BAPATLA ENGINEERING COLLEGE

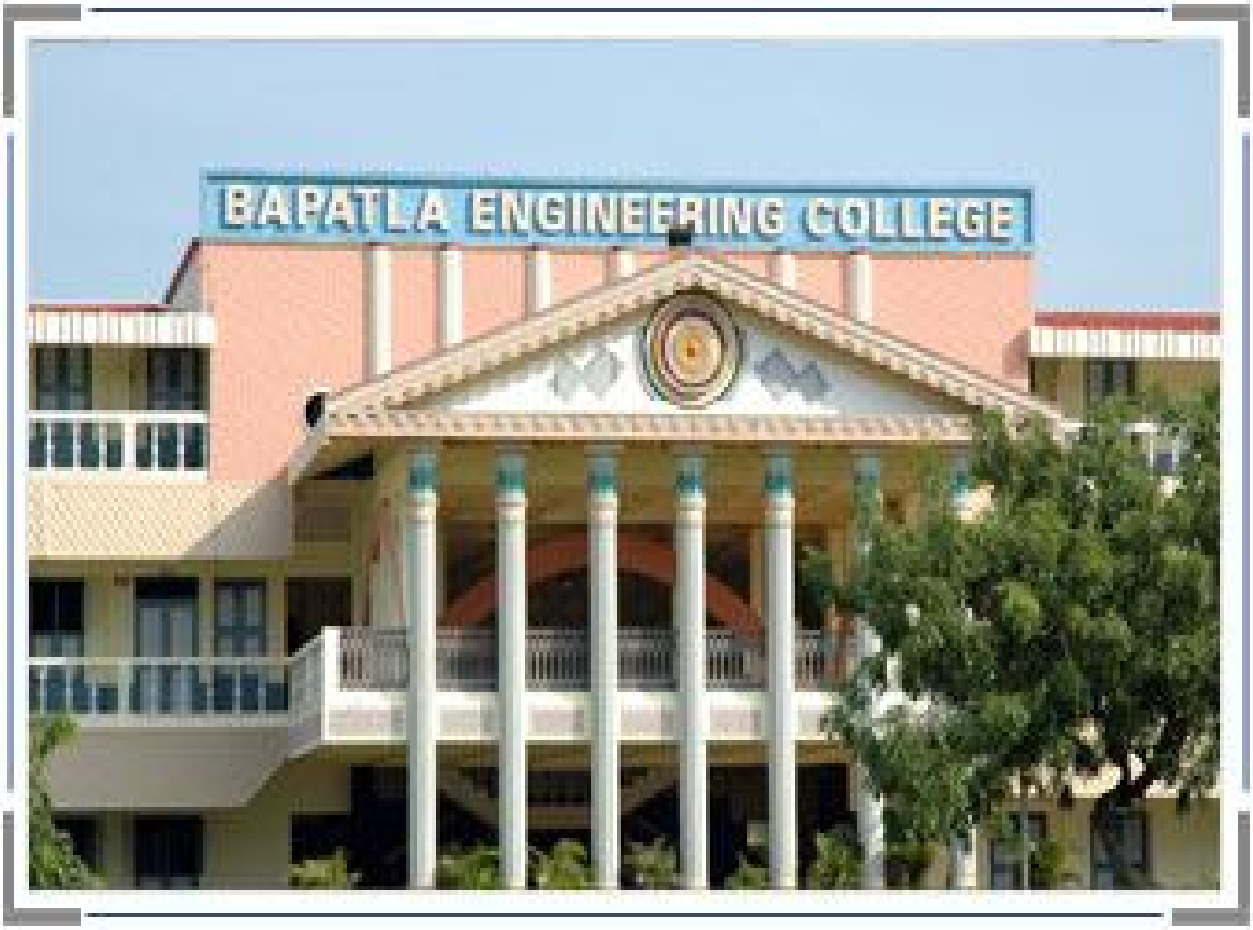
(*Autonomous*)

BAPATLA - 522 102.

SCHEME & SYLLABI for B.Tech.

ELECTRONICS & INSTRUMENTATION ENGINEERING

W.E.F. 2010-2011



ELECTRONICS & INSTRUMENTATION ENGINEERING

BAPATLA ENGINEERING COLLEGE

(Autonomous)

(Sponsored by Bapatla Education Society)

BAPATLA-522102, Guntur District, A.P

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) In each 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 7th semester which would be a precursor to the project work to be done in the 8th 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.

6.10 Make-up Test: A student can appear for a Make-up Test in a single theory subject of a semester to improve marks in the Continuous Assessment – (CA/Internal marks) subject to the following:

If the student becomes eligible to appear for the Final Examination (FE) of a semester and is unable to secure 40% internal marks in a particular theory subject due to genuine reasons, he/she may get an opportunity to appear for makeup test in any one subject in that semester. The makeup test will be conducted for 40 marks and the marks obtained in this test are final. However, the maximum mark awarded will be 16 only irrespective of the marks obtained in the makeup test. Such students have to apply by paying a fee prescribed by the institution and submit the application along with a letter of request indicating the genuineness of his/her

candidature to be eligible for the makeup test. Applications should be recommended by the concerned HOD and approved by the principal.

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 and industry without any notice.

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w.e.f 2010-2011 (Semester System)

First Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI111 / MA01	Mathematics-I	4	1		40	60	100	4
EI112 / PH01	Engineering Physics-I	3	1		40	60	100	3
EI113 / CY01	Engineering Chemistry-I	3	1		40	60	100	3
EI114 / EN01	English Language and Communication	3	1		40	60	100	3
EI115 / BT01	Environmental Studies	3	1		40	60	100	3
EI116 / ME01	Engineering Graphics	3	3		40	60	100	3
EI151 / PH L01	Physics Laboratory-I	-	-	3	40	60	100	2
EI152 / CY L01	Chemistry Laboratory-I	-	-	3	40	60	100	2
EI153 / MEL01	Work Shop	-	-	3	40	60	100	2
	TOTAL	19	8	9	360	540	900	25

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours,
M: Maximum Marks, **Cr. :** No. Credits

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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 **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI121 / MA02	Mathematics-II	4	1		40	60	100	4
EI122 / PH02	Engineering Physics-II	3	1		40	60	100	3
EI123 / CY02	Engineering Chemistry-II	3	1		40	60	100	3
EI124 / EC124	Circuit Theory	3	1		40	60	100	3
EI125 / CE01	Engineering Mechanics	4	1		40	60	100	4
EI126 / CS01	Computer Programming with C	4	1		40	60	100	4
EI161 /PHCY L01	Physics &Chemistry Laboratory-II	-	-	3	40	60	100	2
EI162 / EN L01	English Language Laboratory	-	-	3	40	60	100	2
EI163 / CS L01	Computer Programming Lab.	-	-	3	40	60	100	2
	TOTAL	21	6	9	360	540	900	27

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours,
M: Maximum Marks, **Cr. :** No. Credits

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Second Year B.Tech., (SEMESTER –III)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI211 /MA03	Mathematics-III	4	--		40	60	100	4
EI212 / EE02	Electrical Technology	3	1		40	60	100	3
EI213 / EC02	Electronic Devices	3	1		40	60	100	3
EI214 / EI02	Network Analysis and Synthesis	4	1		40	60	100	4
EI215 /EC03	Digital Electronics	4	1		40	60	100	4
EI216 /EC04	Electromagnetic Field Theory.	4	1		40	60	100	4
EI251 / EEL02	Electrical Engineering Lab	--	--	3	40	60	100	2
EI252/ ECL02	Electronic Devices Lab	--	--	3	40	60	100	2
EI253/ ECL03	Digital Electronics Lab	--	--	3	40	60	100	2
	Total	22	5	9	360	540	900	28

CA: Continuous Assessment , **FE:** Final Examination, L**:** Lecture Hours, **T:** Tutorial Hours, **M:** Maximum Marks, **Cr.:** No. of Credits

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Second Year B.Tech., (SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI221 /MA04	Mathematics – IV	4	-		40	60	100	4
EI222 / EC05	Electronic Circuits – I	4	1		40	60	100	4
EI223	Data Structures Using 'C'	3	1		40	60	100	3
EI224 / ME03	Elements of Mechanical Engineering	3	1		40	60	100	3
EI225	Electrical & Electronic Measurements	4	1		40	60	100	4
EI226	Analysis of Signals and Systems	4	1		40	60	100	4
EI261/ ECL04	Electronic Circuits- I Lab			3	40	60	100	2
EI262	Measurements Lab			3	40	60	100	2
EI263	Data Structures Lab			3	40	60	100	2
		22	**6**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours, **M :**Maximum Marks, **Cr. :** No. Credits

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Third Year B.Tech., (SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI311/EC 06	L IC Applications	3	1		40	60	100	3
EI/EC312	Linear Control systems	3	1		40	60	100	3
EI313/EC 07	Electronic Circuits – II	3	1		40	60	100	3
EI314	Transducers	4	1		40	60	100	4
EI/EC 315	Pulse and Switching Circuits	4	1		40	60	100	4
EI/EC 316	Microprocessors and Microcontrollers	4	1		40	60	100	4
EI 351	Transducers Lab			3	40	60	100	2
EI/EC 352	Pulse and ICs Lab			3	40	60	100	2
EI/EC 353	Microprocessors & Interfacing Lab			3	40	60	100	2
		21	**6**	**9**	**360**	**540**	**900**	**27**

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours, **M :**Maximum Marks, **Cr. :** No. Credits

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

Third Year B.Tech., (SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI 321	Professional Ethics and Human Values	3	1		40	60	100	3
EI 322	Industrial Instrumentation	4	1		40	60	100	4
EI/EC 323	Digital Signal Processing	4	1		40	60	100	4
EI324	Process Control	4	1		40	60	100	4
EI325	Analog and Digital Communications	3	1		40	60	100	3
EI326	Elective - 1	3	1		40	60	100	3
EI361	Process Control Lab			3	40	60	100	2
EI362	OOPs and Pspice Lab			3	40	60	100	2
EI363	Communication Skills Lab			3	40	60	100	2
		21	6	9	360	540	900	27

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours, **M :**Maximum Marks, **Cr. :** No. Credits

Elective – 1 :

A. OOPS and OS.
B. Advanced Computer Architecture.
C. PLCS
D. Adaptive Control Systems

BAPATLA ENGINEERING COLLEGE: BAPATLA
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Fourth Third Year B.Tech., (SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI/EC 411	Industrial Management & Entrepreneurship Development	4	1		40	60	100	4
EI/EC 412	VLSI Design.	4	1		40	60	100	4
EI413	Analytical Instrumentation	4	1		40	60	100	4
EI414	Computer control of process	4	1		40	60	100	4
EI415	Elective – 2	3	1		40	60	100	3
EI416	Elective – 3(Open Elective)	3	1		40	60	100	3
EI451	Term paper			3	40	60	100	2
EI452	Advanced instrumentation and VLSI Lab			3	40	60	100	2
EI453	DSP and Embedded systems Lab			3	40	60	100	2
		22	**6**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours, **M :**Maximum Marks, **Cr. :** No. Credits

Elective – 2 :

A. Robotics and automation
B. Advanced Sensors
C. Computer Networks
D. Advanced DSP

Elective – 3: Open Elective

Please refer next page

LIST OF OPEN ELECTIVES

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 & Control	CE 100
	Remote Sensing & 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 & Transducers	EI 200
Information Technology.	Mobile Application Development	IT 100
	.Net Technologies	IT 200
Mechanical Engineering.	Robotics	ME 100
	Power Plant Engineering	ME 200
BOSCH REXROTH Centre	Automation Technology	BR 100

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Fourth Year B.Tech., (SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory **(L)**	Tutorial **(T)**	Lab **(P)**	**CA**	**FE**	Total Marks **M**	**(Cr)**
EI421	Biomedical instrumentation	4	0		40	60	100	4
EI422	Optoelectronics and laser instrumentation	4	0		40	60	100	4
EI423	Elective – 4	3	1		40	60	100	3
EI424	Elective - 5	3	1		40	60	100	3
EI461	Project and Viva Voce			9	50	100	150	10
EI462	Biomedical Instrumentation and VI lab			3	40	60	100	2
		14	**2**	**12**	**250**	**400**	**650**	**26**

CA: Continuous Assessment , **FE:** Final Examination, **L :** Lecture Hours , **T :** Tutorial Hours, **M :**Maximum Marks, **Cr. :** No. Credits

Elective – 4

A. PC Based Instrumentation.
B. Telemetry and Telecontrol
C. Power plant instrumentation
D. Instrumentation in Aerospace and Navigation

Elective – 5

A. Digital image processing
B. Instrumentation in Petro Chemical Industries
C. Artificial Intelligence
D. Neural Networks and fuzzy logic systems

EI111 **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.

EI112 **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

OPTICS (11 Periods)

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

LASERS & FIBER OPTICS (10 Periods)

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

ELECTRICITY & MAGNETISM (10 Periods)

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

MODERN PHYSICS (11 Periods)

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.

EI113 **ENGINEERING CHEMISTRY**

(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 nanochemistry – preparation of few Nano materials:carbon nanotubes, Fullerenes etc – Properties of Nano materialas 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).

EI114 **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.

EI115 **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.

EI116 **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.

EI151 **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.

EI152 **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.

EI153 **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**

d. Lap joint

e. Tee joint

f. Butt joint

3. Sheet metal operations with hand tools

g. Trapezoidal tray

h. Funnel

i. T-joint

4. House wiring

j. To control one lamp by a single switch

k. To control two lamps by a single switch

l. Stair-case wiring

EI121 **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.

EI122 **ENGINEERING PHYSICS – II**

(Common to all branches)

PH02

Lectures	:	3 Periods/Week	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.

EI123 **ENGINEERING CHEMISTRY – II**

(Common to all branches)

CY02

Lectures	:	3 Periods/Week	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 CI^{-}titrations) and conduct metric titrations (acid-base – HCI 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).

EI124 **CIRCUIT THEORY**

(Common to ECE & EI)

EC124 / EI124

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, 6th Edition,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.

EI125 **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.

EI126 **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 it's 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-lf 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.

EI161 **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 Torsionalpendulum.
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.

6. **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
7. **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

EI162 **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

EI163 **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) $1 + x^2/2! + x^4 / 4!+ \ldots$upto ten terms
   b) $x + x^3/3! + x^5/5!+ \ldots$ upto 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(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

MATHEMATICS – III

EI211 **MA 03**

II B.Tech. I Semester

Lectures	:	4 Periods/Week	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 BOOKS:

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

EI212

ELECTRICAL TECHNOLOGY
EE 02

Lectures	:	3 Periods/Week, 1 Tutorial	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

POLYPHASE SYSTEMS- Advantage-relationship between various values for star and delta connection system.

TRANSFORMERS: Principle, Operation on load and no 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

UNIT – IV

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

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. H Cotton, Advanced Electrical Technology, AH Wheeler & Co., 1990
2. Eugene Lister, Electric Circuits and Machines,
3. BL Theraja, A Text Book of Electrical Technology, Nirja, 1995
4. CK Mukerjee, Electrical Machines.

EI213

ELECTRONIC DEVICES
EC 02

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final 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,2_{nd} 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.

EI214 **NETWORK ANALYSIS AND SYNTHESIS**
EI 02

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final 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 mderived 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

EI215

DIGITAL ELECTRONICS
EC 03

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final 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.

EI216

ELECTROMAGNETIC FIELD THEORY
EC 04

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final 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, Electromagnetic Waves and Radiating Systems, PHI 2003.

EI251

ELECTRICAL ENGINEERING LABORATORY
EEL 02

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

1. Verification of Thevenin's Theorem.
2. Verification of Superposition Theorem.
3. Verification of Reciprocity & Maximum Power Transfer Theorem.
4. Parameters of Given Choke Coil.
5. Resonance of a RLC Series & Parallel Circuits.
6. Verification of KCL & KVL.
7. Speed Control of a DC Shunt Motor.
8. Open Circuit Characteristics of a DC Shunt Generator and Obtaining Critical field
1. Resistance and Critical Speed.
9. Load Test on a DC Shunt Generator.
10. Load Test on a DC Compound Generator.
11. Swinburne's test on a DC Shunt Machine.
12. OC & SC test on Single Phase Transformer.
13. Direct Load Test on Single Phase Transformer.
14. Regulation of 3-Phase alternator by Synchronous Impedance Method.
15. Direct Load Test on a 3-Phase Induction Motor.

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

EI252

ELECTRONIC DEVICE LABORATORY
ECL 02

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

1. Study of CRO
2. Characteristics of silicon germanium diodes.
3. Characteristics of Zener diode.
4. Characteristics of transistor in CB configuration.
5. Characteristics of transistor in CE configuration.
6. Characteristics of Emitter follower circuit.
7. Characteristics of JFET.
8. Characteristics of UJT.
9. Designa and verification of self bias circuit.
10. Applications of BJT as switch and amplifier.
11. Characteristics of SCR.,
12. Characteristics of DIAC.
13. Characteristics of sorce 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 final Practical Examination.

EI253

DIGITAL ELECTRONIC LABORATORY
ECL 03

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

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-Sub tractor 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 & Jhonson 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.

MATHEMATICS – IV

EI221 **MA 04**

II B.Tech. II Semester

Lectures	:	4 Periods/Week	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, 8th Edition, John Wiley, 2000.

REFERENCE BOOK:

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

EI222 **ELECTRONIC CIRCUITS – I**

EC 05

Lectures	:	4 Periods/Week, 1 Tutorial	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.

EI223 **DATA STRUCTURES USING C**

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

UNIT – I

LINKED LISTS**:** List operations and their implementation using arrays, Linked list operations and their implementations, Single linked, Double linked and Circular linked lists.

UNIT – II

STACKS: Logical operations on stack, Stack implementations with arrays and linked lists, Stack applications.

QUEUES: Queue operations, Queue implementation with arrays and linked lists, Queue applications.

UNIT – III

RECURSION: Introduction, Implementation of recursion.

SORTING METHODS: Selection sort, Insertion sort, Bubble sort, Shell sort, Merge sort, Quick sort, Heap sort, Hash sort, Radix sort, Bucket sort and their implementations.

UNIT – IV

SEARCHING METHODS: Linear Search, Binary Search, Hashing methods and applications.

TREES: Logical operations on Trees, Binary Tree Traversals, Binary Search Tree ADT, AVL - Tree, B - Tree and application.

TEXT BOOKS:

1. Markallen Weiss, Data Structures and Algorithm Analysis in C, The Benjamin & Cummings, Addison Wesley, 1997.
2. Trembley and Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill, 1997.
3. S Tanenbaum, Data Structures Using C, PHI, 1992.
4. E Balaguruswamy, Programming ANSI C, PHI, 1993.

EI224 **ELEMENTS OF MECHANICAL ENGINEERING**

ME 03

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

UNIT – I

METROLOGY : Angular measurements, Measurement of length – Plain ness – Area – Diameter – Roughness and Angle , Comparators, Gauge blocks , Sine bars and Slip Gauges , Optical Methods of length and distance measurements.

MECHANICAL COMPONENTS : Pivots & Bearings, Linkages, Gears : Nomenclature of gears., Belt Chain & Friction Drives, Dials, Scales, Pointers & Indicating mechanism, Ratchets, Counters, Escapement, Integrators, Rack & Pinion, Geneva Mechanism, Relays & Switches

UNIT – II

MANUFACTURING PROCESSES: Basic principles and operation of lathe, Milling machines and drilling machines.

WELDING: Welding Types, Oxy-Acetylene Welding, Metal arc welding and resistance welding, soldering and brazing,

FORGING: Basic Principle, Types of Casting and forging Process

PRIME MOVERS: Basic principles, operations and its applications.

UNIT – III

THERMODYNAMICS: Basic Concepts, equilibrium, Zeroth Law and First Law Of thermodynamics, 2nd Law statements, reversibility, Carnot's Theorem, Entropy with complete details

UNIT – IV

FLUID MECHANICS: Properties of Fluids, Fluid static, Hydrostatic Law, Manometers, Centre of pressure, force acting on plane surfaces, kinematics of fluids, types of flow , Continuity equation, equation of motion, Bernoulli’s equation and applications

TEXT BOOKS:

1. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishers 1986.
2. K.P Roy & SKH Choudary , Elements of mechanical Engineering-.
3. Vasandani and Kumar, A Treatise on Heat Engineering, Metropolitan Book co., 1972
4. RK Bansal, Fluid Mechanics and Hydraulic Machines, 8th Ed, Lakshmi Pub., 2002

EI225 ELECTRICAL & ELECTRONIC MEASUREMENS

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

UNIT-I

Measurement and Error: Definitions, Accuracy and precision, significant figures, types of errors, statistical analysis, probability of Errors, Limiting Errors

Electro mechanical indicating instruments: Suspension Galvanometer, Torque and deflection of the galvanometer, permanent magnet moving coil mechanism, DC Ammeter, DC Voltmeter, Voltmeter Sensitivity, Series type ohmmeter, shunt type ohmmeter, calibration of DC instruments, alternating current indicating instruments, thermo instruments, Electro dynamometers in power measurements, watt hour meter, power factor meters, Instrument Transformers.

UNIT – II

Bridge Measurements: Wheatstone Bridge, Kelvin double bridge, Schering bridge, Maxwell's bridge, Hay's Bridge, wein bridge, wagner ground connection.

Electronic Instruments: AC Voltmeter using rectifiers, True RMS responding voltmeter, Electronic multimeter, Digital voltmeters – Ramp type DVM, Stair case ramp DVM, Dual slope DVM, Successive approximation type DVM, Vector Impedance meter, Vector Voltmeter, Q meter, RF power and voltage measurement

UNIT- III

Cathode ray oscilloscope: Oscilloscope block diagram, cathode ray tube, CRT Circuits, Vertical deflection system, Horizontal deflection system, delay line, Dual trace Oscilloscope, Oscilloscope Controls, Measurement of voltage, frequency and phase, pulse measurements, Oscilloscope probes, Lissajous figures, oscilloscope specifications and performance.

Special Oscilloscopes: Delayed Time base Oscilloscopes, analog storage oscilloscope, sampling oscilloscope, Digital storage oscilloscope.

UNIT- IV

Signal Generators & Analyzers:- Sine wave generator, Frequency – Synthesized signal generator, Frequency divider generator, sweep frequency generator, Laboratory square wave and pulse generator, Function generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer.

Frequency Counters and time interval Measurements:- Simple frequency counter, Measurement errors, extending the frequency range of the counter, period measurement.

TEXT BOOKS:

1 W D Cooper & A D Helfrick, Electronic Instrumentation and Measurement Techniques, PHI.
2 David.A.Bell Electronic Instrumentation and Measurements, PHI.

REFERENCE BOOKS:

1. Oliver & Cage, Electronic Measurements and Instrumentation, Mc Graw Hill.
2. Terman & Pettit, Electronic Measurements, Mc Graw Hill.
3. Rajendra Prasad, Electrical measurements and Measuring Instruments, Khanna Publishers.
4. A K Sawhney, Electrical and Electronic measurements and instrumentation, Dhanpat Rai.

EI226 **ANALYSIS OF SIGNALS and SYSTEMS**

Lectures	:	4 Periods/Week, 1 Tutorial	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. 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 distortionless 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, Measurement of Noise Figure

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.

RANDOM PROCESSES: Random process concept , stationarity 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 and IT Young, Signals and Systems, PHI/ Pearson, 2003.
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.

EI261 **ELECTRONIC CIRCUITS – 1 LAB**
ECL 04

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

1. Study of Half Wave Rectifier with and without Filters
2. Study of Full Wave Rectifier with and without Filters
3. Study of 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; $R_{I,}$ $A_{V,}$ A_{I} & R_{O}.
7. Frequency Response of voltage shunt feedback amplifier.
8. Frequency Response of current shunt feedback amplifier.
9. RC phase shift oscillator.
10. *Study of Cascode Amplifier*
11. Two Stage RC-Coupled Amplifier.
12. Class power Amplifier.
13. Class B complementary symmetrry amplifier.
14. Series voltage regulator.
15. Shunt voltga e regulator.

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

EI262 **MEASUREMENTS LABORATORY**

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

1. DC meters using D' Arsonval Galvanometers
2. AC meters using D' Arsonval Galvanometers
3. Measurement of resistance using Kelvin Double Bridge
4. Measurement of inductance using Maxwell Bridge
5. Measurement of capacitance using Shearing and DeSauty's Bridge
6. Study of CRO: Voltage, Frequency, and phase measurement
7. Study of Spectrum Analyzer
8. Study of Wave Analyzer
9. Study of Harmonic distortion Analyzer
10. Study of Q meter
11. Measurement of RF power and Voltage
12. Study of Function generator
13. Study of True RMS voltmeters
14. Study of vector impedance meter
15. Design of ohmmeter.

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.

EI263 **DATA STRUCTURES LAB**

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

1. Linear list-Three programs.
2. Linear and Binary search.
3. Stacks - Two programs.
4. Queues - One program.
5. Linked Lists - Two programs.
6. Heap - One program.
7. Sorting - One program on (a) Quick sort (b) Selection sort
8. Sorting - One program on (a) Radix sort (b) Merge sort.
9. Binary Tree-One program.
10. Tree Traversal-One program.

NOTE: A minimum of 10(Ten) programs, with One program from each Head, have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

EI311 **EC 06**

III B.Tech. I Semester

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

UNIT – I

OPERATIONAL AMPLIFIERS: Block diagram of Operational Amplifier, Ideal voltage Amplifiers, Negative feedback concept in Op Amps, Bandwidth Limitations, cascaded Op-Amps, Op-Amp Error sources, Frequency compensation and 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, High speed and precision type comparators, window detector,

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, u A 723 Voltage Regulator and its design

ACTIVE FILTERS: Active LP and HP filters, Sallen key LP and HP filters, Band pass filters – Wideband, Band pass and multiple feedback 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, 3rd Ed., PHI, 1997,
2. Denton J Dailey, Operational Amplifiers and Linear Integrated Circuits: Theory and Applications, Mc GH, 1989,

REFERENCE BOOKS:

1. D. Roy Chowdhary, Principles of Integrated Circuits, 2nd Edition., New Age International, 2003.
2. V.K. Aatre, Network Theory and Filter Design, 2nd Edition., New Age International, 1997.
3. Jacob, Applications and Design with Analog Integrated Circuits, 2nd Edition, PHI, 1996.

EI/EC312 **LINEAR CONTROL SYSTEMS**

Lectures	:	3 Periods/Week, 1 Tutorial	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 feed back control systems – Liner 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 feed back 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 out put, 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.

EI313 **ELECTRONIC CIRCUITS - II**

EC 07

Lectures	:	3 Periods/Week, 1 Tutorial	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

EI314 **TRANSDUCERS**

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

UNIT – I

Introduction: Basic definitions related to measurements/ Instrumentation , Block diagram of generalized measurement / Instrumentation system.

Static characteristics of instruments: Introduction, static characteristics: accuracy, precision, resolution, static sensitivity, Linearity, Threshold, Hysteresis, Dead Zone, span, Range Loading effect.

Errors in Measurements: Static error, Types of errors, estimation of static errors: limiting errors & their combinations, error estimates from the normal distribution, probable errors& their combinations statistical analysis of measurement data uncertainty analysis curve fitting: Method of least squares.

Dynamic characteristics: Generalised Mathematical model of measurement system, operational & sinusoidal transfer functions zero, first and second order instruments & their response to step, ramp, and impulse inputs.

UNIT – II

Introduction: Definition of Transducer, Classification of transducers.

Resistive Transducers: Potentiometers, straingauges & their types, RTD's, thermistors, Hotwire anemometers.

Inductive Transducers: Transducers type, electromagnetic type, Magnetostrictive type, Variable reluctance type, (or) Variable permeability type.

Capacitive Transducers: Variable dielectric, Variable gap, Variable area type Capacitive devices, Differential type.

UNIT – III

Piezo-electric Transducers: Piezo-electric effect, Piezo-electric Materials, Piezo-electric transducer & its characteristics.

Force-Balance Transducers: The force balance Principle, Electro dynamic acceleration transducer, electrostatic pressure transducer.

UNIT – IV

Thermal Transducers: Thermal expansion transducers: Bi-metallic strips, Liquid-in-glass thermometers, pressure thermometers, Thermo Couples, Thermocouple Laws: Law of Intermediate temperature, Law of intermediate metals

Radiation Transducers: Radiation Pyrometry, Radiation fundamentals Radiation Pyrometer: Total radiation pyrometer, selective radiation pyrometer, Two color radiation pyrometers.

TEXT BOOKS:

1. BC Nakra&KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition, TMH
2. E.O.Doeblin, Measurement systems: Applications and Design,TMH*:*
3. D.V.S Murthy, Transducers & Instrumentation, PHI
4. D.S.Kumar, Mechanical Measurements, Metro Politan

REFERENCE BOOKS:

1. Allan s Morris, Principles of Measurement systems (PHI)
2. A.K.Sawheny, Electrical & Electronic Measurements and Instrumentation Dhanpath Rai
3. JB Guptha, Electrical & Electronic Measurements and Instrumentation, S.K. Kataria
4. AK Ghosh, Introduction to Instrumentation and Control (PHI)

EI/EC 315 **PULSE AND SWITHING CIRCUITS**

Lectures	:	4 Periods/Week, 1 Tutorial	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 BOOKS:

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.

EI/EC 316 MICROPROCESSORS AND MICROCONTROLLERS

Lectures	:	4 Periods/Week, 1 Tutorial	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, interfacing Microprocessor to keyboards.

Analog interfacing: DAC principle of operation, specifications and different types of DACs and interfacing.

Programmable devices: Introduction to Programmable peripheral devices 8254, 8259, 8251, DMA data transfer, RS232 communication standard and maximum mode of 8086 operation

UNIT – IV

Introduction:-Introduction to microcontrollers, comparing microprocessors and microcontrollers, Architecture:- 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, temperature sensor and DAC.

TEXT BOOKS:

1. Microprocessor and Interfacing by Duglus V. Hall, TMH Edition .
2. 8051 micro controller architecture, programming, and applications by Kenneth J. Ayala.

REFERENCE BOOKS:

1. Yu – Cheng Liu, Glem A Gibson Microprocessors Systems : The 8086/8088 Family, Architecture, Programming and design, PHI edition.
2. Barry Bray, the intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium processors, architecture, programming, and interfacing, 6th Edition, PHI edition.

EI 351 **TRANSDUCERS LAB**

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

1. Displacement measurement using LVDT
2. Temperature measurement using RTD
3. Transfer characteristics of thermistor
4. Transfer characteristics of thermocouple
5. Pressure measurement
6. Speed measurement
7. Study of Light Dependent resistor
8. Weight measurement using load cell
9. Torque measurement
10. Study of Synchro Transmitter receiver
11. Study of first order and second order systems
12. Vibration measurement
13. Acceleration measurement
14. pH measurement
15. Humidity measurement
16. Study of Piezo – electric Transducer

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

EI/ EC 352 **PULSE and ICs LAB**

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 Timer (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

EI/ EC 353 **MICROPROCESSOR AND INTERFACING LAB**

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. Find the square of a number using lookup table method.
5. Programs on Subroutines.
6. Block data transfer using string instructions
7. Find minimum and maximum in an array
8. Sorting of an Array.
9. Writing subroutines for reading and displaying strings on a screen.
10. Programs on Interrupts (Software and Hardware).
11. 8086 Programs using DOS and BIOS Interrupts.
12. Square wave generator
13. Seven segment LED display
14. Stepper motor control using 8255
15. Interfacing matrix keyboard to microprocessor

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.

EI 321 **PROFESSIONAL ETHICS AND HUMAN VALUES**

III B.Tech. II Semester

Lectures	:	3 Periods/Week, 1 Tutorial	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, New York 1996.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Engineering Ethics, PHI, 2004.

REFERENCE BOOKS:

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

EI 322 **INDUSTRIAL INSTRUMENTATION**

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

UNIT – I

Introduction: Introduction to Speed/Velocity, Acceleration, Vibration Measurements

Speed/Velocity Measurement: Linear Velocity Measurement techniques: Electro dynamic Transducer, Electro Magnetic Transducer, Doppler transducer, Digital Transducer. Rotational Speed/Angular velocity Measurement techniques: Revolution counter/Timer, Eddy Current tachometer, DC generator tachometer, AC generator tachometer, Variable reluctance tachometer, Photo-electric pick up, Stroboscope.

Acceleration Measurement: Acceleration Measurement techniques: Seismic Accelerometer, LVDT Accelerometer, Piezo-electric accelerometer, Strain gauge accelerometer.

Vibration Measurement: Vibration Measurement techniques: Capacitive vibration sensor, Inductive vibration sensor, Reed type vibration sensor.

UNIT – II

Force Measurement: Introduction, Force Measurement techniques: Analytical Balance, Unequal lever arm balance, Force balance method, Hydraulic load cell, Pneumatic load cell, Strain gauge load cell, Piezo-electric load cell, Vibration string transducer.

Torque Measurement: Introduction, Torque Measurement techniques: Torque Measurement using stroboscope, Strain gauge torque transducer, Optical torsion meter, Electrical torsion meter.

Pressure Measurement: Introduction, Pressure Measurement techniques: Force summing devices, McLeod gauge, Knudson gauge, thermo couple and Pirani gauges, Ionization gauge.

UNIT – III

Flow Measurement: Introduction, Flow Measurement techniques: Head type devices (Orifice plate, Venturi tube, and Pitot tube), Rota meter, Electromagnetic flow meter, Ultra sonic flow meter.

Level Measurement: Introduction, Level Measurement techniques: Dip sticks (Both ordinary and Optical Dipsticks), Hydro static devices, Ultra sonic level gauge, Radiation level sensor, Vibrating level sensor, Radar Methods, Using Hot-Wire elements, Laser methods, Fiber optic level sensors.

UNIT – IV

Viscosity Measurement: Introduction, Units of Viscosity, Viscosity Measurement techniques: Co-axial cylindrical viscometer, Capillary tube viscometer, Redwood &Say bolt viscometers, Falling sphere viscometer, Two float viscometer, Definition for consistency, Consistency Measurement techniques: Rotating vane consistency meter, Oscillating type consistency meter.

Density/Specific gravity: Introduction, Specific gravity scales/Standards, Density/Specific gravity Measurement techniques: Buoyancy density meter, Hydrometer, Bubbler system, Gamma ray method.

Humidity & Moisture Measurement: Introduction, Humidity Measurement techniques: Hair Hygrometer, Electrical type Humidity transducer, Dry & Wet bulb Psychro meter, Al_2O_3 Hygro meter, Dew-point meter. Moisture Measurement techniques: Dean & Stark technique, Thermal drying technique, Karl Fischer technique, Resistive Moisture sensor, Capacitive Moisture sensor

TEXT BOOKS:

1. BC Nakra&KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition TMH.
2. E.O.Doeblin, Measurement systems: Applications and Design,TMH
3. R.K.Jain, Mechanical and Industrial Measurements, KHP
4. D.S.Kumar, Mechanical Measurements, Metro Politan.

REFERENCE BOOKS:

1. Allan s Morris Principles of Measurement systems (PHI) *Author:*
2. A.K.Sawheny Electrical & Electronic Measurements and Instrumentation Dhanpath Rai)
3. JB Guptha Electrical & Electronic Measurements and Instrumentation, S.K. Kataria
4. AK Ghosh Introduction to Instrumentation and Control (PHI) *Author:*

EI/ EC 323 **DIGITAL SIGNAL PROCESSING**

Lectures	:	4 Periods/Week, 1 Tutorial	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 BOOKS:

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
Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
4. Andreas Antoniou, Digital Signal Processing, TMH, 2006.

EI 324 **PROCESS CONTROL**

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

UNIT – I

Introduction to Process Control:- Definition, Elements of Process Control, Process Variables, degrees of freedom, Characteristics of liquid System, gas System, thermal System, Mathematical model of liquid process, gas process and thermal process, Batch process and continuous process, self regulation.

Controller Characteristics:- The automatic Controller, Proportional Control, Integral Control, Proportional – Integral Control, Proportional Derivative Control, Proportional – Integral Derivative action, Two position control, Single speed floating Control, Transient response of control systems using different control modes.

UNIT – II

Controlling Elements:- Self operated controller – pneumatic controllers (displacement type), Air supply for pneumatic systems, Hydraulic Controller, electrical and electronic controllers, pneumatic and electric transmission system, voice – coil motor.

Final Control Elements:- Pneumatic actuators, Electro Pneumatic actuators, Hydraulic actuators, Electric motor actuators. Two position motor actuator, sliding stem control valves, rotating shaft Control valves, Fluid flow through control valves, Control valve sizing.

UNIT – III

Advanced Control Strategies:- Cascade Control, Analysis of cascade control, feed forward Control, Analysis of feed-forward control, Ratio Control, Dead time Compensation(Smith Predictor), Internal model control.

UNIT – IV

Controller tuning and process identification:- Controller tuning, criteria for good control, Ziegler – Nichols tuning rules, Cohen coon tuning rules, process identification, step testing, Frequency testing, pulse testing.

TEXT BOOKS:

1. Donald P Eckman, Automatic process control, wiley Eastern, 1990.
2. Donald p caughnowr, process systems analysis and control, Mc Graw Hill.

REFERENCE BOOKS:

1. Process Control, Modeling, Design and Simulation,- B.Wayne Beqvette
2. Stephanoupoulis, Chemical Process Control, Prentice Hall
3. Patranabis, Principles of Process Control, TMH

EI 325 **ANALOG AND DIGITAL COMMUNICATION**

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

UNIT – I

INTRODUCTION TO ELECTRONIC COMMUNICATIONS: Electronic Communication Systems need for modulation, Electromagnetic Spectrum Band Width and Information capacity.

AMPLITUDE MODULATION TRANSMISSION : Principles of AM, The AM envelope, AM frequency spectrum and Band Width, modulation coefficient, AM voltage and power distributions, Modulation by a complex information signal.

AM MODULATION CIRCUITS: Low level AM Modulator, Medium power AM Modulator, High power AM Modulator.

SSB COMMUNICATION SYSTEMS: SSB systems, comparison of SSB system with conventional AM, SSB generation: Balanced ring modulator, balanced bridge modulator.

Single side band transmitters: Fitter method, Phase shift method, third method.

UNIT – II

AMPLITUDE MODULATION RECEPTION: Receiver parameters, AM receivers: TRF receiver, super heterodyne receiver block diagrams (with detail explanation of each block).

AM RECEIVER CIRCUITS: RF amplifier circuits, AM detector circuits, IF amplifier circuits.

SSB RECEIVERS: SSB BFO receiver, coherent SSB BFO receiver.

UNIT – III

ANGLE MODULATIONS: Mathematical Analysis, Deviation sensitivity, FM, PM wave forms, modulation index, Frequency deviation. Frequency analysis, Band width requirements and power of an angle modulated wave. Noise, pre-emphasis, de-emphasis.

FREQUENCY MODULATORS:

DIRECT FM MODULATORS: Varactor diode modulators, FM reactance Modulators, LIC direct FM modulators, Direct FM transmitters: phase locked loop, Cross by; Indirect FM transmitters: Armstrong; Advantages and disadvantages of angle modulation vs. amplitude modulation , FM receiver block diagram.

FM DEMODULATORS: Slope detector, Balanced slope detector, Ratio detector.

UNIT – IV

PULSE MODULATION: Modulation methods: PAM, PWM, PPM, and PCM: sampling, sampling rate, quantization. Signal-quantization noise ratio, Companding, Analog, Digital , Delta modulation , PCM, Differential PCM ,Multiplexing – TDM, FDM

DIGITAL MODULATION: Shannon limit for information capacity, Modulation methods: ASK,FSK, PSK:BPSK, QPSK, DPSK

TEXT BOOKS:

1. Wayne Tomasi, Electronic Communication Systems, Fourth Edition, Pearson Education , 2003
2. George Kennedy, Electronic Communication Systems, Fourth Edition, TMH, 1999

REFERENCE BOOKS:

1. Simon Haykin, Analog and Digital Communication Systems, John Wiley & Sons , 2001.
2. Principals of communication systems by Taub and Shilling,TMH
3. Communication Electronics Principles and applications, Frenzel,TMH

EI 326/A **OOPS and OS**

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

UNIT – I

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING: Concepts, benefits of OOPS, Object oriented Languages, Applications of OOP, Introduction to C++, C++ Statements, Creating the source file, Compiling and linking.

TOKENS, EXPRESSIONS AND CONTROL STRUCTURES: Introduction, Tokens, Keywords, Basic Data Types, User defined data types, Derived data types, Declaration of variables, Operators in C++, Types, Scope resolution operator, Member dereferencing operator, Memory management operator, Type cast operator.

UNIT – II

FUNCTIONS: Main function, Function prototyping, Call by reference, Return by reference, Inline function, Function Overloading, Friend and Virtual functions.

CLASSES AND OBJECTS: Specifying a class, Defining member functions, Memory allocation for objects, Friendly functions, Pointer to members.

CONSTRUCTORS AND DESTRUCTORS – Introduction

UNIT – III

OVERVIEW OF OPERATING SYSTEMS: Introduction, Computer systems structures, Operating system structures

PROCESS MANAGEMENT: Process: Process Concepts, Process Scheduling, Operation on Process, Co-operating Process, Threads, Inter process communication.

CPU SCHEDULING: Scheduling criteria, Scheduling algorithm, Multiprocessor scheduling, Real time scheduling, Algorithm evaluation.

UNIT – IV

STORAGE MANAGEMENT

MEMORY MANAGEMENT: Logical Vs Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging

VIRTUAL MEMORY: Performance of Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation

CASE STUDIES: Features of Linux OS.

TEXT BOOKS:

1. E Balaguruswamy, Object Oriented Programming with C++, 2nd Edition,TMH, 2003. (For Units I & II)
2. Silberschatz and Galvin, Operating System Concepts, 4th John Wiley & Sons, 2002.(For Units III & IV)

REFERENCE BOOKS:

1. William Stallings, Operating Systems, 4th Edition, Pearson Education/PHI, 2003
2. Timothy Budd, An Introduction to Object Oriented Programming, 2nd Edition, Pearson Education, 2002

EI 326/B **ADVANCED COMPUTER ARCHITECTURES**

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

UNIT – I

Instruction set architecture: Instructions and addressing, procedures and data, assembly language programming, instructions and set variations.

The arithmetic and logic unit: number representation, address and simple ALU, multipliers and dividers, floating point arithmetic.

UNIT – II

Data path and control: instruction executing steps, control unit synthesis, pipelined data paths, pipeline performance limits.

Memory system design: main memory concepts, cache memory organization, Mass memory concepts, virtual memory concepts.

UNIT III

Input / output and interfacing: Input and output devices, input/output programming, uses, links and interfacing, context switching and interrupts.

UNIT IV :

Advanced architectures: vector array processing, shared memory multi processing, distributed multicomputing.

Text book :

1. Computer architecture by behrooz parhami, oxford press.

EI 326/C **PROGRAMMABLE LOGIC CONTROLLERS**

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

UNIT-I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drillpress operation.

UNIT-II

Digital logic gates, programming in the Boolean algebra system, conversion examples

Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-III

PLC Functions: Timer functions & Industrial applications, counters, counter function Industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications

UNIT-IV

Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis & three axis Robots with PLC, Matrix functions.

Analog PLC operation: Analog modules& systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, position indicator with PID control, PID Modules, PID tuning, PID functions.

Text Books:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss, Fifth Edition, PHI
2. Programmable Logic Controllers- Programming Method and Applications –JR.Hackworth &F.D Hackworth Jr. –Pearson, 2004

EI 326/D **ADAPTIVE CONTROL SYSTEMS**

Lectures	:	3 Periods/Week, 1 Tutorial	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:

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.

EI 361 **PROCESS CONTROL LAB**

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

1. Characteristics of PID controller in TPS. Using PC/PLC
2. Characteristics of Level transmitter
3. Characteristics of I/P converter and control valve (L)
4. Characteristics of P I D controller in LPS using PC
5. Characteristics of P I controller in LPS using PC Characteristics of Flow transmitter
6. Characteristics of Flow transmitter
7. Characteristics of P I controller in FPS using PC/PLC
8. Characteristics of I/P converter and control valve (F)
9. Characteristics of PID controller in PPS using PC

Characteristics of pressure transmitter and I/P converter (P)

10. Controller tuning in pressure process station
11. Cascade Control
12. Ratio Control
13. Feed forward Control
14. Study of Data Acquisition System
15. Study of Flapper Nozzle system and I/P and P/I converter.
16. Study of Inter acting and Non interacting systems.

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

EI 362 **OOPS AND PSPICE LAB**

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

Experiments Based On PSPICE

1. Frequency Response of CE Amplifier
2. Frequency Response of CS Amplifier
3. Design of Wein-Bridge Oscillator
4. Design and Verification of Class-A Power Amplifier
5. Verification of Half-wave and Full-wave rectifier
6. Verification of Amplitude Modulation and Demodulation

Experiments Based on OOPS

7. Over Loading Functions
8. Objects and Classes
9. Arrays
10. Overloading Operators
11. Inheritance
12. Pointers
13. Virtual Functions
14. Console I/O Operations
15. File I/O Operations

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

EI 363 **COMMUNICATION SKILLS LAB**

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

Course work is framed to improve the Communication Skills and Language Skills of the students and marks are awarded based on Internal Assessment

EI/EC 411 **INDUSTRIAL MANAGEMENT and ENTREPRENEURSHIP DEVELOPMENT**

IV B.Tech. I Semester

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

UNIT – I

GENERAL MANAGEMENT: Principles of scientific management, Brief treatment of managerial functions.

FORMS OF BUSINESS ORGANISATION: Salient features of sole proprietorship. Partnership, Joint Stock Company, private limited and public limited companies.

UNIT – II

FINANCIAL MANAGEMENT: Concept of interest, compound interest, equivalent cash flow diagram

ECONOMIC EVALUATION OF ALTERNATIVES: Basic methods, the annual equivalent method, present worth method, future worth method.

DEPRECIATION: Purpose, types of depreciation, common methods of depreciation. The straight line method, declining balance method, the sum of the years digits method.

UNIT – III

PERSONNEL MANAGEMENT: Functions of Personnel Management – Human Resources Planning, Brief treatment of Recruitment, Selection, Placement, Performance Appraisal, Career Development, Training and Development, Compensation. Staff role of Personnel Department, Organization for the Personnel Function. Goals and Plans of the Organization. Motivation and Leadership, Theories of motivation and styles of Leadership.

UNIT – IV

MATERIAL MANAGEMENT: Purchasing, Objective, Source Selection, Procurement Methods, Inventory Management –EOQ, EPQ, ABC Analysis.

MARKETING MANAGEMENT: Functions of Marketing, Product life cycle, Channels of distribution, Advertising & Sales promotion, Market Research.

TEXT BOOKS:

1. KK Ahuja, Industrial Management, Vol. I & II, Dhanpat Rai, 1978.
2. E.Paul Degarmo, John R Chanda, William G Sullivan, Engineering Economy, Mac Millan Publishing Co, 1979

REFERENCE BOOKS:

1. Philip Kotler, Marketing Management, 11th Edition, Pearson Education, 2004.
2. P. Gopalakrishnan, Hand Book of Materials Management, PHI, 1999
3. Heinz Weirich and Harold Koontz, Management, 10th Edition, TMH, 2004

EI/EC 412 **VLSI DESIGN**

Lectures	:	4 Periods/Week, 1 Tutorial	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 ωo , 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). Design of an ALU subsystem, A further consideration of adders, Multipliers.

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,

VHDL Hardware Description Language: Design Flow, Program Structure, Types and Constants, functions and Procedures, Libraries and Packages, Structural Design Elements, Dataflow design Elements, Behavioral design Elements, The Time Dimension and Simulation, Synthesis.

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. J.Bhasker, A VHDL Primer, Pearson Education, Third edition, 1999.
4. John F Wakerly, Digital Design Principles & Practices, 3rd Edition, Pearson Education, 2002.

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 VHDL Design, TMH, 2002.

EI 413 **ANALYTICAL INSTRUMENTATION**

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

UNIT – I

ULTRAVIOLET AND VISIBLE SPECTROSCOPIC INSTRUMENTS: Radiation sources – Monochromators – filters, prism, grating types – detectors – Recording type of instruments – UV & VIS absorption methods – emission methods – various types of instruments – application in Industry.

UNIT – II

INFRARED SPECTROSCOPIC INSTRUMENTS: Fundamentals of Infrared spectrometers – Sources of Infrared – detecting units – different types of Instruments

FLAME SPECTROPHOTOMETRY: Essential parts of flame photometers – different types of flame photometers.

UNIT – III

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY : Principle of NMR, Measurement of NMR spectrum, Broad band NMR spectrometer – FT NMR spectrometer – application

ELECTRON SPIN RESONANCE SPECTROSCOPY : Principle of ESR, ESR spectrometer – application,

MASS SPECTROMETRY

Principle of operation – Magnetic deflection Mass Analyzer – Time of flight mass analyzer

UNIT – IV

NUCLEAR RADIATION MEASUREMENTS: Nuclear Radiation detectors – Ionization chamber, GM Counter, proportional counter, scintillation counter, solid state detector

X-RAY SPECTROSCOPY: Introduction, Instrumentation for X-ray spectroscopy, X-ray absorption meter, X-ray diffractometer, X-ray fluorescence spectrometer – application.

TEXT BOOKS :

1. Willard H.H., Merrit L.L. , Dean J.A., Scattle F.I. – Instrumental methods of Analysis, 7th Edn., CBS, 1986
2. R.S.Khandpur – Handbook of Analytical Instruments, TMH 1989
3. Skoog D.A. – Principles of Instrumental Analysis, Holt Soundes publications, 4th Edn., 1982
4. Mann C.K., Vicker T.J. & Gullick W.H. – Instrumental Analysis, Harper and Row Publishers.

EI 414 **COMPUTER CONTROL OF PROCESS**

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

UNIT –I

INTRODUCTION: Introduction to computer control system, need for computers in a control system, functional block diagrams of computer control system, data acquisition system supervisory control and direct digital control.

STATE VARIABLE REPRESENTATION IN DISCRETE SYSTEMS: Matrix exponential series approach solution of the discrete state equation transfer functions from state variable description - controllability, observability, state representation of computer control system.

UNIT – II

DISCRETE CONTROL ALGORTHIMS : Mathematical modeling of processes : I order , II order and I order with pure delay , II order with pure delay . Modified z transforms ,pulse transform functions, analysis of discrete data systems, selection of sampling system time, stability in z - domain, Deadbeat, Dahlin's and kalman's and PID control algorithms

UNIT – III

DIGITAL CONTROL SYSTEM : Distributed control systems (DCS), significance of DCS, advantages, configuration and communications facilities for DCS, programmable logic controller (PLC) -configurations and ladder diagrams.

UNIT - IV

ADAPTIVE CONTROL : Introduction to system identification and self tuning controllers (STC). Use of Artificial intelligence (AI) and Expert systems control.

TEXT BOOKS:

1. C.D. JOHNSON : Process control instrumentation technology, Prentice Hall Inc, 3rd Edition, 1988.
2. Pradeep B.Deshpande and Raymond H Ash: Elements of computer process control with advanced applications, Instrument society of America.,1981
3. C.M.Houpies ,G.B .Lamount: Digital control system theory Hardware and Software International student edition, McGraw Hill, 1985

EI 415/A **ROBOTICS AND AUTOMATION**

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

UNIT -1

BASIC CONCEPTS: Definition and origin of robotics - different types of robots -various generations of robots - degrees of freedom- Asimov's laws of robotics - Dynamics stabilization of robots

POWER SOURCES AND SENSORS: Hydraulic, pneumatic and electric drives - determination of HP of motor and gear ratio - variable speed arrangements - path determinations - machine vision - ranging - laser - acoustic - magnetic - fibre optic and tectil sensors

UNIT-II

MANIPULATORS, ACTUATORS AND GRIPPERS: Construction of manipulators - manipulator dynamics and force control - electronic and pneumatic manipulator control circuits and effectors - various types of grippers - design considerations

UNIT-III

KINEMATICS AND PATH PLANNING: Solution of inverse kinematics problem - multiple solution -jacobian work envelope - hill climbing techniques- robot programming languages

UNIT-IV

CASE STUDIES: Multiple robots - machine interface robots in manufacturing and manufacturing applications - robot cell design - selection of a robot

TEXT BOOKS:

1. Mikell P Weiss G M, Magel R N. Ordrey N G, Industrial Robotics, McGraw Hill, 1986.
2. Deb S R, Robotics Technology and Flexible Automation, Tata McGraw Hill 1994
3. Asfehi C R Robots and Manufacturing Automation, John Wiley, 1992
4. Klafter R D . Chimielewski T A and Neighiru, Robotic Engineering : An Integrated approach, Prentice Hall Of India Pvt. Ltd., 1994

EI 415/B **ADVANCED SENSORS**

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

UNIT – I

SEMICONDUCTOR SENSORS: Metal Oxide Semiconductors, Hall Elements, Silicon Sensors, Silicon planner technology, Micromachine technology, silicon sensors for sensing radiation, mechanical, magnetic, chemical and other signals, IC sensors.

UNIT – II

CHEMICAL AND BIOMEDICAL SENSORS: Polymers, chemically modified electrodes, Membrane electrodes, Thick Film Devices, catalytic devices, Gas sensors.
OPTICAL SENSORS: Lasers, photo-detectors and optical fibre as sensors, Integrated optics

UNIT – III

MICRO SENSORS: Thin film sensors, Micro sensors for sensing thermal Radiation, Mechanical, Magnetic and Chemical signals, Accoustic steam leak detector.

UNIT – IV

INTERFACING AND SIGNAL PROCESSING: Intelligent and smart sensors, concepts of redundant and multi – sensory systems, operation in coded mode and mapping mode.

TEXT BOOKS:

1. Middle Hock S and Andel SA – Silicon Sensors, Academic Press, London, 1989
2. Chemical Seasons Edmonds TE - , Blackie London 1988
3. Sensors and Actuators: No. 8, 1985, No.10, 1986, (pp 65-82), No. 12, 1987.
4. Patranabis D – Sensors and Transducers, Wheeler Publishing

EI 415/C **COMPUTER NETWORKS**

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

UNIT – I

INTRODUCTION: Uses of Computer networks, Network Hardware, Network Software, Reference Models (OSI and TCP/IP only).

PHYSICAL LAYER: Introduction to Guided Transmission Media, Wireless Transmission

UNIT – II

DATA LINK LAYER : Data Link Layer design issues, Error detection and correction, Elementary Data link Protocols, Sliding window protocols

MEDIUM ACCESS CONTROL SUBLAYER: The channel Allocation problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband wireless, Bluetooth, Data Link Layer Switching.

UNIT – III

NETWORK LAYER: Network layer Design Issues, 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.)

Congestion Control Algorithms, Quality of Service - (Requirements, Techniques for Achieving Good Quality of Service), Internetworking, The Network layer in the internet- (The IP Protocol, IP Address, Internet Control Protocols, OSPF, BGP).

UNIT – IV

TRANSPORT LAYER: Elements of Transport Protocols, TCP, UDP,RTP.

APPLICATION LAYER: DNS, Electronic Mail, The World Wide Web (Architectural Overview only) Multimedia.

TEXT BOOKS:

1. A.S Tanenbaum, Computer Networks, 4th Edition, PHI, 2003
2. Behrouz A. Foruzan, Data communication and Networking, TMH, 2004.

EI 415/D **ADVANCED DSP**

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

UNIT - I

MULTIRATE SIGNAL PROCESSING

Introduction, sampling and signal reconstruction, sampling Rate Conversion, Decimation by an Integer Factor, Interpolation by an Integer Factor, Sampling Rate Conversion by a Rational Factor, Sampling Rate Converter as a Time Variant system, Practical Systems for Decimators and Interpolators, Direct Form and Poly-Phase FIR Structures with Time varying Coefficients.

UNIT - II

MULTRATE FIR FILTER DESIGN

Design of FIR Filters for Sampling Rate Conversion, Multistage Implementation of Sampling Rate Conversion, Applications of Interpolation and Decimation in Signal Processing Operations, Low-Pass and Band-Pass Filters, Filter Bank implementation, Sub-Band Processing, Decimated Filter Banks, Two Channel Filter Banks, Tree structured Filter Banks, Octave-Band Filter Banks, Uniform DFT Filter Banks.

UNIT - III

POWER SPECIRAL ESTIMATION

Estimation of Spectra from Finite Duration Observations of a Signal, the Period gram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Turkey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods.

UNIT – IV

PARAMETRIC METHOD OF POWER SPECTRUM ESTIMATION

Parametric Methods for power spectrum estimation, Relationship between Auto -Correlation and Model Parameters, AR(Auto-Regressive) Process and Linear prediction, Yule-Walker, Burg and Unconstructrained Least Squares Methods, Sequential Estimation, Moving Average(MA) and ARMA Models Minimum Variance Method, Piscaranko's Harmonic Decomposition Method, MUSIC Method.

Text Books

1. ProakisJG and Manolakis DG Digital Signal Processing Principles, Algorithms and applications, PHI
2. Openheim AV & Schafer RW, Discrete Time Signal Processing PHI.
3. Orfanadis S, Introduction to Digital Signal Processing PHI
4. Orfanadis S Optimum Signal Processing PHI

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

Lectures	:	3 Periods/Week, 1 Tutorial	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
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
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
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
CE 100

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

UNIT –I

Air Pollution –Definitions, AirPollutants–Classifications –NaturalandArtificial– Primaryand Secondary,pointandNon-Point,Line and ArealSourcesofairpollution-stationaryand mobilesources.
EffectsofAirpollutantsonman,materialand vegetation:Globaleffects ofairpollution – Green Houseeffect,HeatIslands, Acid Rains,Ozone Holesetc.

UNIT –II

MeteorologyandplumeDispersion;properties ofatmosphere;Heat,Pressure, Windforces,MoistureandrelativeHumidity, Influence ofMeteorologicalphenomenaon Air Quality-windrosediagrams.

UNIT – III

Lapse Rates,PressureSystems,Windsandmoistureplume behaviorandplumeRiseModels; GaussianModelfor Plume Dispersion.
Control ofparticulates –Control atSources,Process Changes,Equipmentmodifications,Design andoperation ofcontrol. Equipment's–SettlingChambers, Centrifugalseparators, filtersDryand Wetscrubbers,Electrostatic precipitators.

UNIT – IV

GeneralMethodsofControl ofNOxandSox emissions–In-plantControl Measures, processchanges,dryand wetmethods ofremovaland recycling.
Air QualityManagement–Monitoring ofSPM,SO;NOand COEmission 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.

TEXTBOOKS:
1.Air pollutionByM.N.Raoand H.V.N.Rao –Tata Mc.GrawHillCompany.
2.Air pollutionbyWarkand Warner.-Harper&Row,NewYork.

REFERENCE BOOK:
1.An introductiontoAirpollution by R.K.Trivedy andP.K.Goel,B.S.Publications.

OPEN ELECTIVE
REMOTE SENSING AND GIS
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.WRemotesensind 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 ABurragh 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 - tsungchang, 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
CS 100

Lectures	:	3 Periods/Week, 1 Tutorial	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", RamezElmasri 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, 3rd Edition.
3. “Data base System Concepts”, Silberschatz, Korth, McGraw hill, 5th edition.

OPEN ELECTIVE
JAVA PROGRAMMING
CS 200

Lectures	:	3 Periods/Week, 1 Tutorial	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
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
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, McGraw-Hill.
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

OPEN ELECTIVE
CONSUMER ELECTRONICS
EC 100

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

UNIT – I

Microphones, Headphones and Headsets, Loud Speakers, Disc Recording and Reproduction, Amplifying Systems Equalizers and Mixers, Electronic Music Synthesizers.

UNIT – II

Commercial Sound, Theatre Sound System, Audio Systems , Color TV standards and Systems, Remote Controls, Video Systems.

UNIT – III

Electronic Gadgets and Home Appliances:
Telecommunication Systems, Switching Systems, Modulation Techniques, Carrier Systems, Fibre Optics

UNIT – IV

Data Services, Mobile Systems, Facsimile fax, Xerography

TEXT BOOK:
1.Consumer Electronics by S.P.Bali, Pearson Education, ISBN: 9788131717592.

REFERENCE BOOKS:

1. Consumer Electronics for Engineers by Philip Herbert Hoff, Cambridge University Press (July 28, 1998), **ISBN-10:** 0521582075
2. Digital Consumer Electronics Handbook by RonadlK.Jurgen, (Editor) by McGraw Hill Professional Publishing, 1997. **ISBN-10:** 0070341435.

OPEN ELECTIVE
EMBEDDED SYSTEMS
EC 200

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, behavioural 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, John Wily & sons, 2002.
2. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.

REFERENCE BOOKS:

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

OPEN ELECTIVE
VIRTUAL INSTRUMENTATION USING LABVIEW
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
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. PatranabisD,"Sensors and transducers", second edition, PHI, New Delhi 2003.

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

OPEN ELECTIVE
MOBILE APPLICATION DEVELOPMENT
IT 100

Lectures	:	3 Periods/Week, 1 Tutorial	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.

UNIT – II

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

Strings: Exploring the String class.

Library: Date class, Collection, Enumerations and Wrapper classes.

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.

I/O Streams: Streams, Byte streams, Character streams, File class, File streams.

UNIT – III

Introduction to Mobile Application Development, Constraints and requirements of mobile Apps, Understanding the available mobile platforms

Overview of Android: Introduction to Android OS, History of Android, Versions of Android, Android Architecture.

Understanding the development Environment: Developing Android applications using Eclipse, creating the first Android application, Anatomy of the Android Application, Working with the emulators.

Application Components: Activities, Services, Content Providers, Broadcast Receivers, Understanding Activity, Activity's Life Cycle and Intents.

Creating UI for Android: Android Views and View Groups, Android Layouts, Basic Views, Picker views, List views, Additional views (Image Views, Gallery view and Image Switcher) and working with menus. Understanding and working with screen Orientation.

UNIT – IV

Data Persistence: Shared Preferences, Working with Files, Working with databases (SQLite).

Content Providers: Accessing the Contacts using Content Providers.

Messaging & Networking: Sending SMS, Sending e-mails, Checking for the availability of the network, Downloading binary data from Internet, Downloading images from Internet, Working with XML and consuming web services.

Working with Sensors: Motion & Proximity sensors

Working with Location: Obtaining the location of mobile using GPS and A-GPS, Displaying the Location on Maps.

Camera: Working with camera

Services and Broadcast Receivers: Working with Services and broadcast receivers.

Publishing Apps: Preparing for publishing and deploying the APK file.

TEXT BOOK:

1. "The Complete Reference Java J2SE", 7th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi (for UNIT – I)
2. Beginning Android application development, Wei-Meng Lee, Wiley Publishing Inc.(for UNIT – II)

REFERENCE BOOKS:

1. "Java How to Program", Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. Learn JAVA for Android Development, Jeff Friesen, Apress Publications.

OPEN ELECTIVE
.NET TECHNOLOGIES
IT 200

Lectures	:	3 Periods/Week, 1 Tutorial	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
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 – DenavitHartenberg 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 MikellP.Groover.

REFERENCE BOOKS:

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

OPEN ELECTIVE
POWER PLANT ENGINEERING
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.

OPEN ELECTIVE
AUTOMATION TECHNOLOGY
BR 100

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

UNIT-I

FUNDAMENTAL PRINCIPLES

Industrial prime movers - A brief system comparison: An electrical system, A hydraulic system, A pneumatic system, A comparison - Definition of terms: Mass and force, Pressure, Work, energy and power, Torque - Pascal's law - Gas laws.

HYDRAULIC PUMPS AND PRESSURE REGULATION

Pressure regulation - Pump types: Gear pumps, Vane pumps - Loading valves - Filters.

AIR COMPRESSORS, AIR TREATMENT AND PRESSURE REGULATION

Piston compressors - Air receivers and compressor control - Stages of air treatment - Pressure regulation: Relief valves, Non-relieving pressure regulators and Relieving pressure regulators - Service units.

UNIT -II

CONTROL VALVES

Graphic symbols - Types of control valve: Poppet valves, Spool valves, Rotary valves - Pilot-operated valves - Check valves: Pilot-operated check valves, Restriction check valves - Shuttle and fast exhaust valves - Sequence valves - Time delay valves

ACTUATORS

Linear actuators - Mounting arrangements and Cylinder dynamics - Seals - Rotary actuators: Constructional details - Applications: Speed control, Actuator synchronization, Regeneration, Counter balance and dynamic braking, Pilot-operated check valves, Pre-fill and compression relief.

UNIT-III

SENSORS

Sensors and Transducers - Performance Terminology – Sensors: Displacement, Position, and Proximity - Velocity and Motion - Force - Fluid Pressure - Liquid Flow - Liquid level - Temperature - Light Sensors - Selection of Sensors - Inputting data by switches.

UNIT-IV

PROGRAMMABLE LOGIC CONTROLLER

Programmable - Basic PLC structure - Input / Output Processing - Ladder Programming - Instruction lists - Latching and internal relays - Sequencing - Timers and Counters - Shift registers - Master and Jump Controls - Data Handling - Analog input / output.

MECHATRONIC SYSTEMS: Mechatronic designs, Case studies: Timed switch, A pick-and-place robot and Car park barriers.

Text Books:

1. Andrew Parr, Hydraulics and Pneumatics - A Technician's and Engineer's Guide, Jaico Publishing House, 2005
2. W. Bolton, Mechatronics, Fourth Edition, Pearson Education, 2010

Reference Books:

1. Anthony Esposito, Fluid Power with Applications, Fifth Edition, Pearson Education, 2005
2. W. Bolton, Pneumatic and Hydraulic Systems, Butterworth Heinemann, 1997
3. Ernest. O. Doebelin, Measurement Systems - Applications and Design, Fifth Edition, TMH
4. Gary Dunning, Introduction to Programmable Logic Controllers, 3rd Edition, 2007

EI 451 **TERM PAPER**

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.

EI 452 **ADVANCED INSTRUMENTAION & VLSI LAB**

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

1. Temperature control using Programmable logic controllers (PLC)
2. Level control using PLC
3. Pressure control using PLC
4. Motor Speed control using PLC
5. Digital PID controller.
6. Implementation of logic gates, timer and counter using PLC
7. Process control simulator
8. Flame photo meter
9. UV & IR spectrometers

Design, Simulation and Layout of following experiments

10. Logic gates
11. Sequential logic circuits
12. Multiplexer/De-multiplexer
13. Parity generator
14. Design of ALU
15. CMOS inverter

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

EI 453 **DSP & EMBEDDED SYSTEMS LAB**

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

Digital Signal Processing : using MATLAB

1. Simulation of linear convolution and Circular Convolution.
2. Simulation of DFT & IDFT using DIT algorithm (16 sample sequence).
3. Simulation of DFT & IDFT using DIF algorithm (16 sample sequence).
4. Design of FIR filter using windowing methods.
5. Design of digital Butterworth filter using bilinear transformation & impulse invariant method.
6. Design of digital Chebyshev filter using bilinear transformation & impulse invariant method.
7. Design of digital filters using frequency transformation method.
8. Direct from realization of IIR filters.
9. Cascade realization of IIR filters.
10. Parallel realization of IIR filters.

Embedded system Lab

11. Semaphores and Messages
12. Message Queues
13. Round Robin Scheduling
14. priority scheduling
15. Signals
16. Interrupt handlers

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

EI 421 **BIOMEDICAL INSTRUMENTATION**

IV B.Tech. II Semester

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

UNIT – I

Introduction: Introduction to Bio-Medical Engineering field, Components of Man-Instrument system, problems encountered in measuring a living system

Physiological systems of the Body: Basic Features of cardiovascular system, Nervous system, muscular system, respiratory system.

Resting potential & action potential concepts: Resting potential concept, characteristics of resting potential, action potential concept, propagation of action potential.

Bio-electric potentials: Definition for Bio-electric Potential, Typical Examples of Bio-Electric Potential with important features

UNIT – II

Bio-Medical Electrodes: Introduction to Bio-Medical Electrodes, Various types of Bio-Medical Electrodes: surface electrodes, micro electrodes, needle electrodes depth electrodes.

Electro Cardiograhphy (ECG): Introduction to electro cardiography, ECG LEAD Concept, various types of ECG Lead configurations, typical ECG waveform details, ECG recording, Analysis of Recorded ECG waveform.

Electro Encephalography (EEG): Introduction to Electro Encephalography, EEG Recording EEG in diagnostics

Electro Myography: Introduction to Electro-Myography, EMG Recording, EMG Applications.

UNIT – III

Cardiovascular Measurements: Introduction to various cardiovascular parameters: Blood Pressure Blood flow, cardiac output, Heart sounds. Blood Pressure Measurement techniques: Direct methods & In-direct Methods.

Blood flow measurement techniques: Electro Magnetic Blood flow meter, ultrasonic Blood flow meter, Thermal convection method. Cardiac output Measurement techniques: Fick's technique, Indicator dillution method, thermal dilution method, Impedance change method. Phono cardiography: Heart sounds Recording

UNIT – IV

Therapeutic Instruments: Cardiac Pacemakers, Types of pacemakers: External pace makers, Internal Pacemakers, Pacing modes, lead wires & Electrodes for internal pacemakers, power sources for implantable cardiac pacemakers, hem dialysis. Cardiac defibrillators, defibrillator electrodes, Introduction to diathermy. Various diathermy apparatus: surgical, shortwave, microwave .

Instruments for clinical laboratory: Introduction to Bio-Chemical electrodes, Types of Bio-Chemical electrodes for measurement of various Blood gas parameters such as Blood P^{H}, $P^{O2}P^{CO2}$ Blood gas analyzer, Blood cell counters.

Modern technologies in Bio-Medical field: Use of X-Rays in medicine, CT scan, ultrasound applications in medicine, MRI scan.

TEXT BOOKS:

1. khandpur, Hand Book of Bio-Medical Instrumentation, 2nd Edition, TMH)
2. Cromwell weibell, Bio-Medical Instrumentation and Measurements, Pfeiffer, PHI
   (or) LPE Pearson 2nd Edition.

REFERENCE BOOKS:

1. Webster, Medical Instrumentation Application & Design,John Wiley & Sons

EI 422 OPTO ELECTRONICS AND LASER INSTRUMENTATION

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

UNIT-I

Introduction to optical fiber communication system, advantages of optical fiber communication. Ray theory transmission: Acceptance angle ,Numerical aperture, skew rays. Types of optical fibers: single step ,graded index, single mode fiber and its cutoff wavelength. Transmission characteristics of optical fibers: Attenuation: intrinsic and extrinsic, Linear scattering losses: Rayleigh scattering , mie scattering, Non linear Scattering loss , Fiber bend loss ,Dispersion: Intra model ,Inter model dispersion.

UNIT -II

Optical sources:

LASER :Absorption and emission of radiation, Einstein relations, population inversion, optical feedback and laser oscillation. Optical emission: spontaneous emission, stimulated emission and lasing, Types of Lasers: gain-guided lasers, index guided lasers, quantum well lasers. Non semi conductor lasers: Nd:yag laser, Ruby laser,Co2 laser Laser Instrumentation ; Industrial applications of Lasers, bio medical application, Laser Doppler velocity meter, hologram and applications

UNIT-III

Fiber optic sensors: Interferometric sensor, Polarization sensor, micro bending fiber sensor, Extrinsic fiber sensors, for measurement of length, displacement, velocity, pressure, temperature, current, voltage, level, strain .

Optical sources :LED: Advantages of LEDs,LED power , LED internal quantum efficiency, external power efficiency. Types of LEDs : Surface emitter LEDS, Edge emitter LEDS, Super Luminescent LED ,LED characteristics: optical output power, output spectrum, modulation bandwidth.

UNIT-IV

Optical detectors: Detection principles. Absorption, Quantum efficiency , responsivity

Semiconductor photo diodes: p-n photo diode, p-i-n photo diode, Avalanche photodiode, silicon reach through avalanche photodiode.

Electro-optic modulator , magneto-optic modulator, acoustic -optic modulator, polarization maintaining fibers-applications.

TEXT BOOKS:

1. Senior J.M., Optical Fiber Communication Principles and Practice, Prentice Hall, 1985
2. Thyagarajan & Ghatak A-Laser theory and applications
3. Bishnu P Pal-Fundamentals of fiber optics in Telecommunications and sensor systems

REFERENCE BOOKS:

1. Keiser G., Optical Fiber Communication, McGraw-Hill, 1991
2. Ghatak A.K and Thiagarajan K, Optical electronics foundation book, TMH,1991.

EI 423/A **PC BASED INSTRUMENTATION**

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

UNIT – I

Data acquisition basics and Bus Standards: introduction to data acquisition on PC, sampling fundamentals, input output techniques and buses, ADC, DAC, digital I/O, counters and timers, DMA, software and hardware installation, calibration, resolution, data acquisition interface requirements. Bus standards: microcomputer bus standards, bus management, bus communication protocols, bus topology, bus control signals, data transfer control signals, transmission of digital signals along a bus line, introduction to ISA, VME buses, IEEE 488 bus etc.

UNIT – II

Add on cards and device drivers: Introduction to add on cards, add on card design considerations, power requirements and physical dimensions, of add on cards, case studies of two programmable instruments, Device Drivers: introduction and purpose of device drivers, types of device drivers, static vs. loadable device drivers,

UNIT – III

Virtual instrumentation perspective, advantages, block diagram and architecture of a virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming, development of virtual instrument using GUI, real time systems, embedded controller, OPC HMI/SCADA software programming.

UNIT – IV

Vi programming techniques: VIS and sub VIS, loops and charts, arrays, clusters, and graphs, case and sequence structures, formula nodes, local and global variables string and file I/O. instrument drivers, publishing measurement data in WEB. VI chassis requirements, common instrument interfaces, current loop, RS 232C/ Rs485 GPIB. BUS interfaces: USB< PCMCIA, VXI, SCSI, PCI, PXI, Fire wire, PXI system controllers, Ethernet control of PX.I. Networking basics for office and industrial applications VISA and IVI.

TEXT BOOKS :

1. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control – Kevin James, newness, 2000.
2. Writing Device Drivers, Tutorial and References by T.BURNE, M.A.PARENTI, A.WOJTAS

REFERENCE BOOKS:

1. D.A.Nortan - Writing Windows Device Drivers.
2. Gary Johnson, LAB VIEW graphical programming, 2nd edition, Mc Graw Hill Edition.
3. LABVIEW for Every One, Printicehall, Newjersy 1997 by Lisa K. Wills, & Jeffery Travis.

EI 423/B **TELEMETRY AND TELECONTROL**

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

UNIT – I

TELEMETRY FUNDAMENTALS AND CLASSIFICATION: Fundamental concepts, significance, principles, functional blocks of Telemetry and Tele control system - Methods of telemetry – Electrical, pneumatic, Hydraulic and optical telemetry – state of the art. Telemetry standards.

UNIT – II

LAND LINE TELEMETRY: Electrical telemetry – current systems – voltage systems – Synchro systems – Frequency systems – position and pulse systems – Example of land line telemetry system.

RADIO TELEMETRY: Block diagram of a Radio telemetry system – Transmitting and receiving techniques – AM, FM, PM, Multiplexing and Demultiplexing – Transmitting and receiving techniques – Digital coding Methods – Advantages of PCM, PWM, PDM, FSK – Delta Modulation – coding and decoding equipment, Example of a radio telemetry system.

UNIT – III

OPTICAL TELEMETRY: Optical fibers for signal transmission – sources for fiber optic transmission – optical detectors – Trends in fiber optic device development – Example of an optical telemetry system.

UNIT – IV

TELECONTROL METHODS: Analog and Digital techniques in tele control, tele control apparatus – Remote adjustment, Guidance and regulation – Tele control using information theory – Example of a tele control system.

TEXT BOOKS :

1. Gruenberg, Handbook of telemetry and remote control, Mc Graw Hill, New York, 1987.
2. Swoboda G, Tele control methods and applications of telemetry and remote control, Reinhold Publishing Corporation, London 1991.
3. Young R.E., Telemetry Engineering, Little Books Ltd., London 1988
4. Houslay T. Data Communication and Teleprocessing System, Prentice Hall

EI 423/C **POWER PLANT INSTRUMENTATION**

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

UNIT – I

AN OVERVIEW OF POWER GENERATION: Brief survey of methods of power generation Hydro, Thermal, Nuclear, Solar wind etc. Importance of instrumentation for power generation – Thermal power plants – Building Blocks Details of the Boiler process – PI diagram of Boiler.

Non electrical parameters, flow of feed water, fuel, air and strain with correction factors for temperature, pressure, temperature level –radiation detectors – smoke density measurement, dust monitor.

UNIT – II

CONTROL LOOPS AND INTERLOCKS IN BOILER: Combustion control – control of Main header pressure, air fuel ratio control, furnace draft and excessive air control, drum level, main and reheat steam temperature control, burner tilting up, bypass damper, super heater, spray and gas recirculation controls – B.F.P. recirculation control – hot well and de-aerator level control – Pulverizer control, computers in power plants.

UNIT – III

TURBINE MONITORING AND CONTROL: Condenser Vacuum Control – gland steam exhaust pressure control – speed vibration, shell temperature monitoring and control – lubricating oil temperature control – hydrogen generator cooling system.

UNIT – IV

ANALYSERS IN POWER PLANTS: Thermal conductive type – Paramagnetic type Oxygen Analyzer, IR type and trim Analyzer – spectrum analyzer – Hydrogen purity meter – chromatography PH meter – conductivity cell – Fuel analyzer - brief survey of pollution monitoring and control equipment.

TEXT BOOKS:

1. Modern Power station practice: Volume 6, Instrumentation, Controls and Testing, Pergaman Press, Oxford 1971
2. Wakil. M.M.; Power Plant Technology (Mc Graw Hills), 1985
3. Elonka S.M. and Kohal, Standard Boiler Operations Questions and Answers, TMH, 1973

EI 423/D INSTRUMENTATION IN AEROSPACE AND NAVIGATION

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

UNIT - I

Basics of aerospace and navigation. The technical aspects of this subject. The idea of modern technology. Air craft and aerospace vehicle instrumentation: Air data instruments: altimeter, air speed rate of climb – gyroscopic instruments – turn and back indicator – artificial horizon – directional Gyro Schuler Tuning, Stable Platform – Automatic pilots – integrated flight instruments – Capacitance type fuel level indicating system – altitude compensation – magnetic compass.

UNIT - II

Radio Navigation Aids: automatic direction finder – instruments landing system – visual omni range – distance measuring equipments – radar – optical instruments – engine instruments and control – pressure measurements– thermal meter control – pressure measurement – thermal meter – tachometer – accelerometer – smoke and fire detection – propeller controls – cabin pressure and temperature.

UNIT - III

Satellite and space vehicle instrumentations – propulsion controls –stabilization sensors – Gyros– Sun sensors – Horizon sensors – star tracker – Stabilization controls.

Air Craft Flight Simulation Instrumentation: Basic description of a flight simulator – Solution of Aerodynamics equations – simulation of abnormal conditions – Jet engine power plant troubles – Flight controls and auto pilot troubles.

UNIT – IV

Electrical Troubles: Hydraulic systems troubles – landing gear troubles – cabin conditioning troubles – indication of unsafe canopy – Boeing condition – Radio troubles – Separate generator – System troubles – Trouble indicator light – Advantages of instrumentation in flight – Simulation – Simulation of difficult conditions – Weapons system trainer – Need for realism – Instrumentation.

TEXT BOOKS

1. Pallett E.G.H., *Aircraft Instrumentation and Integrated Systems* , Longman Scientific and Technical',
1992.

2. Nagaraja N.S., *Elements of Electronic Navigation* ,Tata Mcgraw Hill Publishing Ltd., New Delhi, 1975.

REFERENCES

1. Douglas M. Considine and S.D. Ross, *Handbook of Applied Instrumentation* , McGraw Hill, 1965.

EI 424/A **DIGITAL IMAGE PROCESSING**

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

UNIT – I

INTRODUCTION: Origin of Digital Image Processing , Fields That use 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 Nonlinear operations, color Images, Color Models.

UNIT – II

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Some basic gray 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, Lossy Compression

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 BOOKS:

1. R C Gonzalez and Richard E Woodds, Digital Image Processing, Person Education, Second Edition, 2002
2. A R Weeks, Fundamentals of Electronic Image Processing, PHI,2003.

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. Milon Sonka, Vaclav Illavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.

EI 424/B INSTRUMENTATION IN PETRO CHEMICAL INDUSTRIES

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

UNIT – I

PETROLEUM PROCESSING: Petroleum Exploration – Petroleum recovery techniques – Oil Gas separation – processing of wet gases – Refining of crude oil.

UNIT – II

UNIT OPERATION IN PETROLEUM INDUSTRY: Unit operations in petroleum industry – Thermal cracking – Catalytic cracking – Catalytic reforming – Polymerization – Alkylation – Isomerisation – Production of ethylene, acetylene and propylene and petroleum.

UNIT – III

CHEMICALS FROM PETROLEUM PRODUCTS: Chemicals from petroleum – Methane derivatives – Acetylene derivatives – Ethylene derivatives – Propylene derivatives – other products.

MEASUREMENTS IN PETROCHEMICAL INDUSTRIES: Measurements in refineries and petrochemical industries, selection and maintenance of measuring instruments – special measurement problems.

UNIT – IV

CONTROL OF PETROCHEMICAL MANUFACTURES
Process Control in Refineries and Petrochemical Industries – Control of distillation column – control of catalytic crackers and pyrolysis unit.

TEXT BOOKS:

1. Waddams A.L., Chemicals from Petroleum
2. Balcen J.G. and Mumme K.I., Process Control Structures and Applications
3. Austin G.T. , Chemical Process Industries, 5th EdItion, Mc GH, 1984

EI 424/C **ARTIFICIAL INTELLIGENCE**

Lectures	:	3 Periods/Week ,1 Tutorial	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, Natural Deduction.

UNIT – III

REPRESENTING KNOWLEDGE USING RULES – Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

Semantic Nets, Conceptual dependency, scripts

UNIT - IV

PROLOG Language: Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, fail Recursion, Lists, string operations, Dynamic databases.

TEXT BOOKS:

1. Ellaine Rich & Kevin Knight, Artificial Intelligence, 2nd Edition, TMH, 2003
2. Carl Townsend, Introduction to TURBO PROLOG, BPB Publications, 1988

REFERENCE BOOKS:

1. Patrick Henry Winston, Artificial Intelligence, Pearson Education, 2001
2. Russel and Norvig, Artificial Intelligence, Pearson Education, 2003

EI 424/D NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS

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

UNIT – I: Introduction to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN. Essentials of Artificial Neural Networks, Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT–II: Single Layer Feed Forward Neural Networks Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model. Multilayer Feed forward Neural Networks,Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT III: Associative Memories Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Classical & Fuzzy Sets :Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT IV: Fuzzy Logic System Components:Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Applications:Neural network applications: Process identification, control, fault diagnosis. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOK:

1. S. Rajasekharan and G. A. Vijayalakshmi pai, “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Publication, 2004.
2. John Yen and Reza Langan, “Fuzzy Logic: Intelligence, Control and Information”, Pearson Education, 2004.

REFERENCE BOOKS:

1. Simon Haykin, “Neural Networks- A comprehensive foundation”, Pearson Education, 2001.
2. S.N.Sivanandam, S.Sumathi,S. N. Deepa “Introduction to Neural Networks using MATLAB 6.0”, TMH, 2006.
3. James A Freeman and Davis Skapura, Neural Networks Pearson Education, 2002.
4. Timothy J. Ross, “ Fuzzy Logic With Engineering Applications”, McGraw-Hill Inc. 1997

EI 461 **PROJECT AND VIVA VOCE**

Lectures	:	9 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

The internal assessment is based on the weekly progress, performance in a minimum of two seminars and the project report submitted at the end of the semester.

EI 462 **BIO-MEDICAL INSTRUMENTATION and VI LAB**

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

Bio medical Instrumentation Lab

1. Measurement of Blood Pressure
2. Measurement of Blood PH
3. Measurement of Blood PCO2, PO2
4. Study of ECG
5. Study of EEG, EMG
6. Measurement of heart sounds
7. Measurement of respiration parameters.
8. Study of Electronystagmography.
9. Study of stress test system.

Virtual Instrumentation Lab

10. Data acquisition System.
11. Thermo couple modules
12. Strain gauge modules
13. Motion control module.
14. Image acquisition setup

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