimum cost spanning tree, directed acyclic graph (DAG).

TEXT BOOK:

1. C & Data Structures, P.S. Deshpande and O.G. Kakde, Dreamtech Press, 2005.

REFERENCE BOOKS:

1. C Programming and Data Structures, 3rd Edition, E. Balagurusamy, Tata McGraw Hill, 2007.
2. Introduction to Data structures in C, Ashok N.Kamthane, Pearson education, 2007.
3. Data Structures through C, Yashwant Kanetkar, BPB Publications.
4. Classic Data Structures 1e, Samanta, PHI, 2001.

ELECTRONIC DEVICES

EC 213 / EC02

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSPORT PHENOMENA IN SEMICONDUCTORS: Insulators, semiconductors, and metals, Mobility and Conductivity, Electrons and holes in an Intrinsic semiconductor, Donor and Acceptor impurities, charge densities in a semiconductor, Electrical properties of Ge and Si, Hall Effect, Conductivity modulation, Generation and Recombination of charges, Diffusion, Continuity equation, Injected -minority carrier charge, Potential Variation within a Graded Semiconductor.

UNIT – II

JUNCTION DIODE CHARACTERISTICS: Open-circuited P-N Junction, P-N Junction as a Rectifier, Current Components in a p-n diode, The volt-ampere characteristic temperature Dependence of the V/I characteristic, Diode Resistance, Space-charge, or Transition, capacitance $C_{T,}$ Charge- control Description of a Diode, Diffusion Capacitance, Breakdown Diodes, Tunnel Diode, Photo Diode, LED Characteristics and areas of applications.

UNIT – III

BIPOLAR JUNCTION TRANSISTOR: NPN & PNP junction transistors, Transistor current components, Transistor as an Amplifier, CB Configuration, CE Configurations, CE Cutoff& Saturation Regions, Typical Transistor- Junction Voltage Values, CE Current Gain, CC Configuration, Maximum Voltage Rating, Operating point, Bias Stability, Self-bias, or Emitter bias, Stabilization Against Variation in I_{CO},V_{BE}, and β, Bias Compensation Thermistor and Sensistor Compensation, Thermal Runaway, Thermal Stability

UNIT – IV

FIELD EFFECT TRANSISTER: JFET, Pinch-off Voltage V_P, volt-ampere characteristics, Depletion-MOSFET, Enhancement-MOSFET, Biasing the FET.

PNPN AND OTHER DEVICES: SCR, DIAC, TRIAC, UJT, and The Phototransistor (their characteristics only).

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics Analog and Digital Circuits and Systems, 2nd Edition,TMH, 2002

2. Robert L Boylested and Louis Nashelsky , Electronic Devices and Circuit Theory, 8th Edition, PHI, 2003

REFERENCE BOOKS:

1. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.

2. David A Bell, Electronic Devices and Circuits, 4th Edition, PHI, 2003

3. NN Bhargava, DC Kulshrestha and SC Gupta – Basic Electronics and Linear Circuits, TTTI Series, TMH, 2003.

NETWORK ANALYSIS AND SYNTHESIS

EC 214 /EI 02

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

NETWORK FUNCTIONS : Poles and Zeros, Network functions for the one port and two port, Poles and zeros of network functions, Restrictions on pole and zero locations for driving point functions and transfer functions, Time domain behavior from the pole zero plot. **TWO PORT NETWORK PARAMETERS** : Two port network, Open circuit impedance, Short circuit admittance (Y), Transmission, Inverse transmission, Hybrid and inverse hybrid parameters, Relation between parameter sets, Interconnection of two port networks, Lattice networks, Image parameters

UNIT – II

FILTERS : Characteristic impedance of symmetrical networks, Properties of symmetrical networks, Filter fundamentals, Pass and stop bands, Characteristics impedance, Constant K low pass filter, Constant K high pass filter, m-derived T section, m-derived π Section, variation of characteristic impedance over the pass band, Termination with m-derived half section, Band pass filters, Filter circuit design, Filter performance.

UNIT – III

ATTENUATORS: Symmetrical and Asymmetrical attenuators, T-type attenuator, π-type attenuator, Lattice attenuator, Bridged T attenuator, L-type attenuator.

EQUALIZERS: Equalizer configuration, Inverse network, Two terminal equalizer, Constant resistance equalizer, Full series equalizer, Full shunt equalizer, Bridged - T equalizer, Lattice equalizer.

UNIT – IV

NETWORK SYNTHESIS: Positive real functions, Positive real function properties, Testing driving point functions, Driving point function synthesis with two LC,RL,RC (Both cauer and foster forms) elements, Two port network synthesis by ladder development, series and parallel realizations.

TEXT BOOKS:

1. M.E.Vanvalkenburg, Network Analysis, 3rd Edition PHI, 2003.
2. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 3rd Edition, TMH, 2006.
3. John D Ryder, Networks, Lines and Fields, 2nd Edition, PHI, 2003.
4. Franklin F. Kuo, Network Analysis and Synthesis, 2nd Edition, Wiley India Ltd., 2005.

REFERENCE BOOKS:

1. M.E Vanvalkenburg, Introduction to Modern Network Systhesis, 2nd Edition, Wiley India Ltd, 1986.
2. Vasudev K Atre, Network Theory and Filter Design, 2nd Edition, Wiley

DIGITAL ELECTRONICS

EC 215/EC03

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

NUMBER SYSTEMS: Decimal, Binary, Octal, Hexadecimal Number systems and their conversions, Addition, Subtraction, Multiplication and Division in different number systems. Representation of Binary numbers in Sign magnitude, 1's complement, and 2's complement form. Subtraction using Method of complements. CODES: Introduction, Binary codes, BCD codes, 8421 code, Excess -3 code, Gray code, Alphanumeric and Error detection codes. Error detection and correction using Hamming code

BOOLEAN ALGEBRA: Introduction, Boolean Postulates and theorems, Boolean functions and expressions. Canonical and standard forms of Boolean functions, Logic gates, Universal gates, Realization of Boolean functions using basic gates and universal gates.

UNIT – II

SIMPLIFICATION OF BOOLEAN EXPRESSIONS:

Simplification of Boolean functions Using K-Map method (Up to five variables), Quine-Mccluskey minimization technique (Tabulation Method)

COMBINATIONAL LOGIC CIRCUITS:

General design procedure for Combinational logic circuits, Half-adder, Full-adder, Half-subtractor, Full-subtractor, Carry Look-Ahead adder Comparators, Encoders, Decoders, Multiplexers and Demultiplexers, BCD to 7 Segment display Decoder, EX-OR, EX-NOR Circuits, Parity Generator, Parity Checker, Programmable Logic devices: PLA, PAL, ROM

UNIT – III

SEQUENTIAL LOGIC CIRCUITS:

Flip-flops: SR Flip-flop, JK flip-flop, T Flip-flop, D-Flip-flop. Characteristic Table, Characteristic Equation, Excitation table for SR, JK, D and T Flip-flops. Level triggering, Edge triggering, Master-Slave JK Flip-flop. Conversion from one type of Flip-flop to another. Analysis and Synthesis of Sequential Circuits

COUNTERS AND REGISTERS: Modulus of a Counter, Design of Ripple Counters: UP Counter, Down Counter, BCD Counter, Up/Down Counter using Flip-flops. Design of Synchronous Counters, Sequence generator Registers: Definition, Data movement in Registers, Registers Based on Data movement. Shift Registers: Shift Left Register, Shift Right Register, Bi-Directional Shift Register, Ring and Johnson Counters.

UNIT – IV

IC LOGIC FAMILIES: Characteristics of IC Logic families, RTL, DTL, I^2L, TTL, ECL, MOS, CMOS Logic families and their comparison.

TEXT BOOKS:

1. M Morris Mano, Digital Logic and Computer Design, PHI/Pearson Education, 2003.
2. RP Jain, Modern Digital Electronics, 3rd Edition, TMH, 2003
3. Fundamental of Digital Circuits, A.Anand Kumar, Pearson Education, 4th Edition

REFERENCE BOOKS:

1. Zvi Kohavi, Switching and Finite Automata Theory, 2nd Edition, TMH, 1978
2. Taub and Schilling, Digital Integrated Electronics, Mc-Graw Hill, 1977.

ELECTROMAGNETIC FIELD THEORY

EC 216/EC 04

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Electrostatics –I:

The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Guass's law , Applications of Gauss law, Divergence, Maxwell's First equation (Electrostatics), Energy expended in moving a point charge in an electric field, The line integral, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient, the dipole and Energy density in electrostatic field.

UNIT – II

Electrostatics – II:

The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson's and Laplace's equations, Examples of the solution of Laplace's equation. Current and current density, continuity of current, conductor properties and boundary conditions

UNIT – III

The Steady Magnetic Field: Biot-Savart Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials Magnetic Forces and Materials: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

UNIT – IV

Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current, Maxwell's equations in point form, integral form.

The Uniform Plane Wave: Wave propagation in free space, dielectrics. Poynting theorem and wave power. Propagation in good conductors: skin effect. Wave polarization. Reflection of uniform plane waves at normal incidence. Plane wave propagation in general directions. Plane wave reflection at oblique incidence angles.

TEXT BOOKS:

1. W H Hayt, J A Buck Engineering Electromagnetics, 7th Edition TMH, 2006.
2. Mathew NO Sadiku, Elements of Electromagnetics, Oxford University Press, 2003.
3. G S N Raju, Electromagnetic Field Theory and transmission lines, 1st Edition, Pearson Education India, 2005.

REFERENCE BOOKS:

1. Joseph A Edminister, Theory and Problems of Electromagnetics, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill International, 1993
2. EC Jordan and KG Balmain, ElectromagneticWaves and Radiating Systems,

DATA STRUCTURES LAB

EC 251

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

List of Lab Programs

1. C program to perform the following operations on Singly Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
2. C program to perform the following operations on Doubly Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
3. C program to perform the following operations on Circular Linked List
   i. Creation
   ii. Insertion
   iii. Deletion
   iv. Traversal
   v. Search
   vi. Display
4. C program to perform addition of two polynomials.
5. C programs to implement stacks using arrays and linked lists.
6. C programs to implement queues using arrays and linked lists.
7. C program to convert the given infix expression into postfix.
8. C program to evaluate postfix expressions.
9. C program to implement insertion sort, selection sort, heap sort techniques.
10. C program to implement merge sort, radix sort, bubble sort techniques.
11. C program on linear search and binary search.
12. C program on B tree.
13. C program on B+ tree.
14. C program to perform Binary Tree traversal operations.
15. C programs to perform Binary search tree operations.

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

ELECTRONIC DEVICES LABORATORY

EC 252/ ECL 02

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Study of C.R.O
2. Characteristics of Silicon and Germanium diodes
3. Characteristics of Zener diode and regulator
4. Characteristics of Common Base configuration
5. Characteristics of Common Emitter configuration
6. Characteristics of Emitter follower circuit
7. Characteristics of JFET
8. Characteristics of UJT
9. Design and verification of self bias circuit
10. Characteristics of Silicon Controlled Rectifier
11. Characteristics of DIAC
12. Characteristics of LDR and Thermistor characteristics
13. Characteristics of source follower circuit
14. Design and verification of collector to base bias circuit
15. Characteristics of Photo transistor

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

DIGITAL ELECTRONICS LABORATORY

EC 253/ ECL 03

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NANDonly).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-Subtractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders like BCD – Decimal decoder.
6. Applications of IC Parallel Adder (1's & 2's compliment addition).
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

II B. Tech - II Semester

MATHEMATICS – IV

EC221 / MA 04 (ECE/EEE/EIE/ME)

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Complex numbers and functions, conformal mapping:

Introduction to Complex Numbers, Derivative. Analytic Function, Cauchy's- Riemann equations. Laplace equation.

Geometry of analytic functions: conformal mapping, linear fractional transformations

UNIT – II

Complex Integration:

Line integral in the complex plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivates of analytic functions.

Unit – III

Taylor, Laurent series and Residue Integration

Taylor Series and Maclaurin series, Laurent Series, singularities and zeros. Infinity, Residue integration method, evaluation of Real Integrals.

UNIT – IV

Special Functions

Power Series method, Legendre's equation, Legendre Polynomials $P_n(x)$, Bessel's equation. Bessel functions $J_v(x)$.

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8^{th} Edition, John Wiley, 2000.

REFERENCE BOOK:

1. "Theory and Problems of Complex Variables", Murray R Spiegel, Schaum's outline series.

ELECTRONIC CIRCUITS – I

EC 222 / EC05

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSISTOR & FET AT LOW FREQUENCY:

Graphical analysis of the CE Configuration, Two-port Devices and the Hybrid model, Transistor Hybrid model, Determination of h parameters from Characteristics, Measurement of h parameters, Analysis of transistor amplifier using h Parameter model, Emitter Follower, Millers theorem and its Dual, cascading transistor amplifiers, Simplified CE&CC Hybrid models, High input resistance circuits – Darlington pair, Boot Strapped Darlington pair, Cascode transistor amplifier, FET small signal model, CS / CD / CG configurations at low frequencies

UNIT – II

POWER AMPLIFIERS: Class A Large-signal amplifier ,Second-harmonic Distortion, Higher-order Harmonic Distortion, Transformer Coupled Audio Power Amplifier, Efficiency, Push-Pull Amplifiers Class B Amplifier ,Class AB Operation.

UNIT – III

FEEDBACK AMPLIFIERS: Classification of amplifiers, Feedback concept, Transfer Gain with Feedback, Negative feedback amplifiers and their characteristics, Input &Output resistance, Method of Analysis of a feedback amplifier, Voltage-series Feedback, Voltage-series Feedback pair, Current- series Feedback, Current- shunt Feedback ,Voltage-shunt Feedback.

UNIT – IV

OSCILLATORS: Barkhausen criterion for sinusoidal oscillators, RC phase shift oscillator using FET and BJT, Resonant circuit oscillators, General Form of Oscillator, Wien Bridge, Hartley, Colpitt's oscillators using BJT, Crystal oscillators, Frequency stability criterion for oscillators.

RECTIFIERS: Diode as a Rectifier, Half wave, Full wave and Bridge Rectifiers without filter and with inductor filter, Capacitor filter, L section and π- section filters.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, TMH, 2003.

2. A.P.Godse, U.A.Bakshi, Electronic Devices and Circuits , 2nd Edition, Technical publications, Pune, 2008.

REFERENCE BOOK:

1. Donald L. Schilling and Charles Belove, Electronic Circuits-Discrete and Integrated, 3rd Edition, TMH, 2002.

2. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6th Edition, Pearson Education, 2004.

3. Adel S. Sedra and Kenneth C.Smith, Microelectronic Circuits, 5th Edition, Oxford University Press, 2004.

4. NN Bhargava, DC Kulshrestha and SC Gupta – Basic Electronics and Linear Circuits, TTTI Series, TMH, 2003.

ELECTRICAL TECHNOLOGY

EC 223/EE04

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

DC MACHINES: Construction, Principle and operation of DC generator, EMF equation, Methods of excitation, DC motor principle, Back EMF, Torque equation, Load characteristics of DC shunt, series and compound generators, Motors, Losses and Efficiency, Applications of speed control, Swinburne's test, Three-point starter.

UNIT – II

Introduction to poly-phase system, Advantages, relationship between phase and line values for star and delta connection system.

TRANSFORMERS: Principle and Operation on no-load and load, Phasor diagrams, Equivalent circuit, Regulation, Losses and Efficiency, OC and SC tests, Auto transformers, Elementary treatment of 3 phase transformer connections, Star/star, Delta/star connections.

UNIT – III

THREE PHASE INDUCTION MOTORS: Construction, Rotating magnetic field, Principle of operation of Induction Motors, Torque equation, Torque-slip characteristics, Types of starters.

SINGLE PHASE INDUCTION MOTORS: Construction, Starting methods, Fractional Horse Power motors for tape recorders and teleprinters.

STEPPER MOTORS: Principle, Construction, Working and different types of Stepper motors.

UNIT – IV

SYNCHRONOUS MACHINES: Principle and constructional features of an alternator, EMF equation, Regulation-Synchronous impedance method, Synchronous motors, Principle of operation, Methods of starting and applications.

TEXT BOOKS:

1. Edward Hughes, "Electrical Technology", 6th Edition, Longman Group, 1987.
2. JB Gupta, "A Course in Electrical Technology", S K Kataria& Sons, 2003.
3. PC Sen, "Principles of Electrical Machines and Power Electronics", John Wiley, 1989.

REFERENCE BOOKS:

1. Vincent Del Toro, "Fundamentals of Electrical Engineering", Pearson Education.
2. H Cotton, "Advanced Electrical Technology", AH Wheeler & Co., 1990.
3. Eugene C Lister, "Electric Circuits and Machines", New York, MCGraw-Hill, 1975.
4. B.L Theraja&A.K.Theraja, "A Text Book of Electrical Technology", 23rd Revised Edition, S.Chand & Company Ltd., New Delhi, 2005.

TRANSMISSION LINES AND WAVEGUIDES

EC 224

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSMISSION LINES: Transmission line general solution, Attenuation constant and phase constant, Propagation constant, Problems on above, Computing primary and secondary constants. The infinite line, Wavelength, Velocity of propagation, Group velocity, Waveform distortion, The distortion less line, Telephone cable, Inductance loading of telephone cables, Reflection on a line not terminated in Zo, Reflection coefficient, Input and transfer impedance, Open and short circuited lines, Reflection factor and reflection loss, Insertion loss, T and section equivalents to lines, A line of cascaded T-sections.

UNIT – II

TRANSMISSION LINE AT HIGH FREQUENCIES: Parameters of open wire line at high frequencies, Parameters of coaxial lines at high frequencies, Constants for the line of zero dissipation, Voltages and current on dissipation line, Standing waves, Standing wave ratio, Input impedance of the dissipation less line, Input and output impedance of short circuited lines, Power and impedance measurement on lines, Reflection losses on the unmatched line, Single stub and double stub impedance matching on line using Smith chart.

UNIT – III

GUIDED WAVES: Waves between parallel planes, Transverse electric waves, Transverse magnetic waves, Characteristics of TE and TM waves, Transverse electromagnetic waves; Velocities of propagation, Attenuation in parallel plane guides.

RECTANGULAR WAVE GUIDES: Transverse magnetic waves, Transverse electric waves, Impossibility of TEM waves in hollow wave guides, Wave impedance and characteristic impedance, Field distribution in the transverse and longitudinal planes, Current flow on walls for dominant and other important modes, Attenuation factor and Q - factor of wave guide.

UNIT IV

CIRCULAR WAVE GUIDES: Solution of the field equation in cylindrical co-ordinates, TM and TE waves in circular guides, field distribution in the transverse and longitudinal planes.

STRIP TYPE TRANSMISSION LINES: Parallel plate transmission, Symmetrical strip transmission, Asymmetric strip transmission, other strip transmission lines.

TEXT BOOKS:

1. Electromagnetic waves by R.K.Shevgaonkar ,Tata McGraw Hill.
2. P A Rizzi, Micro Wave Engineering: Passive Circuits, PHI, 2002

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SIGNALS & SYSTEMS

EC 225

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

SIGNAL ANALYSIS: Introduction to signals and systems, Classification of signals and systems (both discrete and continuous); Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions, Trigonometric and Exponential Fourier series, Representation of a periodic function by Fourier series, Fourier transform, Properties of Fourier transforms, Fourier transform of simple functions, Dirichlet's conditions. Sampling theorem - statement and proof, Aliasing.

UNIT – II

SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS: Linear time-invariant system, Time response, Convolution and it's graphical interpretation, Causality and stability, Paley-Wiener criterion, Frequency response, Filter characteristics of linear systems, Conditions for distortion less transmission, Relation between bandwidth and rise time.

SPECTRAL DENSITY AND CORRELATION: Energy and power spectral density, Properties, Auto-correlation and Cross-correlation functions, Properties of correlation function, Parseval's theorem.

UNIT – III

NOISE: Sources of Noise, Thermal Noise, Noise power spectral density, Noise calculation, Multiple sources-Superposition Of power spectra, Noise calculations in Passive circuits, Equivalent noise bandwidth, Noise-Figure of an amplifier, Power density and available power density, Effective input noise temperature, Effective noise temperature, Noise Figure in terms of available gain, Cascaded stages.

UNIT – IV

PROBABILITY& RANDOM VARIABLES: Definition of probability, Axioms of probability, Joint probability, Conditional probability, Total probability, Bayes'theorem, Independent events, Random variables, discrete and continuous, Probability Distribution Function, Probability Density Function, Guassian Random variable, Conditional distribution and density functions, Mean ,Variance and standard deviation of a random variable, Characteristic function, moment generating function, Central Limit Theorem.

RANDOM PROCESSES: Random process concept , stationary and independence, correlation functions, Gaussian random process and Poisson random process, power density spectrum and its properties, relationship between power spectrum and autocorrelation function.

TEXT BOOKS:

1. B P Lathi, Signals, Systems and Communications, BSP, 2003
2. P.Z Peebles, Jr, Probability, random variables and random signal principles, TMH.
3. Simon Haykin, Signals and Systems, John Wiley, 2004

REFERENCE BOOKS:

1. A V Oppenheim,A S Wilsky & IT Young, Signals and Systems, PHI/ Pearson,2003
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.
3.Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002.

ELECTRONIC MEASUREMENTS ANDINSTRUMENTATION

EC 226

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

MEASURENT AND ERROR: Definitions, Accuracy and precision, Types of errors, Statistical analysis, Probability of errors, Limiting Errors.

DIRECT CURRENT INDICATING INSTRUMENTS: PMMC, DC ammeters, DC voltmeters, Series type ohmmeter, Shunt type ohmmeter, Multimeter, Calibration of DC Instruments, voltmeter sensitivity and loading effect.

DC & AC BRIDGES: Wheatstone, Kelvin, Guarded Wheatstone, Maxwell, Hay, Schering and Wein bridges, Wagner ground connection.

UNIT – II

ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS:

AC voltmeters using rectifiers, True RMS responding voltmeter, Electronic multimeter, Digital voltmeters: Ramp, Stair case ramp, Integrating, Successive approximation, Quantizing error; Frequency counter, Universal counter.

CATHODE RAY OSCILLOSCOPE: Introduction, Cathode ray oscilloscope, Storage and sampling oscilloscopes, Digital storage oscilloscope, Spectrum analyzer.

UNIT – III

TRANSDUCERS:

Introduction, Classification of transducers, Analog transducers, Resistive transducers, Potentiometers, Strain gauges, Types of strain gauges, Resistance strain gauges, Semiconductor strain gauges, Resistance thermometers, Thermistors, Application of Thermistors, Thermo couple construction, Measurement of thermocouple output, Compensating circuits, Advantages and disadvantages of thermocouples, Variable inductance type transducer, Variation of self inductance, Variation of mutual inductance, Linear variable differential transformer, Rotary variable differential transformer, Capacitive transducers, Piezo-electric transducers, Digital transducers, Shaft Encoder.

UNIT – IV

DATA ACQUISITION SYSTEMS: Digital Data Acquisition System, Various ways of multiplexing, Computer controlled instrumentation.

BIO-MEDICAL MEASUREMENTS: Bioelectric signals (ECG, EMG, ERG, EOG) and electrodes. Elementary Principles of Electrocardiograph, Electromyograph, Electroencephalograph.

TEXT BOOKS:

1. W D Cooper & A D Helfrick, Electronic Instrumentation and Measurement Techniques, PHI, 1998

2. A K Sawhney, Electrical and Electronics Measurement and Instrumentation, Dhanpat Rai, 2000

3. R S Khandpur, Hand Book of Biomedical Engineering, TMH, 2002

REFERENCE BOOKS:

1. C S Rangan, G R Sarma and V S V Mani, Instrumentation Devices and Systems,TMH, 1997

2. H S Kalsi, Electronic Instrumentation, TMH, 1995

3. John G.Webster,Medical Instrumentation: Application and Design, 3rd Edition,Wiley India Ltd, 2003.

ELECTRONIC CIRCUITS-1 LABORATORY

EC 261/ECL 04

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Half Wave Rectifier with and without Filters.
2. Full Wave Rectifier with and without Filters.
3. Bridge Rectifier With and Without Filters.
4. Frequency Response of Common Emitter Amplifier.
5. Frequency Response of Common Source Amplifier.
6. Measurement of Parameters of Emitter Follower and Source Follower; RI, AV, AI &RO.
7. Cascode Amplifier.
8. Two Stage RC-Coupled Amplifier.
9. Voltage Series Feedback Amplifier.
10. Voltage Shunt Feedback Amplifier.
11. Complementary Symmetry Push-pull amplifier.
12. Class-A Power Amplifier.
13. RC Phase Shift Oscillator.
14. Colpitt's Oscillators.
15. Hartley Oscillators.

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NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

PSPICE LAB

EC 262

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

List of Lab Programs

Write the simulation programs and design using schematics for the following:

1. Low Pass and High Pass Filters
2. Half Wave and Full Wave Rectifiers
3. CE configuration
4. CC configuration
5. CS configuration
6. Wien Bridge Oscillator
7. Class A power amplifier
8. Pre-emphasis and De-emphasis
9. Clippers
10. Clampers
11. RC coupled amplifier
12. Voltage Regulator
13. Attenuators
14. Differential amplifier
15. Logic Gates

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

TEXT BOOK

1. Introduction to PSpice using OrCAD for circuits and electronics,M. H. Rashid, Prentice Hall, 2004.

SIGNALS AND SYSTEMS LABORATORY

EC 263

Laboratory	:	3 Periods/Week	Continuous Assessment	:	40
University Exam	:	3 hours	University Examination Marks	:	60

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal x (t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal.

$$x(t) = \begin{cases} \cos(2\pi \times 47t) + \cos(2\pi \times 219t), & 0 \le t \le 10 \\ 0, & otherwise \end{cases}$$

8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.
11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.
13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.

NOTE: A minimum of 10(Ten) experiments, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

Text Book: Contemporary Communication Systems using MATLAB by John G.Proakis, M.Salehi, Cengage Learning Publisher.

III B.Tech. I Semester

LINEAR ICs AND APPLICATIONS

EC 311/EC 06

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

OPERATIONAL AMPLIFIERS:

Operational amplifier and block diagram representation, op-amp with negative feedback. Block diagram representation of feedback configurations, voltage series feedback amplifier, voltage shunt feedback amplifier, differential amplifier with one op-amp, input offset voltage, input bias current, input offset current, total output offset voltage, frequency response of op-amp, stability, slew rate.

OP-AMP APPLICATIONS:

The summing amplifier, Differential and instrumentation amplifiers, Voltage to current and current to voltage conversion, The Op-amp with complex impedances, Differentiators and integrators, Non Linear Op Amp circuits, Precision rectifiers.

UNIT – II

OSCILLATORS: Oscillator principles, Oscillator types, Frequency stability, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square-wave generator, Triangular wave generator, Saw tooth wave generator, Voltage controlled oscillator. COMPARATORS: Introduction to comparator, Basic comparator, Zero-crossing detector, Schmitt Trigger, Comparator characteristics, Limitations of Op-Amps as comparators, Voltage limiters.

UNIT – III

CLIPPERS, CLAMPERS & CONVERTERS: Positive and negative clippers, Positive and negative clampers, Absolute value output circuit, Peak detector, Sample and hold circuit. D/A conversion fundamentals, weighted resistor summing D/A Converter, R-2R Ladder D/A converter, A/D conversion: Ramp converters, Successive Approximation A/D converters, Dual slope converters, Parallel A/D converters. Tracking A/D converters.

UNIT – IV

APPLICATIONS OF SPECIAL ICS: The 555 timer, 555 as Monostable and Astable Multivibrator and applications. Phase Locked Loops, Operating principles, Monolithic PLLs, 565 PLL applications, A 723 Voltage Regulator and its design. ACTIVE FILTERS: Active LP and HP filters, Band pass filters: Wideband, Narrow Band pass filters, Band stop filters, State variable filters, All pass filters.

TEXT BOOKS:

1. Rama Kant A. Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Edition,PHI/ Pearson Education, 2003.
2. D.Roy and Choudhury, Shail B.Jain, Linear Integrated Circuits, 2nd Edition,New Age International, 2003.
3. Denton J Dailey, Operational Amplifiers and Linear Integrated Circuit Theoryand Applications,

REFERENCE BOOK:

1. J.Michael Jacob, Applications and Design with Analog Integrated Circuits,2nd Edition, PHI, 2003.

LINEAR CONTROL SYSTEMS

EC 312/ EI 03

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Basic concept of simple control system, open loop – closed loop control systems. Effect of feedback on overall gain – stability sensitivity and external noise. Types of feedback control systems – Linear time invariant, time variant systems and non-linear control systems.

Mathematical models and Transfer functions of Physical systems: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions and open-loop and closed-loop systems. Block diagram representation of control systems – black diagram algebra – signal flow graph – Mason's gain formula- Components of Control Systems: DC servo motor– AC servo motor – synchro transmitter & receiver.

UNIT – II

Time domain analysis: Standard test signals – step, ramp, parabolic and impulse response function, characteristic polynomial and characteristic equations of feedback systems, transient response of first order and second order systems to standard test signals. Time domain specifications – steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width, dominant poles of transfer functions. Stability Analysis in the complex plane: Absolute, relative, conditional, bounded input bounded output, zero input stability, conditions for stability, Routh – Hurwitz criterion.

UNIT – III

Frequency domain analysis: Introduction – correlation between time and frequency responses – polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT – IV

Root locus Technique: Introduction – construction of root loci – State space analysis: Concepts of stat, state variables and state models – digitalization – solution of state equations – state models for LTI systems. Concepts of controllability and Observability.

TEXT BOOKS:

1. B.C. Kuo, Automatic control systems, 7th edition, PHI.
2. I.J.Nagrath & M Gopal, Control Systems Engineering, 3rd edition, New Age International.
3. K. Ogata, Modern Control Engineering, 3rd edition, PHI.

REFERENCE BOOKS:

1. Schaum Series, Feedback and Control Systems, TMH
2. M.Gopal, Control Systems Principles and Design, TMH
3. John Van de Vegta, Feedback Control Systems, 3rd edition, Prentice Hall,1993.

ELECTRONIC CIRCUITS – II

EC 313/ EC 07

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

TRANSISTOR AT HIGH FREQUENCY:

Hybrid-pi CE transistor model, Hybrid-π Conductances, Hybrid-π Capacitences, Validity of Hybrid-π Model, Variation of Hybrid-π model, CE short circuit current gain, CE current gain with Resistive load, Single stage CE amplifier response, Gain Bandwidth product, Emitter Follower at High frequencies

UNIT – II

FET AT HIGH FREQUENCY: FET small signal model, CS / CD configurations at high frequencies.

REGULATED POWER SUPPLIES: Design and analysis of Series and Shunt regulators using discrete components, Protection techniques, Switching Mode Power Supplies, UPS.

UNIT – III

MULTISTAGE AMPLIFIERS:

Distortion in amplifiers, Frequency response of an amplifier, Bode plots, Step Response of an Amplifier, Band pass of Cascaded stages, RC coupled amplifier, Effect of Emitter Bypass Capacitor on Low-frequency response, High-frequency Response of two cascade CE Transistor Stages

UNIT – IV

TUNED AMPLIFIERS:

Band–Pass Amplifiers, Parallel-Resonant Circuit, Impedance Variation at frequencies Near Resonance, Bandwidth of Parallel-Resonant Circuit, Transformation from the series-Resonance form, Single tuned amplifier, Tuned primary amplifier, Tuned secondary FET amplifier, Double tuned transformer coupled amplifier, Stagger tuned amplifier.

TEXT BOOKS:

1. Jacob Millman and Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, TMH, 2003

2. John D Ryder, Electronic Fundamentals and Applications: Integrated and Discrete Systems, 5th Edition, PHI, 2003

3. Theodore F Bogart Jr., Jeffrey S Beasley and Guillermo Rico, Electronic Devices and Circuits, 6thEdition, Pearson Education, 2004.

REFERENCE BOOK:

1. Donald L. Schilling and Charles Belove, Electronic Circuits-Discrete and Integrated, 3rd Edition, TMH, 2002

ANALOG COMMUNICATIONS

EC 314

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

AMPLITUDE MODULATION: Time domain description, Frequency domain description, Single tone modulation, Generation of AM wave, Square law modulator, Switching Modulator, Detection of AM waves, Square law detector, Envelope detector, DSB-SC Modulation, Time-domain and frequency domain descriptions of DSB-SC, Generation of DSB-SC: Balanced modulator, Coherent detection of DSBSC modulated waves, Costas loop, Quadrature-Carrier multiplexing.

UNIT – II

SSB AND VSB MODULATIONS: Band-pass transmission, Complex low-pass representation of Narrow-band signals, Concepts of pre-envelope, Complex envelope and Natural envelope, Equivalent low-pass transmission model, Single side band modulation: Frequency domain description, Generation of SSB-SC wave, Frequency-discrimination method, Phase discrimination method, Demodulation of SSB-SC waves, Vestigial side-band modulation, Frequency domain description, Generation of VSB modulated wave, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Frequency Division Multiplexing (FDM).

UNIT – III

ANGLE MODULATION: Introduction to Angle modulation, Relation between frequency Modulation and phase modulation, Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow Band FM and Wide Band FM, Transmission bandwidth of FM waves, Carson's Rule, Generation of FM waves, Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator – Zero-crossing detector, Linearized model of PLL, FM demodulation employing first order PLL, Practical Considerations, FM limiters, Applications.

UNIT – IV

DISCRETE MODULATION: Generation and Demodulation of PAM, PWM and PPM;TDM, Comparison of Discrete Modulation Techniques.

NOISE IN ANALOG MODULATION: AM Receiver model, Signal to noise ratios for coherent reception. DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection. AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

TEXT BOOKS:

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, JohnWiley and Sons, 3rd Edition, 2001
2. LeonW Couch II, Digital and Analog Communication Systems, PearsonEducation, 2004

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, TMH, 2nd Edition, 1986
2. Sam Shanmugam, Analog and Digital Communication Systems, John Wiley,1992.

PULSE AND SWITCHING CIRCUITS

EC 315/ EI 07

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

LINEAR WAVE SHAPING

The high- pass RC circuit, Response of RC high- pass circuit to sinusoidal, step, pulse, square-wave, exponential and ramp input, The high-pass RC circuit as a differentiator, Double differentiation, low-pass RC circuit, Response of RC low-pass circuit to sinusoidal, step, pulse, square-wave, exponential and Ramp inputs, The low-pass RC circuit as an integrator, Attenuators, RL circuits, RLC Circuits, Ringing circuit.

UNIT – II

NON-LINEAR WAVE SHAPING

Clipping (Limiting) circuits, Diode clippers, Clipping at two independent levels, Comparators, Breakaway diode and amplifier, Diode-differentiator comparator, Applications of voltage comparators, The clamping operation, clamping circuit taking source and diode resistances into account, A clamping circuit theorem, Practical clamping circuits, The transistor as a switch.

UNIT – III

BISTABLE MULTIVIBRATORS

The stable states of a binary, A fixed bias transistor binary, A self-biased transistor binary, Commutating capacitors, Methods of improving resolution, Unsymmetrical triggering of the binary, Triggering Unsymmetrically through a unilateral device, Symmetrical triggering, Direct –connected binary circuit, Schmitt Trigger circuit, Emitter- coupled binary.

MONOSTABLE AND ASTABLE MULTIVIBRATORS

Monostable multi, Gate width of a collector-coupled monostable multi, Waveforms of the collector-coupled monostable multivibrator, Gate width of an emitter-coupled one-shot, Triggering of the monostable multi, The monostable circuit adjusted for free-running operation, Astable collector- coupled multi.

UNIT –IV

VOLTAGE TIME BASE GENERATORS

General features of a time- base signal, Exponential sweep circuit, A fixed- amplitude sweep ,A transistor constant- current sweep, Miller and Bootstrap time-base generators-general considerations, The transistor Miller time-base generator, Bootstrap time -base generators-Basic principles, The transistor Bootstrap time-base generator.

CURRENT TIME-BASE GENERATORS

A simple current sweep, Linearity correction through adjustment of driving waveform, A transistor current time -base generator.

TEXT BOOK:

1. J Millman and H Taub, Pulse, Digital and Switching Circuits, TMH, 2003

REFERENCE BOOKS:

1. J Millman and H Taub, Mothiki S. Prakash Rao, Pulse Digital & Switching Waveforms, 2nd Edition, TMH.

2. David A Bell, Solid State Pulse Circuits, 4th Edition, PHI 2003.

MICROPROCESSORS AND MICROCONTROLLERS

EC 316/ EC 08

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Microprocessor: introduction to microcomputers and microprocessors, introduction and architecture of 8086 family, addressing modes, instruction description and assembler directives of 8086 microprocessors.

UNIT – II

8086 programming and system connections: Program development steps, writing programs for use with an assembler, assembly language program development tools, writing and using procedures and assembler macros. An example of minimum mode system, addressing memory and ports in microcomputer system. 8086 interrupts and interrupt responses.

UNIT – III

Digital Interfacing: Programmable parallel ports, handshake IO, 8255 programmable peripheral interface. Interfacing microprocessor to keyboards.
Analog interfacing: DAC principle of operation and interfacing.
Programmable devices: Introduction to Programmable peripheral devices 8254, 8259, 8251, DMA data transfer, 8237 DMA controller, RS232 communication standard and maximum mode of 8086 operation

UNIT – IV

Introduction to microcontrollers: comparing microprocessors and microcontrollers, Architecture of 8051, pin configuration of 8051microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts. Programming & interfacing 8051:- Addressing modes of 8051 microcontroller, Instruction set of 8051 microcontroller, simple programs using 8051 microcontroller. Interfacing a stepper motor, ADC.

TEXT BOOKS:

1. Duglus V. Hall, Microprocessor and Interfacing, Revised 2nd Edition, TMH, 2006.

2. Mohammed Ari Mazidi and Janci Gillispie, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi

ANALOG COMMUNICATIONS LAB

EC 351

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. Amplitude Modulation and Demodulation
2. DSB SC Modulation and Demodulation
3. SSB SC Modulation and Demodulation
4. Frequency Modulation and Demodulation
5. Pre Emphasis - De Emphasis Circuits
6. Verification of Sampling Theorem
7. PAM generation and Reconstruction
8. PWM and PPM: Generation and Reconstruction
9. Frequency Division Multiplexing
10. Design of Mixer
11. Synchronous Detector.
12. Phase Locked Loop.
13. Diode Detector Characteristics.
14. AGC Characteristics.
15. Squelch Circuit.

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination

PULSE CIRCUITS AND ICs LAB

EC 352/ ECL 07

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. Linear Wave-Shaping.
2. Non-linear Wave-Shaping.
3. Design and Verification of Astable Multivibrator.
4. Design and Verification of Monostable Multivibrator.
5. Design and Verification of Schmitt Trigger (using discrete components and using IC741).
6. Measurement of Op-amp Parameters.
7. Applications of Op-amp (Adder, Subtractor, Integrator, Differentiator).
8. Instrumentation Amplifier using Op-Amp.
9. Waveform Generation using Op-amp (Square, Triangular).
10. Design of Active Filters (LPF&HPF-First Order).
11. Application of 555 Timers (Astable, Monostable, Schmitt Trigger).
12. PLL using 556.
13. Design of IC Regulator using 723.
14. Design of VCO using 566.
15. D-A Converter (R-2R Ladder).

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the Candidate to attain eligibility for University Practical Examination

MICROPROCESSORS AND MICROCONTROLLERS LAB

EC 353/ ECL 08

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Experiments Based on ALP (8086)

1. Programs on Data Transfer Instructions.
2. Programs on Arithmetic and Logical Instructions.
3. Programs on Branch Instructions.
4. Programs on Subroutines.
5. Sorting of an Array.
6. Programs on Interrupts (Software and Hardware).
7. 8086 Programs using DOS and BIOS Interrupts.

Experiments Based on Interfacing & Microcontroller (8051)

8. DAC Interface-Waveform generations.
9. Stepper Motor Control.
10. Keyboard Interface / LCD Interface.
11. Data Transfer between two PCs using RS.232 C Serial Port
12. Programs on Data Transfer Instructions using 8051 Microcontroller.
13. Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.
14. Applications with Microcontroller 8051.

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be Performed and recorded by the candidate to attain eligibility for University

III B.Tech. II Semester

PROFESSIONAL ETHICS AND HUMAN VALUES

EC 321

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Human Values: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self Confidence, Character, Spirituality.

UNIT – II

Engineering Ethics: Senses of 'Engineering Ethics', Variety of model issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Professions and Professionalism, Professional Ideals and Virtues, Theories about right action, Self-interest, customs and Religion, Uses of Ethical Theories.

UNIT – III

Engineering as Social Experimentation: Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law. Safety, Responsibility and Rights: Safety and Risk-Assessment of Safety and Risk, risk Benefit analysis and reducing risk.

Collegiality and Loyalty , Respect for Authority , Collective Bargaining, Confidentiality , Conflicts of Interest , Occupational Crime , Professional Rights ,employee Rights , Intellectual Property Rights (IIPR) , Discrimination.

UNIT – IV

Global Issues: Multinational Corporations , Environmental Ethics, Computer Ethics, Weapons Development , Engineers as Managers , consulting Engineering, Engineers as Expert Witnesses and Advisors, Moral Leadership, Sample Code of Ethics like ASME, ASCE, IEEE, Institution of engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, NewYork 1996.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Engineering Ethics, PHI,2004.

REFERENCE BOOKS:

1. Charles D Fleddermann, Engineering Ethics, Prentice Hall, New Jersey, 2004
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, Engineering EthicsConcepts and Cases, Thomson Learning, United States, 2000.
3. John R Boatright, Ethics and the Conduct of Business, PHI,New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, Fundamentals of ethics for Scientistsand Engineers, Oxford University Press, 2001.

DIGITAL COMMUNICATIONS

EC 322

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

PULSE MODULATION

Quantization Process, Quantization Noise, Pulse Code Modulation: Encoding, Regeneration, Decoding, Delta Modulation, Differential Pulse Code Modulation (DPCM).

BASE BAND PULSE TRANSMISSION:

Matched filter, Properties, Intersymbol interference, Correlative level coding, Nyquist's criterion for distortionless baseband binary transmission, Ideal Nyquist channel, Raised cosine spectrum, Duobinary signaling, Modified Duobinary signaling.

UNIT – II

DIGITAL PASSBAND TRANSMISSION

Introduction, Pass band transmission model, Gram Schmidt Orthogonalization procedure, Geometric interpretation of signals, Coherent detection of signals in noise, Probability of error, Correlation receiver, detection of signals with unknown phase, Coherent BPSK, QPSK, BFSK, Non Coherent BFSK, DPSK.

UNIT – III

INFORMATION THEORY

Uncertainty, Information, Entropy, Properties of Entropy, Source Coding Theorem, Shannon Fano Coding, Huffman Coding, Discrete memoryless channels, Mutual information, Properties, Channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Information capacity theorem.

UNIT – IV

E**RROR CONTROL CODING**

Linear Block Codes, Hamming Codes, Cyclic Codes, Convolution codes.

SPREAD SPECTRUM TECHNIQUES

PN Sequences, Notion of Spread Spectrum, DSSS: DSSS with CBPSK, Processing gain, Probability of error, Acquisition and tracking, FHSS: Slow frequency hopping, Fast frequency hopping. Acquisition and tracking, Practical Jammer types, THSS.

TEXT BOOKS :

1. Simon Haykin, Communication Systems, 3rd Edition, John Wiley & Sons,
2. Bernard Sklar, Digital Communication, 2nd Edition, Pearson Education, 2001
3. Leon W Couch II, Digital and Analog Communication Systems, Pearson, 2004

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, 2nd Edition, TMH, 1986
2. J Das,S K Mallik and PK Chatterjee, Principles of Digital Communication,NAI(P),

DIGITAL SIGNAL PROCESSING

EC 323

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Signals Systems & Signal Processing: Classification of Signals Discrete time signals, The Concept of Frequency in Continuous- Time and Discrete- Time signals.

Discrete Time Signals And Systems: Discrete time signals, discrete time Systems, Analysis of Discrete Time LTI system, Solution of Linear Constant- Coefficient Difference Equations, The Impulse Response of a LTI Recursive system.

Z-Transforms: Z-transform, Region of convergence, Properties of Z-transforms, Inversion of Z-transform, Causality and Stability of LTI systems in Z-domain, The One Sided Z-transform.

UNIT – II

Fourier series for Discrete – time Periodic Signals.

DFT: The Discrete Fourier Transform, Properties of the DFT.

FFT: Efficient Computations of the DFT, Applications of FFT algorithms, Quantization Effects in the Computation of the DFT.

UNIT – III

Design of Digital Filters: General Considerations, Design of FIR Filters: Symmetric and Antisymmetric FIR filters, Design of Linear-phase FIR filters using Windows, Design of Linear-phase FIR filters by the Frequency-Sampling Method, Design of Optimum Equiripple Linear-phase FIR Filters. Structural Realization of FIR Systems: Direct, Canonic, Cascade, Frequency Sampling & Latice Structure.

UNIT – IV

Design of IIR Filters From Analog Filters: Characteristics of Commonly Used Analog Filters, IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation, Frequency Transformations, Structural Realization of IIR Systems: Direct, Canonic, Transposed, Cascade, Parallel, Lattice-Ladder.

TEXT BOOK:

1. John G.Proakis, Dimitris G Manolakis, digital Signal Processing: Principles, Algorithms and Applications, Pearson Education / PHI, 2003

REFERENCE BOOKS:

1. S K Mitra, Digital Signal Processing: A Computer Based Approach, 2nd Edition, TMH, 2003
2. Lonnie C Ludeman, Fundamentals of Digital Signal Processing, John Wiley & Sons, 2003.
3. Alan V Oppenheim and Ronald W Schafer, Digital Signal Processing, Pearson Education/PHI, 2004
4. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
5. Andreas Antoniou, Digital Signal Processing,TMH, 2006.

ANTENNAS AND WAVE PROPAGATION

EC 324

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Radiation: Radiation Mechanism, Potential functions-heuristic approach, Maxwell's equation approach, Potential functions for sinusoidal oscillations, Alternating current element, Power radiated by current element, Application to short antennas, Assumed current distribution, Radiation from quarter wave Monopole / half wave dipole, Traveling wave antennas and the effect of the point of feed on standing wave antennas.

UNIT – II

Antenna fundamentals: Isotropic, Directional, Omni-directional patterns, Principle patterns, Field regions, Radiation density, Radiation intensity, Directive gain, Power gain, Half power Beamwidth, Antenna polarization, Power loss factor, Radiation efficiency, Effective aperture of antenna, Relation between maximum effective aperture and directivity, Friss transmission equation.

Array Antennas: Two element array, Uniform linear array, Side lobe level and beam width of broadside array, Beam width of end fire array, Principle of multiplication of patterns, Effect of earth on vertical patterns, Binomial array, Basic principle of Dolph-Tschebyscheff array.

UNIT – III

Characteristics of typical antennas and Rhombic antennas, Folded Dipole, Loop antenna, Yagi Uda array, Helical antenna, Log periodic antenna, Pyramidal and conical Horn antenna, Corner reflector antenna, Parabolic reflector antennas - Paraboloid and parabolic cylinder, Cassegrain system of reflectors, Basic principles of slot antennas and micro strip antennas.

UNIT – IV

Radio wave propagation: Ground wave Propagation, Earth constants, Space-wave Propagation, Effect of curvature of an Ideal Earth, Variations of Field strength with height in space-wave Propagation, Atmospheric effects in space-wave Propagation, Radio-Horizon, Duct Propagation, Extended-range Propagation resulting from Tropospheric Scattering, Ionospheric Propagation, Gyro frequency, Refraction and reflection of Sky Waves by the Ionosphere, Critical Frequency, Skip Distance, Maximum Usable Frequency.

TEXT BOOKS:

1. Edward C Jordan and Keith G Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2003
2. Constantine A Balanis, Antenna Theory : Analysis and Design, Harper and Row Publishers, 2002
3. G.S.N.Raju, Antennas andWave Propagation, 1st Edition, Pearson Publication, Singapore
4. F.E. Terman, Electronic and Radio Engineering, Mc Graw Hill, 1985.

REFERENCE BOOK:

1. J.D.Kraus and Ronald J Marhefka, Antennas For all Applications, TMH, 2003

OBJECT ORIENTED PROGRAMMING USING C++

EC 325

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

Introduction: Basic concepts of OOP, benefits and applications of OOP, what is C++, applications of C++, C++ statements, structure of a C++ program, creating the source file, compiling and linking. C++ tokens, keywords, identifiers and constants, data types in C++, operators in C++,symbolic constants, type compatibility, declaration of variables, dynamic initialization of variables, reference variables, scope resolution operator, member dereferencing operator, memory management operator, type cast operator, expressions and their types, special assignment expressions, implicit conversions, operator overloading, operator precedence, control structures. C++ streams and stream classes, unformatted I/O operations, formatted I/O operations, managing output with manipulators

UNIT II

Functions in C++: main function, function prototyping, call by reference, return by reference, inline functions, default arguments, const arguments, function overloading, friend and virtual functions. **Classes and objects**: specifying a class, defining member functions, nesting member functions, private member functions, static data members and member functions, arrays of objects, objects as function arguments, returning objects, local classes.

UNIT III

Constructors and Destructors: constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of objects, copy constructor, dynamic constructor, const objects, destructors. Defining Operator overloading, overloading unary and binary operators, overloading binary operators using friends, rules for operator overloading, manipulation of strings using operators.

UNIT IV

Pointers, pointers to objects, this pointer, pointers to derived classes, pure virtual functions. Inheritance: single inheritance, making a private member inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes.

TEXT BOOK

1. Object oriented programming with C++, Balagurusamy, 4th edition, Tata McGraw-Hill publications, 2008.

REFERENCE BOOKS

2. Object oriented programming with ANSI and turbo C++, Ashok N.Kamthane, Pearson Education, 2005.

3. C++ programming language by Bjarne Stroustup,3rd edition, Pearson education,2009.

ELECTIVE - I

COMMUNICATION SYSTEMS

EC 326(A)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Radio transmitters:

Frequency allocation for radio communication systems, Block diagrams and functions of radio transmitters for AM and FM systems.

Radio receivers:

TRF and super heterodyne receivers, RF, Mixer and IF stages, Choice of IF, Image frequency, Alignment and tracking of radio receivers, AGC, Tone and volume controls, Receiver characteristics and their measurements, FM receivers, Communication receivers, Fading and diversity reception.

UNIT – II

Telecommunication switching systems:

Evolution of Telecommunications, Simple telephone communication, Basics of switching system, Electronic space division switching: Stored Program Control, Centralized SPC, Distributed SPC, Two stage networks, Three stage networks, n stage networks, Time division switching: Basic time division space switching, Basic time division time switching, Combination switching, Three stage combination switching, n stage combination switching.

UNIT – III

Television:

Vision characteristics and scanning systems, Composite video signal, Camera tubes: Principle of operation, Image Orthicon, Vidicon, Plumbicon, Block diagram of broadcast TV transmitter, Block diagram of broadcast TV receiver.

UNIT – IV

Color television:

Color fundamentals, Color TV cameras, Picture tubes, TV transmission and reception, NTSC, PAL & SECAM systems, Cable television, Digital TV, DTH.

TEXT BOOKS:

1. George Kennedy, Electronic Communication Systems, Mc Graw Hill, 4th Edition,1999.
2. T Viswanathan, Telecommunication Switching Systems and Networks, PHI, 2004.
3. RR Gulati, Monochrome and Color Television, New Age Publishers, 1996.

REFERENCE BOOKS:

1. RR Gulati, Composite Satellite and Cable Television, New Age International,2000.
2. William Schweber, Electronic Communication Systems: A Complete Course,4th Edition, PHI, 2002.

ELECTIVE - I

COMPUTER ORGANIZATION

EC 326 (B)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers.

MACHINE INSTRUCTIONS AND PROGRAMS: Numbers, Arithmetic Operations and Characters, Memory locations and addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions.

UNIT – II

BASIC PROCESSING UNIT: Some fundamental concepts, Execution of a complete instruction, Multiple –Bus Organization, Hardwired control, Micro programmed control

ARITHMETIC: Addition and Subtraction of Signed Numbers, Design of fast adders, Multiplication of Positive numbers, Signed operand multiplication, Fast multiplication, Integer Division, Floating point numbers and operations.

UNIT – III

THE MEMORY SYSTEM: Some Basic Concepts, Semiconductor RAM Memories, Read-Only memories, Speed, Size and Cost, Cache Memories, performance Considerations, Virtual memories, Memory management Requirements, Secondary Storage

PIPELINING: Basic Concepts, Data Hazards, Instruction hazards, Influence on Instruction Sets, Data path and Control Considerations, Superscalar Operation, performance Considerations.

UNIT - IV

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces: PCI Bus, SCSI Bus, USB Bus

TEXT BOOK:

1. “Computer Organization”, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill.

REFERENCE BOOKS:

1. “Computer Architecture and Organization”, John P. Hayes, Third Edition, McGraw Hill.
2. “Computer Organization and Architecture”, William Stallings, 6th Edition, Pearson/PHI.
3. “Computer Systems Architecture”, M. Morris Mano, Third Edition, Pearson/PHI.

ELECTIVE - I

ADAPTIVE CONTROL SYSTEMS

EC 326 (C)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT –I

Mathematical Model: Mathematical Model for process of I order, II order – I order with pure delay & higher order system. Discretization techniques and computer solution of differential equations – simulation of process dynamics – state models.

UNIT –II

Identification of Methods: Conventional techniques of identification, Identification of systems with dead time Discrete Systems, ARMA process, discrete state model – least squares techniques – recursive least squares – generalized recursive least squares algorithms – fixed memory algorithm, Minimum variance method.

UNIT –III

Adaptive Control of Deterministic Systems: Gain scheduling, MRAC, STC, Minimum variance controller – Predictive control, Minimum prediction error adaptive controls – adaptive control algorithms for closed loop pole assignment – adaptive control of time varying systems.

UNIT –IV

Adaptive Control of Stochastic Systems: Stochastic processes, Stochastic minimum prediction error adaptive controller – adaptive pole placement – adaptive optimal controllers.

REFERENCES BOOKS:

1. Goodwin G.C. and Sin K.S. Jersey,, “Adaptive filtering, prediction and control”, Prentice Hall, inc., 1984.
2. Mendel J.M., Marcel, Dekker, “Discrete techniques of parameter estimation”, New York, 1994.
3. Hsia T.C.H.A., “System Identification”, Lexington books, 1974.
4. Harris C.J. and Billings S.A. Peter ,“Self Tuning and Adaptive control”, Peregnius Ltd., 1984.

ELECTIVE - I

ADVANCED MICROCONTROLLERS

EC 326 (D)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Computer Architectures: RISC/CISC and Harvard/Princeton Architectures. Introduction: The 8051 Microcontroller, Criteria for choosing a microcontroller, 8051 Family members & block diagram. The 8051 Assembly Language Programming: 8051internal registers, Structure of Assembly Language, Program Counter & ROM Space, Data types & Directives, PSW, Register Banks & Stack. JMP, LOOP & CALL Instructions: Looping, Conditional & unconditional jump, LCALL, ACALL, PUSH, POP instructions & Subroutines. Time Delay Generation & Calculation.

UNIT-II

I/O Port Programming: Pin description, I/O Ports, Bit addressability & Read modify-write feature. Addressing Modes: Addressing modes, Indexed addressing & Look up tables,SFR registers and their addresses.

Arithmetic & Logical Instructions: Addition, subtraction, BCD numbers and DA A instruction, multiplication and division, signed number and overflow problem in arithmetic operations. Logic & Compare Instructions, Rotate & Swap Instructions, BCD & ASCII conversion programs.

UNIT – III

Single Bit Instructions: Single bit instructions, Registers & bit addressability, Bit addressable RAM, Reading input pins Vs. Port Latch. 8051Timer /Counter Programming: Timer registers, TMOD Register, Timer mode 1, mode 2, mode 3 programming. Counter programming.

8051 Serial Communication: Basics of serial communication, Asynchronous serial communication & data framing, RS 232 standards, MAX 232. Baud rate selection & T1 register, SBUF, SCON Registers, and Serial port Programming to transmit & receive data serially.

UNIT – IV

8051 Interrupts Programming: 8051 interrupts, IVT for 8051, IE register, TCON register and Timer Interrupts, External H/W Interrupts Programming. Serial Port Interrupts programming, Interrupt Priority upon reset and IP register. Real World Interfacing: LED, Switches, LCD, ADC, DAC, Sensors, Stepper Motor, Keyboard, and Memory.

TEXT BOOKS:

1. 8051 Microcontroller and Embedded Systems: M.A. Mazidi & J. G. Mazidi.Pearson Education
2. Microcontrollers: Architecture, Programming & System Design: Rajkamal Pearson Education
3. 8051 Microcontrollers Arch., Programming & Applications: K. J. Ayala Penram International

DIGITAL COMMUNICATIONS LAB

EC 361

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Experiments based on Hardware:

1. Generation and Detection of PCM.
2. Generation and Detection of ASK.
3. Generation and Detection of FSK.
4. Generation and Detection of PSK&QPSK.
5. Generation and Detection of TDM
6. Generation and Detection of DPSK
7. Delta Modulation and Demodulation.
8. Generation and Detection of DPCM.

Simulation Experiments:

1. Generate a sinusoidal signal with amplitude 2, and $\omega = 1$. Using a uniform PCM scheme, quantize it once to 8 levels and once to 16 levels. Plot the original signal and the quantized signals on the same axis. Compare the resulting SQNR in the two cases.

2. Design a Huffman code for an information source with probabilities p={0.1,0.05,0.21,0.07,0.02,0.2,0.2,0.15}. Determine the efficiency of the code by computing the average codeword length and the entropy of the source.

3. Generate the basic pulse shapes, NRZ, RZ, half sinusoid and raised cosine pulses. Generate eye diagrams of binary polar signaling.

4. Write a program to generate any digital modulation (ASK, PSK,FSK) and demodulation scheme.

5. Determine the output of a convolutional encoder when the information sequence is 10011100110000111.

6. Plot the capacity of an additive white Gaussian Noise channel with a bandwidth of 3000Hz as a function of signal to noise power.

7. Find all the code words of the (15,11) Hamming code and verify that the minimum distance is equal to 3.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

EC 362

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

List of Lab Programs

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

1. Arrays
2. Structures
3. Pointers
4. Objects and Classes
5. Console I/O operations
6. Scope resolution and memory management operators
7. Inheritance
8. Polymorphism
9. Virtual Functions
10. Friend Functions
11. Operator overloading
12. Function overloading
13. Constructors and Destructors
14. *this* pointer
15. File I/O operations

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

SOFT SKILLS LAB

ENL 02

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. **NON-VERBAL COMMUNICATION**
    a. Voluntary & Involuntary Body Language.
    b. Facial Expressions.
    c. Kinesics.
    d. Oculesics.
    e. Haptics.
    f. Proxemics.
    g. Chronemics.
    h. Para Linguistics.
2. **LIFE SKILLS**
    a. Good Attitude & Self Motivation.
    b. Social Behavior &Social Norms.
    c. Ethics, Values and Positive Work Ethics.
    d. Desire to Learn and Responsibility**.**
3. **EMOTIONAL INTELLIGENCE**
    a. Self Awareness.
    b. Self Control.
    c. Self Motivation.
    d. Empathy.
    e. Relationship Skills.
    f. Self Esteem.
4. **PEOPLE SKILLS**
    a. Effective Listening.
    b. Managing Stress.
    c. Persuading Techniques.
    d. Questioning Techniques – Close End, Open End Questions and Answers.
    e. Role Perception.
5. **COGNITIVE SKILLS**
    a. Situational Analysis. b. Critical Thinking. c. Lateral Thinking d. Creative Thinking.
6. **EMPLOYABILITY**
    a. Corporate Information.
    b. Group Discussion.
    c. Team Building.
    d. Conflict Management. e. Negotiating Skills. f. Interview Techniques.

RFFERENCE BOOKS:

1. “The Definitive Book Of Body Language”, Allan & Barbara Pease
2. “You Can Win”, Shiv Khera.
3. ““Lateral Thinking”, Edward De Bono.
4. “How To Prepare For Group Discussions And Interview”, Hari Mohan Prasad, Rajnish Mohan, 2nd Edition, TMH.
5. “Emotional Intelligence”, Daniel Goleman.
6. “ The 7 Habits Of Highly Effective People“, Stephen R. Covey
7. “Working in Teams”, Sandy Pokras.

IV B.Tech. I Semester

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

BT 421/ME 05

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT- I

General management: Management definition, functions of management and principles of management. Forms of Business Organization: Salient features of Sole Proprietorship, Partnership, Joint Stock Company; Private Limited and Public Limited companies; Cooperative and Government owned companies; Merits and Demerits of above types;

Marketing Management: Functions of Marketing; Concepts of Selling and Marketing-Difference; Market Research; Product pricing; Distribution channels; Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle.

UNIT- II

Production and Materials Management: Functions of Production planning and control; Production systems-Types; Inventory control-Relevant costs, EOQ, Deterministic single item model with static demand, ABC, VED and FSN analysis; Introduction to MRP; **Financial Management**: Concept of time value of money; Interest formulae; Present and Future worth amounts for different cash flow patterns; Evaluation of alternative investment proposals (Capital budgeting); Types of Capital-Fixed and Working capital; Working capital management- Factors and Principles; **Depreciation**- Straight line depreciation, declining balance and Sum of Years digits methods.

UNIT- III

Personnel Management: Functions of personnel management, human resource planning, recruitment, selection, placement, training and development and performance appraisal. Motivation theories, leadership styles.

UNIT- IV

Entrepreneur Development: Introduction, Entrepreneural characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial development-Objectives, Need of Training for enterprises; Finance for the enterprises; Product, Process and Plant Design- Product analysis and Product Design process. Steps in process design and Plant Design.

Text Books:

1. Industrial Engineering and Operations Management, S.K.Sharma, Savita Sharma and Tushar Sharma.
2. Industrial engineering and production management, Mahajan
3. Industrial Economics, R.R.Bharatwal

Reference Books:

1. Operations Management, Joseph G Monk.
2. Production, Planning and Control, Samuel Eilon.
3. Marketing Management, Phillip Kotler.
4. Financial Management I.M.Pandey.
5. Projects, Prasanna Chandra.
6. The Essence of Small Business, Barrow colin.
7. Small Industry Ram K Vepa.

VLSI DESIGN

EC 412

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT- I

An introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, NMOS fabrication, CMOS fabrication and BICMOS technology. Basic Electrical Properties of MOS and BICMOS Circuits: Ids versus Vds relationships, threshold voltage Vt, Transconductance gm, Figure of merit uo , Pass transistor, NMOS inverter, Pull-up to pull-down ratio, CMOS inverter, BICMOS inverters, Latch up in CMOS circuits.

UNIT- II

MOS and BICMOS circuit Design processes: MOS layers, Stick diagrams, Design rules and layout, Sheet resistance Rs, Standard unit of capacitance, The Delay unit, Inverter delays, Propagation delays, Wiring capacitances, Scaling models, Scaling factors for device parameters.

UNIT- III

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic, examples of Structured Design (combinational logic and sequential logic). Design of an ALU subsystem.

UNIT- IV

VLSI design flow, Introduction to ASICs, Full Custom ASICs, standard cell based ASICs, Gate array based ASICs, Programmable logic devices, PLAs, PALs, CPLDs
and FPGAs.

Verilog HDL : Emergence and Importance of HDLs, Basic Concepts, Modules and Ports, Simulation and Synthesis, Switch Level Modeling, Gate-Level Modeling, Data Flow Modeling, Behavioral Modeling, Tasks and Functions.

TEXT BOOKS:

1. Douglas A.Pucknell and Kamran Eshranghian, Basic VLSI Design, Third edition, PHI, 2002.
2. Michael John Sebastian Smith, Application Specific Integrated Circuits, Addison Wesley, 2003.
3. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Second Edition, Prentice Hall PTR, 2003

REFERENCE BOOKS:

1. Neil H E Weste and Kamran Eshranghian, Principles of CMOS VLSI Design, A system perspective, 2nd Edition, Pearson Education, 2002.
2. Stephen Brown and Z Vonko Vranesic, Fundamentals of Digital Logic with Verilog HDL Design, TMH, 2002.
3. John F Wakerly, Digital Design Principles & Practices, 3rd Edition, Pearson Education, 2002.

MICROWAVE ENGINEERING

EC 413

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure.

Microwave components: Microwave Cavities - Rectangular and Circular cavity Resonators, Microwave Hybrid Circuits - Waveguide Tees E-plane or Series tee, H-plane or shunt Tee, Magic Tees(Hybrid Tees), Tee junction parameters, fields and currents in Tee junctions, Theorems on Tee junctions, Equivalent circuit of magic Tee, Applications of magic Tee, Hybrid Rings, Waveguide Corners, Bends and Twists, Directional couplers, Coupler parameters, Directional couplers in use, Applications of directional couplers, Circulators and Isolators.

UNIT – II

Microwave solid-state devices: Microwave Tunnel diode, Transferred Electron Devices: GUNN-EFFECT Diodes, RWH Theory, Modes of operations, Avalanche Transit Time Devices: Read diode, IMPATT diode, TRAPATT diode, Pin diodes, Varactor diodes, Crystal detectors.

UNIT – III

Microwave linear beam tubes (o type): Limitations of Conventional tubes at Microwave frequencies, Klystron: Velocity modulation process, bunching process, output power and beam loading, Multicavity Klystron amplifiers: Beam current density, output current and output power of two cavity Klystron, Reflex Klystron: Velocity modulation, Power output and efficiency. Helix Traveling Wave tube: Slow Wave structures, Amplification process, conventional current.

Microwave cross field tubes (m type): Magnetron Oscillators: Cylindrical Magnetron, CFA and BWO (Qualitative analysis only).

UNIT – IV

Microwave measurements: Components of Microwave Bench, Detection of Microwaves, Microwave power measurement, Impedance measurements, VSWR measurement, Frequency measurement, scattering coefficient measurements.

TEXT BOOKS:

1. Samuel Y Liao, Microwave Devices and Circuits, 3rd Edition, Pearson Education,2003.
2. ML Sisodia and V.L.Gupta, Microwave Engineering, New Age International, 2005

REFERENCE BOOK:

1. RE Collin, Foundations for Microwave Engineering, IEEE Press Series, 2003
2. M.L.Sisodia and GS Raghuvamshi, Microwave Circuits and Passive Devices,Wiley Eastern, 1987.

SATELLITE COMMUNICATIONS

EC 414

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction and Orbital Mechanics and Launchers: A brief history of Satellite communications ,Orbital mechanics, Look angle determination, Orbital perturbations, Orbit determination, Launch and launch vehicles, Orbital effects in Communication System performance.

UNIT – II

Satellites: Satellite sub systems, Attitude and Orbit Control system (AOCS), Telemetry, Tracking, Command & Monitoring, Power Systems, Communication subsystems, satellite antennas.

Multiple Access Techniques: Introduction, FDMA, TDMA, DAMA, Random Access.

UNIT – III

Satellite Link Design: Basic transmission theory, System noise temperature and G / T ratio. Design of down links, Satellite systems using small earth stations, Uplink Design, Design for specified C / N: Combining C/N and C/I values in satellite links.

VSAT systems: Introduction, Overview of VSAT systems, Network Architectures, Access control Protocols, Basic techniques, VSAT earth station engineering.

UNIT – IV

Satellite Navigation and Global positioning System: Introduction, Radio and satellite Navigation, GPS position location Principles, GPS receivers and codes, Satellite signal Acquisition, GPS Navigation message, GPS signal levels, Timing Accuracy, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOK:

1. Timothy Pratt , Charles Bostian, Jeremy Allnutt, Satellite Communications, 2nd Edition, John Wiley, 2003.

REFERENCE BOOK:

1. W Tomasi, Advanced Electronic Communication Systems, 4th Edition, Pearson Education, 2002.

ELECTIVE - II

DIGITAL IMAGE PROCESSING

EC 415(A)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System.

Digital image fundamentals: Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations.

UNIT – II

Image enhancement in spatial domain: Some basic Grey level transformations, histogram processing, enhancement using Arithmetic/Logic operations, Smoothing Spatial Filters, Sharpening Spatial Filters.

Image enhancement in frequency domain: Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.

UNIT – III

Image restoration: Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Inverse Filtering, Wiener Filtering.

Image compression: Fundamentals – Image Compression models – Error Free Compression, LossyCompression.

UNIT – IV

Image Segmentation: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation

Image Representation and Description: Representation schemes, Boundary Descriptors, Regional Descriptors.

TEXT BOOK:

1. R C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education, Second Edition, 2002

REFERENCE BOOKS:

1. A K Jain, Digital Image Processing, PHI, 1989
2. B Chanda and D Dutta Majumder, Digital Image Processing and Analysis, PHI,2001.
3. MilanSonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis andMachine Vision, Thomson learning, Second Edition, 2001.

ELECTIVE - II

DIGITAL TV FUNDAMENTALS

EC 415(B)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

Video Engineering : Elements of Television system:- Basic block schematic of television transmitter and receiver, camera , picture tube, Scanning, human factor consideration, flicker, interlaced scanning, number of scanning lines, Horizontal and vertical resolution, maximum video frequency, resolution and bandwidth, Composite video signal - vertical and horizontal synchronization Television camera: - Working principle of CCD- its working - Color television camera: block schematic explanation Modulation -Positive and negative modulation and its comparison, high level and low level modulation and its comparison. vestigial side band transmission. Transmission of sound signal.

UNIT II

Colour Television: Compatibility consideration, Color response of human eye, Three color theory, additive mixing of colors, chromaticity diagram, Luminance and chrominance, color difference signal and its generation, Frequency interleaving and Colour burst signal Colour TV picture tubes : CRT,

UNIT III

Principles of LCD displays: LED displays, Plasma displays, 3D television concepts, Cable television, DTH broadcasting.

UNIT IV

Video coding and video compression: Demand for video compression- video image representation quantization of image data intraframe compression techniques; DPCM - DCT based transform coding - Motion compensation –H. 261 video conference coding standard - MEPEG video compression. Digital audio broadcasting- Block schematic explanation-Audio compression and source encoding – HDTV: pixel transmission rate – video compression for HDTV.

Text Books:

1. Multi Media Communication Fred Halsal Pearson Education
2. Basic Television Engineering: Bernad Grob, Mc Graw Hill.

Reference Books:

3. Monochrome and colour television: R R Gulati, Wiley Eastern
4. Discrete time Speech Signal Processing :Thomas Quatieri Pearson Education
5.The Electronics Hand Book :J C Whitaker IEEE press

ELECTIVE - II

EMBEDDED SYSTEMS

EC 415(C)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Unit – I

Introduction to embedded systems, design challenges, processor technology, IC technology, design technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, optimizing custom single purpose processors. General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors

Unit – II

State machine and concurrent process models: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real-time systems. Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

Unit - III

Embedded system and RTOS concepts: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

Unit – IV

Embedded system and RTOS concepts: Timers, memory management, priority inversion problem, embedded OS and real time OS, RT Linux, and Handheld OS. Design technology: Introduction, automation, synthesis, parallel evolution of compilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis, system synthesis, HW / SW co- design, verification, and co-simulation.

TEXT BOOKS:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, JohnWiley & sons 2002.
2. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.

REFERENCE BOOKS:

1. Raj Kamal, Embedded system architecture, programming and design, TMHedition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embeddedsystems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson Learning
4. David E. Simon, An Embedded Software Primer, Pearson edition.

ELECTIVE - II

Advanced Digital Signal Processing

EC 415(D)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Multirate Digital Signal Processing Fundamentals: The basic Sample Rate Alteration Devices, Multrate structures for Sampling rate conversion, Multistage Design of Decimator and Interpolator. The polyphase decomposition. Arbitrary rate sampling rate converter. Nyquist Filters.

UNIT – II

Multirate Filter Banks and Wavelets: Digital Filter Banks. Two-Channel Quadrature-Mirror Filter Bank, Perfect reconstruction Two-Channel FIR Filter Banks. L-Channel QMF Banks. MultilevelFilter Banks.

UNIT – III

Adaptive Filters: Typical applications of Adaptive Filters: Echo cancellation in communication, Equalization of data communication channels, linear predictive coding, Noise cancellation. Principles of Adaptive Filters

UNIT – IV

Methods of Steepest Descent, Least Mean Square Adaptive Filters: Derivation, Adaptation in stationary SOE, LMS algorithm and Applications of LMS algorithm, Recursive Least Square Adaptive Filters.

TEXT BOOKS:

1. Sanjit K Mitra: Digital Signal Processing, Third Edition, Tata McGraw Hill Edition-2006.

2. D.G.Manolakis, Vinay K.Ingle, S.M.Kogon: Statistical and Adaptive signalprocessing, McGraw Hill, 2000.

REFERENCE BOOK:

1. P.P.Vaidyanathan: Multirate Systems and Filter Banks, Pearson Education India2006.

List of Open Electives offered by various departments:

Department	Subject Name	Subject Code
Biotechnology.	INTELLECTUAL PROPERTY RIGHTS, PATENT LAWS &ETHICAL ISSUES	BT 100
	BIOINFORMATICS ALGORITHMS	BT 200
Chemical Engineering.	INDUSTRIAL POLLUTION & CONTROL	ChE 100
	ENERGY ENGINEERING	ChE 200
Civil Engineering.	AIR POLLUTION AND CONTROL	CE 100
	REMOTE SENSING AND GIS	CE 200
Computer Science & Engineering.	DATABASE MANAGEMENT SYSTEMS	CS 100
	JAVA PROGRAMMING	CS 200
Electrical & Electronics Engineering.	OPTIMIZATION TECHNIQUES	EE 100
	NON-CONVENTIONAL ENERGY SOURCES	EE 200
Electronics & Communication Engineering.	CONSUMER ELECTRONICS	EC 100
	EMBEDDED SYSTEMS	EC 200
Electronics & Instrumentation Engineering.	VIRTUAL INSTRUMENTATION USING LABVIEW	EI 100
	SENSORS and TRANSDUCERS	EI 200
Information Technology.	WEB TECHNOLOGIES	IT 100
	.NET TECHNOLOGIES	IT 200
Mechanical Engineering.	ROBOTICS	ME 100
	POWER PLANT ENGINEERING	ME 200

OPEN ELECTIVE
INTELLECTUAL PROPERTY RIGHTS, PATENT LAWS &ETHICAL ISSUES
EC416/BT 100

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Intellectual Property Rights: Introduction, forms of Intellectual property, international & regional agreements/ treaties in IPR; IPR related Legislations in India; IPR and Agricultural Technology- implications in India and other developing countries; GATT, TRIPS, and WIPO;
Other IPR issues: Trade Secrets, Copy Rights, Trade Marks and their legal implications; Farmer's Rights, Plant Breeder's rights; Traditional knowledge and their commercial exploitation and protection.

UNIT – II

Patents and Patent processing: Introduction, Essential requirements, Patent application, Procedures and granting, Patent search, PCT, UPOV, Patents in Biotechnology and controversies involved.

UNIT – III

Regulatory Affairs: Regulatory affairs: Indian contest- requirements and guidelines of GMP, understanding of Drugs and cosmetic act 1940 and rules 1945 with reference schedule M, U & Y. Related quality systems- objectives and guidelines of USFDA, WHO &ICH, Introduction to ISO series.
Documentation and Protocols: Documentation: Types related to pharmaceuticals industry, protocols, harmonizing formulation development for global fillings, NDA, ANDA, CTD, Dealing with post approval changes- SUPAC, handling and maintenance including electronic documentation.

UNIT – IV

Ethics: Research and ethical issues; Ethical issues in use of animals in research and testing; ethical issues in research involving human participants; Protecting Genetic Privacy; Gene testing – Pros & Cons. Human Cloning & Human Dignity – an ethical enquiry; Ethical, Legal and Social Issues (ELSI) concerning recent advancements in key areas of biotechnology- pre-natal diagnostics.

TEXTBOOKS:

1. Good manufacturing practices for pharmaceuticals, S.H.Willing
2. Protection of Industrial property Rights, P.Das&Gokul Das
3. Intellectual property rights on Biotechnology, Singh K, BCIL, New Delhi
4. Biotechnologies in developing countries present and future, Sasson A, UNESCO Publications.
5. Bioethics and Biosafety- M.K.Sateesh, I.K. International, New Delhi.

OPEN ELECTIVE
BIOINFORMATICS ALGORITHMS
EC416/BT 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION: Algorithms and Complexity- Biological algorithms versus computer algorithms – The change problem –Correct versus Incorrect Algorithms – Recursive Algorithms – Iterative versus Recursive Algorithms – Big-O Notations– Algorithm Design Techniques.

GREEDY ALGORITHMS: Molecular Biology Primer – Exhaustive Search – Mapping Algorithms – Motif-Search Trees – Finding Motifs –Finding a Median String – Greedy Algorithm – Genome Rearrangements – Sorting by Reversals – Approximation Algorithms – A Greedy Approach to Motif Finding.

UNIT – II

DYNAMIC PROGRAMMING ALGORITHMS: DNA Sequence comparison – Manhattan Tourist Problem – Edit Distance and Alignments – Longest Commons Sub sequences – Global Sequence Alignment – Scoring Alignment – Local Sequence Alignment – Alignment with Gap Penalties – Multiple Alignment-Gene Predictions – Approaches to Gene Prediction – Spiced Alignment – Divide and Conquer Algorithms.

UNIT – III

GRAPH ALGORITHMS: Graphs – Graphs and Genetics – DNA Sequencing – Shortest Superstring Problem – DNA arrays as alternative sequencing techniques – Sequencing by Hybridization – Path Problems – Fragment assembly in
DNA Sequencing – Protein Sequencing and Identification – The Peptide Sequencing Problem – Spectrum Graphs – Spectral Convolution and Alignment – Combinatorial Patter matching.

UNIT – IV

CLUSTERING AND TREES: Clustering and trees – Gene expression analysis – Hierarchical clustering-k-means clustering – Clustering and corrupted Cliques – Evolutionary Trees – Distance-based tree reconstruction – Reconstruction trees from additive matrices – Evolutionary trees and hierarchical clustering – Character-based tree reconstruction – Small and large Parsimony Problem – Hidden Markov Models- Randomized Algorithms.

TEXTBOOKS:

1. Neil C. Jones and Pavel A. Pevzner, *An Introduction to Bioinformatics Algorithms*, MIT Press, FirstIndian Reprint 2005.
2. Gary Benson Roderic page (Eds), *Algorithms in Bioinformatics*, Springer International Edition, FirstIndian Reprint 2004.

REFERENCE BOOKS

1. Gusfields G, Algorithms on strings, trees and sequences- Computer Science and ComputationalBiology, Cambridge University Press 1997.
2. Steffen Schulze-Kremer, Molecular Bioinformatics: Algorithms and Applications, Walter de Gruyter, 1996.

OPEN ELECTIVE
INDUSTRIAL POLLUTION & CONTROL
EC416/ChE 100

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Man & Environment, Types of Pollution, Pollution control aspects, Industrial emissions-Liquids, Gases, Environmental Legislation, Water quality management in India, Air (Prevention & Control of Pollution) Act.

UNIT – II

Removal of BOD, Biological oxidation, Anaerobic treatment, Removal of Chromium, Removal of Mercury, Removal of Ammonia, Urea, Treatment of Phenallic effluents.

UNIT – III

Removal of Particulate matter, Removal of Sulfur Oxides, Removal of Oxides of Nitrogen, Removal of Organic vapors from Effluent.

UNIT – IV

Pollution control in Chemical Industries, General considerations, pollution control aspects of Fertilizer industries, Pollution control in Petroleum Refineries and Petrochemical units, Pollution control in Pulp and Paper Industries.

TEXT BOOK:

1. Pollution control in Process Industries, S.P .Mahajan, Tata McGraw Hill Publishing Company Ltd, New Delhi

REFERENCE BOOKS:

1. Environmental Pollution Control Engineering, C.S.Rao, Wiley Eastern Ltd., New Age International Ltd.,
2. Air pollution, M.N.Rao, H.V.N.Rao, Tata McGrawhill.
3. Water Pollution control, W.Wesley Eckenfelder Jr.Industrial, Tata McGrawHill.

OPEN ELECTIVE
ENERGY ENGINEERING
EC 416 / ChE 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Conventional energy resources, the present scenario, scope for future development.

Coal: Origin, occurrence and reserves, classification, ranking, analysis and testing, coal carbonization, manufacture of coke, coal gasification, coal liquefaction.

UNIT – II

Petroleum: Origin, occurrence and reserves, composition, classification, characteristics, exploration and production.

Petroleum Refining: Refinery processes, petroleum products, testing and analysis of petroleum products.

UNIT – III

Non conventional energy sources: Solar energy, solar radiation, principles of heating and cooling, photo voltaic cells.

Bio gas products, bio-mass, wind energy, hydrogen energy, geothermal and ocean thermal energy, fuel cells.

UNIT – IV

Energy storage, mechanical energy storage, water storage, solar pond, phase change storage, chemical storage.

Energy Conservation: Conservation methods in process industries, Theoretical analysis, practical limitations, equipment for energy saving / recovery.

TEXT BOOKS:

1. Conventional Energy technology, S.B.Pandy, Tata McGraw Hill
2. Fuel Science, Harker and Allen, Oliver & Boyd.
3. Energy conversion, Culp, Mc Graw Hill.

OPEN ELECTIVE
AIR POLLUTION AND CONTROL
EC 416 / CE 100

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Air Pollution – Definitions, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE BOOK:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

OPEN ELECTIVE
REMOTE SENSING AND GIS
EC 416 / CE 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Concepts and Foundations of Remote Sensing: Introduction, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with Earth surface features, an ideal remote sensing system, characteristics of remote sensing systems, application of remote sensing .

UNIT – II

Visual Image Interpretation: Introduction, Fundamentals of visual image interpretation, basic visual image interpretation equipment, land use and land cover mapping, geologic and soil mapping, agricultural applications, forestry applications, water resources applications, urban and regional planning applications.

UNIT – III

Digital Image Processing: Introduction, Image rectification and restoration, Image enhancement, contrast manipulation, spatial feature manipulation, Image Classification, Supervised classification, the classification stage, the training stage, Un-supervised classification, Classification accuracy assessment.

UNIT – IV

Geo-graphical Information Systems (GIS):Introduction, spatial information system: an overview, conceptual model of spatial information, concept of databases, digitizing, editing, and structuring map data, data quality and sources of errors in GIS, spatial data analysis (vector based), spatial data analysis (raster based), Fundamental concepts of GPS, Types of GPS, GPS satellite, Application of GPS in resource surveys, mapping and navigation.

TEXT BOOKS:

1. Lillisand.T.M, Keifer.R.W, and Chipman.J.WRemote sensind Image interpretation, 2004, John Wlley and Sons.
2. Chrisman, N.R. (1997), Exploring Geographic Information systems, John Willey and sons
3. Remote Sensing and its applications by LRA Narayana University Press 1999.
4. Principals of Geo physical Information Systems - Peter A Burragh and Rachael A. Me Donnell, Oxford Publishers 2004.

REFERENCE BOOKS:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001,
3. B.S.Publications.GIS by Kang - tsung chang, TMH Publications & Co.
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
5. Fundamental of GIS by Mechanical designs John Wiley & Sons.

OPEN ELECTIVE
DATABASE MANAGEMENT SYSTEMS
EC416/ CS 100

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

(17 Periods)

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene - Advantages of Using the DBMS Approach - A Brief History of Database Applications - When Not to Use a DBMS.

Database System Concepts and Architecture: Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces - The Database System Environment - Centralized and Client/Server Architectures for DBMSs - Classification of Database Management Systems.

Data Modeling Using the Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design - An Example Database Application - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints - Weak Entity Types - Refining the ER Design for the COMPANY Database - ER Diagrams, Naming Conventions, and Design Issues.

UNIT – II

(15 Periods)

The Relational Data Model and Relational Database Constraints: Relational Model Concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations - Relational Database Design Using ER-to-Relational Mapping.

SQL-99: Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types - Specifying Constraints in SQL - Schema Change Statements in SQL - Basic Queries in SQL - More Complex SQL Queries - INSERT, DELETE, and UPDATE Statements in SQL - Views (Virtual Tables) in SQL.

UNIT – III

(16 Periods)

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

Relational Database Design Algorithms and Further Dependencies: Properties of Relational Decompositions - Algorithms for Relational Database Schema Design – Multivalued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.

UNIT – IV

(16 Periods)

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions - Characterizing Schedules Based on Recoverability - Characterizing Schedules Based on serializability.

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control - Concurrency Control Based on Timestamp Ordering – Multiversion Concurrency Control Techniques - Validation (Optimistic) Concurrency Control Techniques - Granularity of Data Items and Multiple Granularity Locking.

TEXT BOOK:

1. "Fundamentals of Database Systems", Ramez Elmasri and Navate Pearson Education, 5th edition.

REFERENCE BOOKS:

1. "Introduction to Database Systems", C.J.Date Pearson Education.
2. "Data Base Management Systems", Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill, 3rdEdition.
3. "Data base System Concepts", Silberschatz, Korth, McGraw hill, 5th edition.

OPEN ELECTIVE
JAVA PROGRAMMING
EC416/ CS 200

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

(16 Periods)

Introduction: Introduction to java, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals.

Classes and Objects : Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

Inheritance: Basic concepts, access specifires, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch, Object class.

Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.

Strings: Exploring the String class, String buffer class, Command-line arguments.

UNIT – II

(15 Periods)

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

Multithreading: Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiplethreads, Synchronization, thread priorities.

Applets: Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics

UNIT-III

(16 Periods)

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

AWT: AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menubar.

UNIT-IV

(17 Periods)

Swing-I – swings introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons.

JDBC Connectivity: Jdbc connectivity, types of Jdbc Drivers, connecting to the database, Jdbc Statements, Jdbc Exceptions, Manipulations on the database, Metadata.

TEXT BOOKS:

1. "The Complete Reference Java J2SE", 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.
2. "Big Java", 2nd Edition, Cay Horstmann, John Wiley and Sons, Pearson Education.

REFERENCE BOOKS:

1. "Java How to Program", Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. "Core Java 2", Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. "Core Java 2", Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
4. "Beginning in Java 2", Iver Horton, Wrox Publications.
5. "Java", Somasundaram, Jaico.
6. "Introduction to Java programming", By Y.DanielLiang, Pearson Publication.

OPEN ELECTIVE
OPTIMIZATION TECHNIQUES
EC 416 / EE 100

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Linear Programming: Introduction and formulation of models – Convexity - simplex method - Bid method - two phase method – degeneracy – nonexistent and unbounded solutions - duality in L.P. - dual simplex method - sensitivity analysis - revised simplex method - transportation and assignment problems.

UNIT – II

Non-linear Programming: Classical optimization methods - equality and inequality constraints - Lagrange multipliers and Kuhn-Tucker conditions - quadratic forms - quadratic programming and Bessel's method.

UNIT – III

Search Methods: One dimensional optimization - sequential search - Fibonacci search - multi dimensional search method - Univariate search - gradient methods - steepest descent / ascent methods - conjugate gradient method -Fletcher – Reeves method - penalty function approach.

UNIT – IV

Dynamic Programming: Principle of optimality recursive relation - solution of linear programming problem - simple examples

TEXT BOOKS:

1. Engineering Optimization: Theory and Practice by S.S. Rao, 3rd Ed., New Age International, 1998
2. Optimization Methods in Operations Research and Systems Analysis by K.V. Mittal and C. Mohan, 3rd Ed, New Age International, 1996.

REFERENCE BOOKS:

1. Non-linear Programming by P.L. Mangassarian.
2. Operations Research by S.D. Sharma.
3. Operations Research: An introduction by H.A. Taha, 6th Edition, PHI.
4. Linear Programming by G. Hadley.

OPEN ELECTIVE
NON-CONVENTIONAL ENERGY SOURCES
EC 416 / EE 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Principle of Renewable Energy: Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management.

UNIT – II

Solar Radiation: Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion - solar thermal central receiver systems - photovoltaic energy conversion - solar cells – 4 models.

UNIT – III

Wind energy: Planetary and local winds - vertical axis and horizontal axis wind mills - principles of wind power - maximum power - actual power - wind turbine operation - electrical generator.

UNIT – IV

Energy from Oceans: Ocean temperature differences - principles of OTEC plant operations - wave energy - devices for energy extraction – tides - simple single pool tidal system.
Geothermal energy: Origin and types - Bio fuels – classification - direct combustion for heat and electricity generator - anaerotic digestion for biogas - biogas digester - power generation.

TEXT BOOK:

1. Renewable Energy Sources by John Twidell & Toney Weir : E&F.N. Spon.

REFERENCE BOOKS:

1. Power plant technology by EL-Wakil, Mc Graw-Hill.
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

OPEN ELECTIVE
VIRTUAL INSTRUMENTATION USING LABVIEW
EC 416 / EI 100

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

REVIEW OF VIRTUAL INSTRUMENTATION: Historical perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.

PROGRAMMING TECHNIQUES: VIS and sub-VIS, loops & charts, arrays, clusters, graphs, case & sequence structures, formula modes, local and global variable, string & file input. Graphical programming in data flow, comparison with conventional programming.

UNIT – II

DATA ACQUISITION BASICS: ADC, DAC, DIO, Counters & timers, PC Hardware structure, timing, interrupts, DMA, Software and Hardware Installation. GPIB/IEEE 488 concepts, and embedded system buses - PCI, EISA, CPCI, and USB & VXI. A

UNIT – III

COMMON INSTRUMENT INTERFACES: Current loop, RS 232C/RS 485, GPIB, System basics, interface basics: USB, PCMCIA, VXI, SCXI, PXI etc, networking basics for office & industrial application VISA & IVI, image acquisition & processing, Motion Control. ADC, DAC, DIO, DMM, waveform generator.

UNIT – IV

USE OF ANALYSIS TOOLS AND APPLICATION OF VI: Fourier transforms Power spectrum, Correlation methods, windowing & flittering. Application in Process Control projects, Major equipments- Oscilloscope, Digital Multimeter, Pentium Computers, temperature data acquisition system, motion control employing stepper motor.

TEXT BOOKS:

1. Gary Johnson, LABVIEW Graphical Programming , 2nd Edition, McGraw Hill, 1997.
2. Lisa K. Wells and Jeffrey Travis, LABVIEW for Everyone , PHI, 1997.
3. Skolkoff, Basic concepts of LABVIEW 4 , PHI, 1998.

REFERENCE BOOKS:

1. S. Gupta, J.P. Gupta, *PC Interfacing for Data Acquisition and Process Control*, ISA, 2nd Edition, 1994.
2. Technical Manuals for *DAS Modules of Advantech* and National Instruments.
3. L.T. Amy, *Automation System for Control and Data Acquisition*, ISA, 1992.

OPEN ELECTIVE
SENSORS and TRANSDUCERS
EC 416 / EI 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Definition related to measurements /instrumentation, static and dynamic characteristics of instruments, classification of transducers.

UNIT – II

Displacement Measurement: Variable resistance devices, variable inductance devices, variable capacitance devices, digital displacement transducers.

Strain measurement: Stress-strain relations, resistance strain gauges, types of strain gauges, strain gauge measurement techniques, static measurements ,dynamic measurements. Calibration of strain gauge, strain gauge load cell, force and torque measurements using strain gauge.

UNIT – III

Pressure measurement: Diaphragm, Bellows, Bourdon tubes, Resistive inductive and capacitive transducers, piezo-electric transducers.

Low pressure measurement: McLeod gauge, Knudson gauge, Ionization gauge.

Temperature measurement: RTD, Thermocouple and thermistor.

UNIT – IV

Flow measurement: Head type flow meters, Rotometer, Electromagnetic flow meter.

Measurement of liquid level, viscocity, humidity and moisture.

TEXT BOOKS:

1. A.K.Ghosh, Introduction to Instrumentation and Control, PHI.
2. BC Nakra, KK Chaudhry, Instrumentation measurement and analysis, TMH, New Delhi second edition.

REFERENCE BOOKS:

1. Patranabis D,"Sensors and transducers", second edition, PHI, New Delhi 2003.

Ernest O Doeblin, "Measurement Systems Application and Design", TMH.

OPEN ELECTIVE
WEB TECHNOLOGIES
EC 416 / IT 100

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

(15Periods)

Introduction to XHTML, Cascading Style Sheets (CSS), JavaScript: Introduction to Scripting, Control Statements, Part 1, Control Statements, Part 2, Functions, Arrays, Objects.

UNIT – II

(16Periods)

Dynamic HTML: Object Model and Collections, Dynamic HTML: Event Model, XML, RSS (Really Simple Syndication).

UNIT – III

(15 Periods)

Building Ajax-Enabled Web Applications, Web Servers (IIS and Apache).

UNIT – IV

(18 Periods)

Servlets and Java Server Pages.

TEXT BOOK:

1. Harvey M. Deitel and Paul J. Deitel, “Internet & World Wide Web How to Program”, 4/e, Pearson Education.

REFERENCE BOOKS:

1. Jason Cranford Teague, “Visual Quick Start Guide CSS, DHTML &AJAX”, 4e, Pearson Education.
2. Tom Nerino Doli smith, “JavaScript & AJAX for the web”, Pearson Education, 2007.
3. Joshua Elchorn, “Understanding AJAX”, Prentice Hall, 2006.
4. Marty Hall, Larry Brown, “Core Servlets and Java Server Pages™: Volume 1: Core Technologies”, 2nd Edition, Prentice Hall.

OPEN ELECTIVE
.NET TECHNOLOGIES
EC 416 / IT 200

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to C# 2.0, Expressions and control structures, Strings and regular expressions, Arrays and collections, Object-oriented programming in C#, Introduction to generics, I/O and persistence, Working with XML, Events and delegates, Multithreaded programming, Reflection fundamentals

UNIT – II

Assemblies and App Domains, COM and windows interoperability, Code access security, Cryptography and data protection, Optimizing your .NET 2.0 code, ADO.NET fundamentals, Advanced ADO.NET techniques, Working with ADO.NET data providers, Programming with SQL Server 2005.

UNIT – III

HTML, Introduction to ASP.NET 2.0 and Web forms, ASP.NET Web Controls, State management in ASP-NET 2.0, Using master pages, ASP.NET personalization and customization, Building rich, database-driven Web applications, Securing your ASP.NET applications, Exposing functionality with Web services.

UNIT – IV

Introduction to Windows Forms 2.0, The Windows Forms control library, advanced user, interface programming, Data binding with Windows Forms 2.0, Remoting

TEXT BOOK:

1. Microsoft Visual C# 2005 Unleashed by **Kevin Hoffman**, Sams (Pearson India), 2006.

REFERENCE BOOKS :

1. Core C# and .NET by Stephen C.Pary, Prentice Hall (Pearson Education), 2006.
2. C#: The complete reference by Herbert Schildt, Tata McGraw Hill, 2006 2/e.
3. Pro C# 2005 and the .NET Platform by Andrew Troelson, Apless 2005 3/e.

OPEN ELECTIVE
ROBOTICS
EC 416 / ME 100

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to Robotics, major components of a robot, robotic like devices, classification of robots – Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation, economic analysis, overview of robot application.

UNIT – II

Robot end Effectors: Introduction, end effectors, interfacing, types of end effectors, grippers and tools, considerations in the selection and design of remote centered devices.

UNIT – III

Robotic sensory devices: Objective, Non-optical position sensors – potentiometers, synchros, inductocyn, optical position sensors – optic interrupters, optical encoders (absolute & incremental).

Proximity sensors: Contact type, non contact type – reflected light scanning laser sensors.

Touch & slip sensors: Touch sensors – proximity rod & photo detector sensors, slip sensors – Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors.

UNIT – IV

Transformations and Kinematics: Objectives, homogenous coordinates, basic transformation operations, forward solution – Denavit Hartenberg procedure. Simple problems involving planar manipulators, inverse or backward solution – problems involved, techniques.

Introduction to Trajectory Planning, the manipulator jacobian.

TEXT BOOKS:

1. Robotic Engineering by Richard D.Klafter.
2. Industrial Robotics by Mikell P.Groover.

REFERENCE BOOKS:

1. Introduction to Robotics – John J.Craig.
2. Robotics – K.S.Fu, Gonzalez & Lee.
3. Robotics for Enginers by Yoram Koren.
4. Robotics Technology and Flexible Automation by S.R.Deb.
5. Robotics by Saeed.B.Niku.

OPEN ELECTIVE
POWER PLANT ENGINEERING
EC 416 / ME 200

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION: Various Energy sources, types of power plants.

HYDRO ELECTRIC POWER PLANT: Hydrology, Rainfall, Run off and their measurement, hydrograph, Flow duration curve, Mass curve and calculation of storage capacity, site selection of hydro plant, different types of hydro plants.

DIESEL AND GAS TURBINE POWER PLANTS: Classification, main components of plant, plant layout, application and comparison with other plants.

UNIT – II

THERMAL POWER PLANT: General layout, Fuels, Coal analysis, Coal handling, burning of coal - stoker and pulverized systems, Ash handling systems, ESP, Need for Draught, High-pressure boilers, Condensers, cooling ponds and towers (wet and dry types), Deaeration.

UNIT – III

NUCLEAR POWER PLANTS: Nuclear Fission, Nuclear Fuels, Components of Reactor, types of Nuclear Reactors, Breeding, Fast Breeder Reactor, Radiation shields, nuclear waste disposal.

FLUCTUATING LOADS ON POWER PLANTS: Various performance Factors (load factor, diversity factor, use factor etc.).

POWER PLANT ECONOMICS: Fixed costs, operating costs, cost per kWh, comparison of fixed and operating costs of hydro, thermal, nuclear plants, power tariffs.

POLLUTION AND CONTROL: Introduction, particulate and gaseous pollutants, thermal pollution and solid waste pollution, methods to control pollution - brief description.

UNIT – IV

SOLAR ENERGY: Solar collectors, solar energy storage, solar ponds, solar energy utilization and applications.

POWER: Basic principle, different types of wind mills, wind energy conversion systems, other applications.

GEOTHERMAL POWER: sources, energy conversion system.

OTEC: ocean thermal energy conversion systems, introduction to tidal power.

DIRECT ENERGY CONVERSION SYSTEMS: Fuel cells, MHD, Solar cell.

TEXT BOOKS:

1. Power Plant Engineering - G.R. Nagpal, Khanna publ, New Delhi
2. Power Plant Engineering –P.K.Nag, TMH
3. Non Conventional Energy Sources - G.D. Rai, Khanna publ, New Delhi.

REFERENCE BOOKS:

1. Power Plant Technology - M.M. El Wakil, MGH, New York.
2. Principles of Energy Conversion - A.W.Culp, MGH, New York.

TERM PAPER

EC 451

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Course work is prescribed to develop the project and documentation skills of the students. Marks are awarded based on Internal Assessment.

VERILOG HDL LAB

EC 452

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Verilog HDL Simulation and Synthesis of the Following Experiments

1. Logic Gates.
2. Multiplexers/De-Multiplexers.
3. Encoders/Decoders.
4. Comparators.
5. Adders/Subtractors.
6. Multipliers
7. Parity Generators.
8. Design of ALU.
9. Latches.
10. Flip-Flops
11. Synchronous Counters
12. Asynchronous Counters
13. Shift Registers
14. Memories
15. CMOS Circuits

NOTE: A minimum of 10(Ten) experiments must be chosen from 15 Experiments.

DIGITAL SIGNAL PROCESSING LAB

EC 453

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Experiments Based On Tool Boxes

1. Simulation of AM & FM.
2. Fourier Transforms.
3. Simulation of M-ary PSK.
4. Simulation of DPCM.
5. Evaluation of DFT and IDFT of 16 Sample Sequence using DIT Algorithm.
6. Evaluation of DFT and IDFT of 16 Sample Sequence using DIF Algorithm.
7. Design of IIR Butterworth Filter using Impulse Invariant Method.
8. Design of FIR Filter using Windowing Technique.
9. Convolution & Correlation of Two Signals.
10. DFT Analysis of a Noise Corrupted Signal.

Experiments Based on Simulink

11. Solving the Given Differential Equation using Simulink.
12. Analog to Digital conversion of a signal using Simulink.
13. Direct form II realization of Given Second ordered Digital Filter using Simulink.
14. Serial form realization of Given Second ordered Digital Filter using Simulink.
15. Parallel form realization of Given Second ordered Digital Filter using Simulink.
16. Implementation of given feedback control system using Simulink.

Text Books :

1.Essentials of MATLAB Programming By Stephen J. Chapman
2. Introduction to the Simulation of Dynamics Using Simulink By Michael A. Gray

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination

IV B.Tech. II Semester

RADAR AND NAVIGATIONAL AIDS

EC 421

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Block Diagram of Pulse Radar, simple form of Radar equation, Detection of signals in noise, Receiver noise and signal to noise ratio, integration of Radar pulses, RCS:RCS of simple targets, RCS of multiple targets, PRF and Range Ambiguities, Doppler Effect, Limitations of CW Radar, FMCW Radar, Altimeter.

UNIT – II

MTI Radar, Delay line cancellers: Frequency response of single delay line cancellers, Clutter Attenuation, MTI improvement factor, N-pulse delay line canceller, on recursive and Recursive filters, Staggered PRF, Doppler filter banks.

TRACKING: Types of Tracking Radar Systems, Sequential lobing, conical scan and mono pulse tracking (amplitude comparison and phase comparison).

UNIT – III

Super heterodyne Receiver, types of Duplexers and receiver protectors, types of Displays, Radomes.

Electronic Warfare: Objectives an definitions, Noise jamming, Types of Electronic counter measures and Electronic counter to counter measures, Stealth applications.

UNIT – IV

Elementary ideas of Navigation Aids: VOR, DME, DVOR, TACAN, ILS and MLS,GPS, Automatic Direction finder, Hyperbolic Navigation (LORAN, DECA, OMEGA).

TEXT BOOKS:

1. Merrill I Skolnik, Introduction to Radar Systems, 2nd Edition, TMH, 2003.
2. Dr AK Sen and Dr AB Bhattacharya, Radar Systems and Radio Aids toNavigation, Khanna Publishers, 1988.
3. Roger J Suullivan, Radar Foundations for Imaging and Advanced Topics.
4. NS Nagaraja, Elements of Electronic Navigation, TMH.
5. Peyton Z Peebles Jr, Radar Principles, John Wiley Inc., 2004.

OPTICAL COMMUNICATIONS

EC 422

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction:

Historical development, Elements of an Optical Fiber transmission link, Advantages of Optical Fibers, Applications of Optical Fiber, Ray Theory Transmission, Total internal reflection, Acceptance angle, Critical angle, Numerical Aperture, Cylindrical fibers-Modes, Fiber types: Step Index, Graded Index : Modes of Propagation : single mode and multimode fibers, Fiber materials.

UNIT – II

Transmission characteristics of optical fibers: Attenuation, absorption, scattering and bending losses in fibers, Dispersion: Intermodel and intramodel.

Fiber optic components: Splicing, Connectors, Connection losses, Fiber Optic couplers, Fiber Optic Switches.

UNIT – III

Optical sources: General characteristics, Principles of Light Emission. Light Emitting Diodes types-Planar, Dome, Surface emitting, Edge emitting Super luminescent LED's, Lens coupling to fiber, LED Characteristics – Optical output power & efficiency, output spectrum, modulation bandwidth, reliability. LASER: Working of DH injection laser, DFB laser and Threshold condition for lasing. DETECTORS: Principles of photo detection. PIN Photodiode, Avalanche Photodiode and their characteristics.

UNIT – IV

Optical fiber systems: Optical Transmitter Circuits - source limitations, LED drive circuits. Optical Receiver operation-Digital system transmission, error sources, receiver configuration, Preamplifier types, Digital receiver performance-probability of error, Quantum limit, System considerations – Link power budget, rise time budget, Direct intensity modulation, Advanced Multiplexing Strategies – OTDM,WDM.

Optical fiber measurements: Numerical Aperture, attenuation, refractive index, dispersion losses, cutback and OTDR.

TEXT BOOKS:

1. John M Senior, Optical Fiber Communications: Principles and Practice, 2nd Edition, PHI, 2002.
2. Henry Zanger and Cynthia Zanger, Fiber Optics: Communication and other Applications, Maxwell Macmillan Edition.
3. JC Palais, Fiber Optic Communications, 2nd Edition, PHI, 2001.
4. W.Tomasi, Advanced Electronic Communication Systems, Pearson Education,2002.

ELECTIVE - I

COMPUTER NETWORKS

EC 423 (A)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION: **Uses of Computer Networks**: Business Applications, Home Applications, Mobile Users, Social Issues.

Network Hardware: LANs, MANs, WANs. **Network Software:** Protocol Hierarchies, Design Issues for the Layers, Connection –Oriented and Connectionless Services, Service Primitives, The Relationship of Services to Protocols.

Reference Models: The OSI Reference Model, The TCP/IP Reference Model.

Example Networks: The Internet, Connection-Oriented Networks (X.25, Frame Relay & ATM), Ethernet.

Network Layer: **Network Layer Design Issues**: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram Subnets.

Routing Algorithms: The Optimality Principle, Shortest Path, Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts.

UNIT-II

Network Layer(Continued):Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.

Quality of Service: Requirements, Techniques for Achieving Good Quality of Service, Integrated Services, Differentiated Services.

Internetworking: Networks Differences, Connecting Networks, Concatenated Virtual Circuits, Connection less Internetworking, Tunneling, Internetwork Routing, Fragmentation.

The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, OSPF-The Interior Gateway Routing Protocol, BGP-The Exterior Gateway Routing Protocol, Internet Multicasting, Mobile IP,IPv6.

UNIT-III

The Transport Layer: **The Transport Service**: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets.

Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery, **Simple transport Protocol.**

The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol.

The Internet Transport Protocols (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management, Wireless TCP & UDP Transactional TCP.

UNIT – IV

Application Layer: **The Domain Name System** (**DNS):** The DNS Name Space, Resource Records, Name Servers. **Electronic Mail**: Architecture & Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP – Hyper Text Transfer Protocol, Performance Enhancements.

Multimedia: Introduction to Digital Audio, Audio Compression, Streaming Audio, Internet Radio, Voice over IP, Introduction to Video, Video Compression, Video on Demand, The MBone – The Multicast Backbone.

TEXT BOOK:

1. Tanenbaum, "Computer Networks", 4th Edition, (Pearson Education / PHI).

REFERENCE BOOKS:

1. Kurose & Ross, "COMPUTER NETWORKS – A Top-down approach featuring the Internet", Pearson Education, Alberto Leon, Garciak.
2. Leon Gartia, Indra Widjaja, "Communication Networks Fundamental Concepts and Key Architectures", TMH.
3. Nader F.Mir, "Computer and Communication Networks", PHI.

ELECTIVE - I

HDL PROGRAMMING

EC 423(B)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to VHDL : capabilities, Hardware Abstraction, Basic Terminology, Entity Declaration, Architecture Body, Configuration Declaration, Package Declaration , Package Body, Model Analysis, Simulation, Writing a Test Bench, Identifiers, Data Objects, Data Types, Operators

UNIT – II

Dataflow Modeling & Structural Modeling : Concurrent Signal Assignment Statement , Concurrent versus Sequential Signal Assignment , Delta Delay Revisited ,Multiple Drivers , Conditional Signal Assignment Statement , Selected Signal Assignment Statement , Block Statement , Concurrent Assertion Statement , Structural Modeling Example , Component Declaration , Component Instantiation ,Resolving Signal Values

UNIT – III

Behavioral Modeling: Entity Declaration , Architecture Body , Process Statement , Variable Assignment Statement , Signal Assignment Statement , Wait Statement , If Statement , Case Statement, Null Statement , Loop Statement, Exit Statement , Next Statement , Assertion Statement , More on Signal Assignment Statement, Other Sequential Statements , Multiple Processes

UNIT – IV

Subprograms, Functions , Procedures , Declarations, Subprogram Overloading , Operator Overloading, Package Declaration ,Package Body, Design Libraries, Design File, Generate Statements, Qualified Expressions , Type Conversions , Guarded Signals , Attributes, Synthesis.

TEXT BOOK:

1. J.Bhasker, A VHDL Primer, Pearson Education, Third edition, 1999.

REFERENCE BOOK:

1. Stephen Brown and Z Vonko Vranesic, Fundamentals of Digital Logic with VHDLDesign, TMH, 2002.

ELECTIVE - I

ARTIFICIAL INTELLIGENCE

EC423(C)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Problems, Problem Spaces And Search: Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT – II

Knowledge Representation Using Predicate Logic: Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Question answering.

Representing Knowledge Using Rules- Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge, Semantic Nets

UNIT – III

Conceptual dependency, Scripts. Hopfield Networks, Perceptrons, Back propagation networks, generalization, Applications of Neural networks, Expert systems.

UNIT – IV

PROLOG Language: Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, Fail, Recursion, string operations, Dynamic databases, Lists.

TEXTBOOKS:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, 2nd Edition, (Tata McGraw Hill Edition)
2. Carl Townsend, Introduction to TURBO PROLOG, BPB Publications.

REFERENCE BOOKS:

1. Patrick Henry Winston, Artificial Intelligence, Pearson Education,
2. Russel and Norvig, Artificial Intelligence, Pearson Education, PHI.

ELECTIVE - I

JAVA PROGRAMMING

EC 423(D)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Introduction: Introduction to java, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals.
Classes and Objects : Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes. **Inheritance:** Basic concepts, access specifiers, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch, Object class. **Interfaces:** Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces. **Packages**: Creating a Package, setting CLASSPATH, Access control protection, importing packages. **Strings:** Exploring the String class, String buffer class, Command-line arguments. **Library:** Date class, Collection, Enumerations and Wrapper classes.

UNIT-II

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes. **Multithreading :** Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups. **I/O Streams:** Streams, Byte streams, Character streams, File class, File streams. **Applets:** Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics

UNIT-III

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events. **AWT:** AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menubar.
Swing-I – swings introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields,buttons – The JButton class, Check boxes, Radio buttons.

UNIT-IV

Swing- II: Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables. **JDBC Conectivity :** Jdbc connectivity , types of Jdbc Drivers, connecting to the database, Jdbc Statements, Jdbc Exceptions, Manipulations on the database, Metadata . **Networking**: Basics of Networking, Inet Address, URL, URL connection, TCP/IP sockets, Datagrams, java.net package.

TEXT BOOKS:

1. The Complete Reference Java J2SE 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi. (UNTI – I and UNIT – II)
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons,Pearson Edu.(UNIT–IV)

REFERENCES:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, 7E, Pearson.
3. CoreJava2,Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, 7E, Pearson
4. Beginning in Java 2, Iver Horton, Wrox Publications.
5. Java, Somasundaram, Jaico.

ELECTIVE - II

MOBILE & CELLULAR COMMUNICATIONS

EC 424(A)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I:

INTRODUCTION TO MOBILE COMMUNICATION:

Evolution of Mobile Radio Communication, Mobile Radio Telephony in US and around the world, Examples of Wireless Communication Systems: Paging system, Cordless telephones systems, Cellular telephone Systems, Trends in Cellular Radio and personal Communications

The Cellular concept: Frequency reuse, Channel Assignment strategies, Hand off Strategies, Interference and system capacity, Improving coverage and capacity in cellular systems.

UNIT – II:

MOBILE RADIO PROPAGATION:Large Scale Fading: Introduction, Free space propagation model, Relating power to electric field, The Three basic propagation mechanisms: Reflection, Ground reflection (Two-Ray) model, Diffraction, scattering, Practical Link budget design using path loss models. **Small Scale Fading:** Small-scale Multipath Propagation, Impulse response model of a multipath channel, Parameters of mobile multipath channels, Types of small scale fading: Fading effects due to multipath time delay spread and Doppler spread Rayleigh and Ricean distributions. **Equalization:** Fundamentals of equalizers, Training a generic adaptive equalizer, Equalizers in a communication receiver, survey of equalization techniques, Linear equalizers, Nonlinear equalizers: Decision feedback equalizers, Maximum likelihood sequence Estimation (MLSE) equalizer.

Diversity Techniques: Space diversity: Selection diversity, feedback, MRC, EGC diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT – III:

WIRELESS NETWORKING (2G):Global system for mobile(GSM):services and features, system architecture, Radio subsystem ,channel types, Example of a GSM call, Frame structure for GSM, signal processing in system. CDMA digital cellular standard (IS – 95): Frequency and channel specifications, Forward CDMA channel and Reverse CDMA channel.

UNIT – IV:

WIRELESS NETWORKING (3G): Mobile Services (2.5G): GPRS: GPRS Functional groups, architecture, network nodes, procedures, billing.**WAP:** WAP Model, WAP Gateway, WAP Protocols, WAP UA prof and caching, wireless bearers for WAP, WAP developer tool kits. Mobile station application execution environment. **Mobile Services (3G):**Paradigm Shifts in 3G Systems, W-CDMA and CDMA 2000,Improvements on core network, Quality of service in 3G,Wireless OS for 3G handset,3G systems and field trials, Other trail systems, Impact on manufacture and operator technologies.

TEXT BOOKS:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education, 2003 (UNIT I, II, III)

2.Yi-BingLin, Imrich Chlamtac, Wireless and Mobile Network architectures, Wiley, 2001(IV)

REFERENCE BOOKS:

1. Kamilo Feher, Wireless Digital Communications, PHI, 2003

2. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, MC Graw Hill, 1995.

3. P. Nicopolitidis, Wireless Networks, Wiley, 2003

ELECTIVE - II

FUZZY LOGIC

EC 424(B)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Classical and fuzzy sets: Classical sets- operations, properties of classical sets, mapping of classical sets to the functions. Fuzzy sets-membership, uncertainty, fuzzy set operations, properties of fuzzy sets. Classical and fuzzy relations: Cartesian product, crisp relations-cardinality, operations and properties of crisprelations, Fuzzy relations-cardinality operations and properties of fuzzy relations. Non interacting fuzzy sets, Tolerance and equivalence relations.

UNIT – II

Membership functions: Futures of membership functions, fuzzification, membership value assignments-intuition, ranking ordering, angular fuzzy sets, neural nets, genetic algorithms, inductive reasoning, Fuzzy-to-crisp conversions: Lambda cuts for fuzzy sets, lambda-cuts for fuzzy relations, defuzzification methods. Fuzzy arithmetic, numbers and vectors and extension principle: fuzzy members, approximate methods of extension-vertex method, DSW algorithm, restricted DSW algorithm, fuzzy vectors.

UNIT – III

Classical logic and fuzzy logic: Classical predicate logic-tautologies, contradictions, equivalence, exclusive or and exclusive nor, logical proofs, deductive inferences. Fuzzy logic, approximate reasoning, Fuzzy tautologies, contradictions, equivalence and logical proofs, other forms of the implication operation, other forms of the composite operation. Fuzzy rule-based systems: Natural language, linguistic Hedges, rule-based systems-canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, Graphical techniques inference.

UNIT – IV

Fuzzy decision-making: Fuzzy synthetic evaluation, fuzzy ordering, preference and consensus, Multi objective decision making, Fuzzy Bayesian Decision method, Decision making under Fuzzy states and fuzzy actions. Fuzzy classification: Classification by Equivalence Relations-crisp relations, Fuzzy relations, Cluster validity, C-Means clustering-Hard C-Means (HCM). Fuzzy C-Means (FCM), classification Metric, Hardening the Fuzzy C-partition, similarity relations from clustering.

TEXT BOOKS:

1. Timothy J. Ross, Fuzzy logic with engineering applications, Mc Graw Hill, 1997
2. Klir and Ywan, Fizzy sets and Fuzzy logic, Prentice Hall of India
3. S.Rajasekharan & Y.A.Vijayalakshmi Pai, Neural Networks, Fuzzy logic and Genetic Algorithms, Prentice Hall of India

REFERENCE BOOK

1. Fuzzy - Neural Control: Principles, Algorithms and applications by Nie and Linkens, PHI.

ELECTIVE - II

SPEECH SIGNAL PROCESSING

EC 424(C)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Production And Classification Of Speech Sounds: Anatomy and Physiology of Speech Production, Categorization of Speech Sounds. Acoustics of Speech Production: Physics of Sound, Uniform tube model, A Discrete-Time model based on Tube Concatenation.

Time-Domain Models for Speech Processing: Short-Time energy, average zero crossing rate, Pitch period estimation using autocorrelation.

UNIT – II

Short Time Fourier Transform Analysis and Synthesis: Short Time Analysis, Signal estimation from STFT, Frequency Domain Pitch Estimation, A Correlation based Pitch Estimator, Pitch estimation based on a Comb Filter.

Digital Representations Of The Speech Waveform: Instantaneous quantization, Delta Modulation, DPCM.

UNIT – III

Homomorphic Signal Processing: Homomorphic Systems for Convolution, Complex Cepstrum of Speech-like Sequences, Spectral root Homomorphic Filtering, Short-Time Homomorphic Analysis, Short-time Speech Analysis and Analysis/Synthesis Structures.

UNIT – IV

Speech Coding: Linear Prediction, Error minimization, Autocorrelation method, Levinson Recursion, Lattice filter formulation of the inverse filter. Vector Quantization, Distortion Measure, Sub-band coding

Speaker Recognition: Spectral features for Speaker Recognition, Mel- Cepstrum, Speaker Recognition Algorithms, Minimum – distance classifier.

TEXT BOOKS:

1. Thomas F Quatieri, Discrete-Time Speech Signal Processing Principles and Practice, Pearson Education, 2002.
2. L R Rabiner and R W Schafer, Digital Processing of Speech Signals Pearson Education, 2002.

ELECTIVE - II

NEURAL NETWORKS

EC 424(D)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: History of Neural Networks, Structure and functions of biological and artificial neuron, Neural network architectures, Learning methods, evaluation of neural networks

UNIT – II

Supervised learning – I: Single layer networks, McCulloch – Plus Neuron, Model Perceptron I carning, Delta learning Widrow – Hoff learning rules, linear seperability, Adaline and modifications

UNIT – III

Supervised learning – II: Multi-layer networks: Architectures, Madalines, Back propagation algorithm, importance of learning parameter and momentum term, radial basis functions, polynomial networks

Unsupervised learning: Winner – Take – all learning, out star learning, learning vector quantizers, counter propagation networks, Kohonen self-organizing networks, Grossberg layer, adaptive resonance theory, Hamming Net

UNIT – IV

Assoctative memories: Hebbian learning rule, continuous and discrete, Hopfield networks, recurrent and associative memory, Boltzman machines, Bi-directional associative memory

Applications of neural networks: Optimization, Travelling Salesman, Problem solving simultaneous linear equations, Applications in pattern recognition and Image Processing

TEXT BOOKS:

1. Kishan Mehrotra, ChIlkuri K. Mohan, Sanjav Ranka, elements of Artificial Neural Networks, penram International
2. J.M. Zurada Introduction to Artificial Neural Systems, Jaico Publications
3. B. Yegnanarayana, Artificial Neural Networks, PHI, New Delhi
4. Waserman: Neural Computing – Theory and Practice.

MICROWAVE AND OPTICAL COMMUNICATIONS LAB

EC 462

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Experiments Based on Microwave Engineering

1. Characteristics of Reflex Klystron
2. Verification of the Expression $1/\lambda_0^2 = 1/\lambda_g^2 + 1/\lambda_c^2$
3. Measurement of VSWR using Microwave Bench
4. Measurement of Unknown Impedance Using Microwave Bench
5. Determination of Characteristics of a Given Directional Coupler
6. Measurement of Gain of an Antenna
7. Measurement of Dielectric Constant of a Given Material

Experiments Based on Optical Communication

8. Characteristic of Light Sources/Detectors
9. Fiber Optics Cable: Numerical Aperture Measurement
10. Measurement of Coupling and Bending Losses Of a Fiber
11. Analog Link set up using a Fiber
12. Digital Link set up using a Fiber
13. Set up of Time Division Multiplexing using Fiber Optics
14. Study of Cellular Communication.

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.