Bapatla Engineering College:: Bapatla

(Autonomous)

Department of Electronics & Instrumentation Engineering

Academic Rules & Regulations for B. Tech Programme

(As Approved by The Academic Council & The Governing Body of the College)

(Amended in August 2014; Applicable to the students admitted into the First year B.Tech from the academic year 2014-2015 onwards).

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, The Principal, Bapatla Engineering College (Autonomous), shall be the Chairman of the College Academic Council.

2.0 ADMISSIONS:

2.1 Admission into the First year of any Four Year B.Tech Programmes of study in Engineering: Admissions into the 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 and the Govt. of Andhra Pradesh from time to time.

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

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 intends to pursue B.Tech 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/her Programme of study for the award of the degree.
4) When a student is not able to pursue his/her existing Programme of study but intends 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 from time to time. 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 stipulated in ***5.3.***

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

SNo	Activity	Description
1.	Number of Semester in an Academic Year	Two
2.	Regular Semester duration in Weeks	19
3.	Academic Activities Schedule	
	Course Work	15 Weeks
	Examination Preparation	1 Week
	Examinations	2 Weeks
	Declaration of Results	1 Week
4.	Evaluation	Continuous Internal Evaluation (CIE) with a weightage of 40% and Semester End Examinations (SEE) with a weightage of 60% of the student's performance in course/laboratory work and other activities, if any.
5.	Other Items	The total number of working days in an academic year shall be >180;
		Academic schedules prescribed by the college shall be adhered to by all the concerned.
		Students failing in any course (s) shall register for the same again (re-register) and shall secure SEE afresh in each course(s). This shall continue until a pass grade is obtained in the said course(s).

4.0 MINIMUM No. INSTRUCTION DAYS:

Each semester shall consist of a minimum of 90 instruction days.

5.0 Programmes of study in B.Tech:

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

S.No.	Title of the UG Programme	Abbreviation
1.	Civil Engineering	CE
2.	Chemical Engineering	CH
3.	Computer Science & Engineering	CS
4.	Electrical & Electronics Engineering	EE

5.	Electrical & Communication Engineering	EC
6.	Electronics & Instrumentation Engineering	EI
7.	Information Technology	IT
8.	Mechanical Engineering	ME

5.2 Structure of the Programme:

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

1) General courses in Basic Sciences, Basic Engineering Sciences, Social Sciences & Humanities.
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 branch of study concerned.
4) Elective courses from either discipline or interdisciplinary areas to be chosen 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.

Humanities & Social Science, Basic Science and Engineering Science courses	30 -45%
Professional Core courses	35-45%
Professional Elective and Open Elective Courses	10-15%
Major Project / Seminar, etc	5-10%

***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 (4 Periods/Week)	03
Theory Course with additional Tutorial Period	04
Laboratory Course (3 Periods/Week)	02
Term paper (2 Periods/Week)	01

Business communication & Presentation Skills Lab (2 Periods/Week)	01
Final year Project (12 Periods/Week)	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 accordingly.

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

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 Board of Studies concerned and is approved by the Academic council of the college.
2) In the case of students admitted through lateral entry, the respective regular curriculum contents from the second year onwards are to be pursued by such students.
3) In the case of students admitted under advanced standing, the Programme curriculum will be prepared by the Board of Studies concerned and the same shall be approved by the Academic Council.
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.

Table below shows a typical curriculum frame work for B.Tech Degree program.

S.No.	**Subject Area**	**Average no. of credits**
1.	Humanities & Social Sciences courses	14
2.	Basic Science Courses	35
3.	Engineering Science	32
4.	Professional Core courses	96

5.	Professional Elective Courses	16
6.	Major Project / Seminar, etc.	11
7.	Open Electives	3
	TOTAL	**207**

The students admitted through the **Lateral Entry scheme** have to complete **155** credits

5.5 The Maximum duration permitted to pursue the programme 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 the first year of any Programme,
2) Six academic years in sequence from the year of admission for a Lateral entry student admitted into the 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 mentioned 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 Alternate Assessment Tests, term examinations on a continuous basis during the semester called Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) 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 Internal Evaluation (CIE) and Semester End Examination (SEE) to be conducted at the end of the semester will be as follows:

Nature of the Course	**CIE**	**SEE**
Theory subjects	40	60
Drawing	40	60
Practical	40	60

Business communication & presentation Skills Lab	20	30
Term Paper	20	30
Project work	50	100

6.3 Continuous Internal Evaluation (CIE) in Theory and Drawing subjects:

1. In each Semester there shall be two Term examinations and two tests from any of the ***Alternate Assessment Tools (AAT)*** like Home Assignment, Class Test, Problem Solving, Group Discussion, Quiz, Seminar and Field Study in every theory course. The Alternate Assessment Tool with detailed modality of evaluation for each course shall be finalized by the teacher concerned before beginning of the course with the permission of HOD concerned and the PRINCIPAL.

   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, AAT and the calculation of marks for CIE in a theory course is given in the following table.

Weightage for different heads to calculate CIE for 40 marks in a Theory course			
Particulars	Term Exams (Max. 25 marks)	AAT (Max. 10 marks)	Attendance (Max.5 marks)
Better Performed exam	75% of marks obtained	50% of marks obtained	5
Other exam	25% of marks obtained	50% of marks obtained	

2. For drawing courses, there shall be only two Term examinations in a semester with no Alternate Assessment Tool. In case of such courses a maximum of 10 marks shall be given for day-to-day class work and a maximum of 25 marks shall be awarded to the Term examinations taking into account the performance of both the Term examinations giving weightage as prescribed above.

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

6.4 Semester End Examination (SEE) in Theory and Drawing subjects:

1) For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester for 100 marks and reduced to 60 marks for the combined performance in CIE & SEE purpose, 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 40 marks are to be secured exclusively in the Semester End Examination (SEE) of theory/drawing course which shall be reduced to 24 marks (40%) and a minimum total of 40 marks in SEE and CIE 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 Internal Evaluation (CIE) in laboratory courses:

1) The evaluation for Laboratory course is based on SEE and CIE. The CIE 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 internal lab teacher concerned and the Head of the Department concerned to be eligible to appear for the Final Examination in that laboratory course.

6.6 Semester End Examination (SEE) in laboratory courses:

1) For each laboratory course, the Semester End Examination (SEE) 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 SEE is for 100 marks which include 15 marks for write up, 40 marks for lab experiment/exercise, 10 marks for record, 15 marks for result analysis and 20 marks for Viva-voce. The student performance in SEE shall be reduced to 60 marks.

2) A minimum of 50 marks shall be obtained in SEE which shall be reduced to 30 marks (50%) and a minimum total of 40 marks in SEE and CIE 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 and Business communication & Presentation Skills Lab:

1) A term paper is to be submitted by each student in the 7^{th} semester which would be a precursor to the project work to be done in the 8^{th} semester, and Business Communication & Presentation Skills Lab is to be taken up in the 7^{th} semester. The evaluation is based on CIE for 20 marks, which includes a minimum of two seminars/presentations for 10 marks and the report submitted at the end of the semester which is evaluated for 10 marks.

2) The Semester End Examination (SEE) shall be conducted for 100 marks by one internal and one external examiner appointed by the Principal. The same shall

be reduced to 30 marks. The SEE contains Viva-voce and the demonstration of the model developed or work performed as a part of the term paper.

3) A minimum of 25 marks shall be obtained in SEE which is reduced to 15 (50 %) and a minimum total of 20 marks in SEE and CIE 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 CIE and SEE. The CIE 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) SEE 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 SEE exclusively and a minimum total of 60 marks in SEE and CIE 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 CIE of a semester is not eligible to appear for the Semester End 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 Internal Evaluation (CIE), 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 Internal Evaluation (CIE/Internal marks) subject to the following:

If the student becomes eligible to appear for the Semester End Examination (SEE) of a semester and is unable to secure 40% internal marks in a particular theory subject due to genuine reasons, he/she may be given an opportunity to appear for makeup test in any one subject of 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 HOD concerned and approved by the principal.

6.11 Course Repetition: The students secured less than 40% in the Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE) may register for the course repetition. The students have to apply to the Principal through the respective HOD by paying prescribed fees. A student can take up a maximum of two courses in a semester immediately after the semester end examinations of that particular semester.

The HODs concerned have to allot a teacher related to that course to conduct class work. The minimum number of periods to be conducted should not be less than 50% of the total prescribed periods for that course. The classes will be conducted in the vacation period or in the weekends or in the afternoons as decided by the HOD concerned. Teacher has to evaluate the student for his performance in CIE as per the autonomous norms and students should appear for a semester end examination. The pass criteria in both CIE & SEE should be as per autonomous norms.

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 CIE in each theory/drawing course shall be given for those students who put in a minimum of 65% attendance in the respective theory/drawing course in a graded manner as indicated below:

Attendance of 65% and above but less than 75%	4 mark
Attendance of 75% and above but less than 80%	6 mark
Attendance of 80% and above but less than 90%	8 marks
Attendance of 90% and above	10 marks

The above marks are scaled and reduced to maximum of 5 marks for the purpose of calculating attendance weightage.

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 Semester End 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 Semester End Examination (SEE) at the end of the semester when

8.1 The student does not have a minimum average 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 CIE 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 Semester End Examination (SEE), 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 courses).

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 courses).

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.

12.4 Example

Semester	Course Code.	Credits	Grade	Grade Point	Credit Points	SGPA	CGPA
I	14MA101	4	C	5	20	**7.73 (201/26)**	**7.73 (201/26)**
I	14PH102	3	B	6	18		
I	14CH103	3	A	8	24		
I	14EL104	3	O	10	30		
I	14ES105	3	A+	9	27		
I	14EG106	4	B+	7	28		
I	14CHL101	2	O	10	20		
I	14ELL102	2	A	8	16		
I	14WSL103	2	A+	9	18		
Total		**26**			**201**		
II	14MA201	4	A	8	32		
II	14PH202	3	B	6	18		

II	14CH203	3	A+	9	27		
II	14EE204	3	C	5	15		
II	14EM205	4	O	10	40	**7.96 (207/26)**	**7.84 (408/52)**
II	14CP206	3	B+	7	21		
II	14PHL201	2	A+	9	18		
II	14HWL202	2	A	8	16		
II	14CPL203	2	O	10	20		
Total		**26**			**207**		

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 SEE 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 the same to 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 CIE in any course or for Semester End Examination (SEE) 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 shall not 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 Internal Evaluation (CIE) and Semester End Examination (SEE) to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice allegedly committed by the student to the Principal. The Principal along with the members of the Committee is authorized to award a suitable punishment, if the student is found guilty.

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 Grade is awarded accordingly.

19.3 When a component of Continuous Internal Evaluation (CIE) or Semester End Examination (SEE) 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, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other matter pertained that meets to the needs of the students, society and industry without any notice and the decision is final.

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CH, CS, EI, IT, ME Branches
With Effective from 2014-2015 Academic Year
First Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14MA101	Engineering Mathematics – I	4	1	0	0	5	40	60	100	4
14PH102	Engineering Physics – I	4	0	0	0	4	40	60	100	3
14CY103	Engineering Chemistry – I	4	0	0	0	4	40	60	100	3
14EL104	Communicative English	4	0	0	0	4	40	60	100	3
14ES105	Environmental Studies	4	0	0	0	4	40	60	100	3
14EG106	Engineering Graphics	4	1	0	1	6	40	60	100	4
14CYL101	Chemistry Lab	0	0	3	0	3	40	60	100	2
14ELL102	English Communication and Skills Laboratory	0	0	3	0	3	40	60	100	2

14WSL103	Workshop	0	0	3	0	3	40	60	100	2
	TOTAL	24	2	9	1	36	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical S: Self Study

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
CH, CS, EI, IT, ME Branches
With Effective from 2014-2015 Academic Year
First Year B.Tech, (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14MA201	Engineering Mathematics – II	4	1	0	0	5	40	60	100	4
14PH202	Engineering Physics – II	4	0	0	0	4	40	60	100	3
14CY203	Engineering Chemistry – II	4	0	0	0	4	40	60	100	3
14EE204	Basic Electrical and Electronics Engineering	4	0	0	0	4	40	60	100	3
14EM205	Engineering Mechanics	4	1	0	0	5	40	60	100	4
14CP206	Problem Solving with Programming	4	0	0	1	5	40	60	100	3
14PHL201	Physics lab	0	0	3	0	3	40	60	100	2

14HWL202	Hardware Lab	0	0	3	0	3	40	60	100	2
14CPL203	Problem Solving with Programming Lab	0	0	3	0	3	40	60	100	2
	TOTAL	24	2	9	1	36	360	540	900	26

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture T: Tutorial P: Practical S: Self Study

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
ELECTRONICS & INSTRUMENTATION ENGINEERING
With Effective from 2014-2015 Academic Year
Second Year B.Tech, (SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14EI/MA301	Engineering Mathematics - III	4	0	0	0	5	40	60	100	**3**
14EI302	Data Structures using 'C'	4	0	0	0	4	40	60	100	**3**
14EI303	Electronic Devices	4	0	0	0	4	40	60	100	**3**
14EI304	Elements of Mechanical Engineering	4	0	0	0	4	40	60	100	**3**
14EI305	Digital Electronics	4	1	0	0	5	40	60	100	**4**
14EI306	Circuit Theory	4	1	0	1	5	40	60	100	**4**
14EIL301	Data structures Lab	0	0	3	0	3	40	60	100	**2**
14EIL302	Electronic Devices Lab	0	0	3	0	3	40	60	100	**2**
14EIL303	Digital Electronics Lab	0	0	3	0	3	40	60	100	**2**
	TOTAL	**24**	**2**	**9**	**1**	36	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture S: Self Study T: Tutorial P: Practical

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics & Instrumentation Engineering
With Effective From 2014-2015 Academic Year
Second Year B.Tech., (SEMESTER –IV)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14MA401	Engineering Mathematics - IV	4	0	0	0	4	40	60	100	**3**
14EI402	Electronic Circuits – I	4	0	0	0	4	40	60	100	**3**
14EI403	Electrical Technology	4	0	0	0	4	40	60	100	**3**
14EI404	Microprocessors and Interfacing	4	0	0	1	5	40	60	100	**3**
14EI405	Electrical & Electronic Measurements	4	1	0	0	5	40	60	100	**4**
14EI406	Signals & Systems	4	1	0	0	5	40	60	100	**4**
14EIL401	Electronic Circuits – I Lab	0	0	3	0	3	40	60	100	**2**
14EIL402	Measurements Lab	0	0	3	0	3	40	60	100	**2**
14EIL403	Microprocessors and Interfacing Lab	0	0	3	0	3	40	60	100	**2**
	TOTAL	**24**	**2**	**9**	**1**	**36**	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture S: Self Study T: Tutorial P: Practical

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics & Instrumentation Engineering
With Effective From 2014-2015 Academic Year
Third B.Tech., (SEMESTER –V)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14EI501	Linear Integrated Circuits	4	1	0	0	5	40	60	100	**4**
14EI502	Linear Control Systems	4	1	0	0	5	40	60	100	**4**
14EI503	Electronic Circuits - II	4	0	0	0	4	40	60	100	**3**
14EI504	Analog and Digital Communications	4	0	0	1	5	40	60	100	**3**
14EI505	Transducers	4	0	0	0	4	40	60	100	**3**
14EI506	Elective - I	4	0	0	0	4	40	60	100	**3**
14EIL501	Transducers Lab	0	0	3	0	3	40	60	100	**2**
14EIL502	Pulse & Integrated Circuits Lab	0	0	3	0	3	40	60	100	**2**
14EIL503	PSPICE & Signal Simulation Lab	0	0	3	0	3	40	60	100	**2**
	TOTAL	**24**	**2**	**9**	**1**	**36**	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture S: Self Study T: Tutorial P: Practical

Elective – I

14EI506/A Pulse and Switching Circuits
14EI506/B Electromagnetic Fields Theory
14EI506/C Computer Organization
14EI506/D OOPS and Operating Systems

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics & Instrumentation Engineering
With Effective From 2014-2015 Academic Year
Third B.Tech., (SEMESTER –VI)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14EI601	Professional Ethics And Human Values	4	0	0	0	4	40	60	100	**3**
14EI602	Industrial Instrumentation	4	1	0	0	5	40	60	100	**4**
14EI603	Digital Signal Processing	4	0	0	1	5	40	60	100	**3**
14EI604	Process Control	4	1	0	0	5	40	60	100	**4**
14EI605	Object Oriented Programming with JAVA	4	0	0	0	4	40	60	100	**3**
14EI606	Elective - II	4	0	0	0	4	40	60	100	**3**
14ELL601	Soft Skills Lab	0	0	3	0	3	40	60	100	**2**
14EIL602	Process Control Lab	0	0	3	0	3	40	60	100	**2**
14EIL603	DSP & OOPS Lab	0	0	3	0	3	40	60	100	**2**
	TOTAL	**24**	**2**	**9**	**1**	**36**	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture S: Self Study T: Tutorial P: Practical

Elective – II
14EI606/A. Adaptive Control Systems
14EI606/B. Advanced Computer Architectures
14EI606/C. Programmable Logic Controllers
14EI606/D. Embedded Systems

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics and Instrumentation Engineering
With Effective From 2014-2015 Academic Year
Fourth Year B.Tech., (SEMESTER –VII)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14EI701	Industrial Management & Entrepreneur Ship Development	4	0	0	0	4	40	60	100	3
14EI702	Biomedical Instrumentation	4	1	0	0	5	40	60	100	4
14EI703	Analytical Instrumentation	4	0	0	0	4	40	60	100	3
14EI704	Optoelectronics and LaserInstrumentation	4	0	0	0	4	40	60	100	3
14EI705	Elective - III	4	1	0	0	5	40	60	100	4
14OE706	Open Elective	4	0	0	0	4	40	60	100	3
14ELL701	Business communications and presentation skills Lab	0	0	2	0	2	20	30	50	1
14EIL702	AI & BMI Lab	0	0	3	0	3	40	60	100	2
14EIL703	VI Lab	0	0	3	0	3	40	60	100	2
14EIL704	Term Paper	0	0	2	0	2	20	30	50	1
	TOTAL	**24**	**2**	**10**	**0**	**36**	**360**	**540**	**900**	**26**

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture S: Self Study T: Tutorial P: Practical

Elective – III

14EI705/A. Robotics and automation
14EI705/B. Advanced Sensors
14EI705/C. Computer Networks
14EI705/D. Wireless Sensor Networks

Open Elective

List is provided in the next page

Open Electives offered by the Departments(14OE706)

DEPARTMENT	SUBJECT NAME	SUBJECT CODE
Chemical Engineering.	Industrial Pollution & Control	ChE01
	Energy Engineering	ChE02
Civil Engineering.	Air Pollution & Control	CE 01
	Remote Sensing & GIS	CE 02
Computer Science & Engineering.	Database Management Systems	CS 01
	Java Programming	CS 02
Electrical & Electronics Engineering.	Optimization Techniques	EE 01
	Non-Conventional Energy Sources	EE 02
Electronics & Communication Engineering.	Consumer Electronics	EC 01
	Embedded Systems	EC 02
Electronics & Instrumentation Engineering.	Virtual Instrumentation Using LABVIEW	EI 01
	Sensors & Transducers	EI 02
Information Technology.	Mobile Application Development	IT 01
	Web Technologies	IT 02
Mechanical Engineering.	Automobile Engineering	ME 01
	Refrigeration & Air Conditioning	ME 02
BOSCH REXROTH Centre	Automation Technology	BR 01

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics and Instrumentation Engineering
With Effective From 2014-2015 Academic Year
Fourth Year B. Tech., (SEMESTER –VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)					Scheme of Examination (Maximum Marks)			No. of Credits
		L	T	P	S	Total	CIE	SEE	Total Marks	
14EI801	Computer Control of Process	4	0	0	0	4	40	60	100	3
14EI802	VLSI Design	4	0	0	1	5	40	60	100	3
14EI803	Elective - IV	4	1	0	0	5	40	60	100	4
14EI804	Elective - V	4	0	0	0	4	40	60	100	3
14EIL801	Verilog HDL Lab	0	0	3	0	3	40	60	100	2
14EIPR802	Project Viva Voce	0	0	12	0	12	50	100	150	10
	TOTAL	**16**	**1**	**15**	1	33	**250**	**400**	**650**	**25**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture S: Self Study T: Tutorial P: Practical

Elective – IV

14EI803/A.	PC Based Instrumentation
14EI803/B.	Telemetry & Tele Control
14EI803/C.	Power Plant Instrumentation
14EI803/D.	Instrumentation in Aerospace and Navigation

Elective -V

14EI804/A.	Neural networks
14EI804/B.	Digital Image Processing
14EI804/C.	Artificial Intelligence
14EI804/D.	Instrumentation in Petro Chemical Industries

Engineering Mathematics – I
(Common for all branches)
I B.Tech – I Semester (Code: 14MA101)

Lectures	4	Tutorial	1	Practical	0	Self Study	0
Continuous Internal Assessment	:	40	Semester End Examination (3 Hours)	:	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

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

UNIT IV

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.

TEXT BOOK:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th 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.

(Common for all branches)
I B.Tech – I Semester (Code: 14PH102)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40	Semester End Examination (3 Hours)	:	60		

UNIT – I

OPTICS:

INTERFERENCE: Coherence, spatial and temporal coherences, interference due to thin films(reflected system), cosine law, anti-reflection coating, Michelson interferometer and its applications, (determination of wavelengths of monochromatic light and resolution of two nearby wavelengths)., Newton's rings theory and applications(determination of wavelength of light, and refractive index of transparent liquid).

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

POLARISATION: Introduction, double refraction,Nicol prism, quarter wave plate, half wave plate, production and detection of circularly and elliptically polarised lights and optical activity, Electro optic effect(Kerr effect),Magneto optic effect(Faraday effect).

UNIT II

LASERS & FIBER OPTICS:

LASERS: Properties of lasers**,** Spontaneous and stimulated emissions, Population inversion, 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, losses in optical fibers, fiber optic communication and its advantages.

UNIT III

ELECTRICITY & MAGNETISM:

Gauss's law in static electricity (qualitative only), Gauss's law of magnetism, circulating charges, Cyclotron-construction, 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, AC circuit containing series LCR circuit-resonance condition and quality factor.

UNIT IV

MODERN PHYSICS:

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

TEXT BOOK:

1. "A Text Book of Engineering Physics", M.N. Avadhanulu, P.G. Kshirasagar, S.Chand& Co.,(Edition – 2013).

REFERENCE BOOKS:

2. "Engineering physics" by R.K.Gour and S.L.Gupta. Dhanpat rai publications.
3. "Basic Engineering Physics" by P.Srinivasa rao & K.Muralidhar,Himalaya publications.
4. "Engineering physics" by M.R.Sreenivasan. New age international publications
5. "Engineering physics" by Palani swamy. Scitech publications

Engineering Chemistry – I
(Common for all branches)
I B.Tech – I Semester (Code: 14CY103)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40	Semester End Examination (3 Hours)	:	60		

UNIT – I

Water Technology:

Characteristics: **Alkalinity** – types of alkalinity and determination (problems); **Hardness** – types and estimation by EDTA method (problems); **Domestic water treatment** – disinfection methods (Chlorination, ozonation, UV treatment); **Boiler feed water** --disadvantages of using hard water in boilers: Scales, Sludges, Caustic embrittlement, boiler corrosion, Priming and foaming; **Internal conditioning** - phosphate, calgon and carbonate methods; **External conditioning** - Ion exchange process, Lime Soda process; **Desalination** of brackish water by electro dialysis and reverse osmosis.

UNIT II

Polymers: Classification, polymerization: types – addition and condensation polymerization; Mechanism of free radical polymerization with suitable example; Polymer Tacticity and Ziegler Natta polymerization (mechanism).

Plastics: Classification; Preparation, properties and uses of PVC, Teflon, Bakelite, Nylon-6, 6.
Rubbers: Natural rubber**,** Vulcanization of rubber; Synthetic rubbers: Buna-S, Buna-N and Poly urethane.

Surface Chemistry: Solid surfaces, types of adsorption, Frendlich and Longmuir adsorption isotherm, Applications of adsorption: Role of adsorbents in catalysis.

UNIT – III

Renewable and Non Renewable Energy Sources:

Thermal and Chemical energy: Introduction to solid fuels; Calorific value (lower, higher) – determination of calorific value (Bomb Calorimeter), Coal ranking, Carbonization of coal (Bee Hive method and Otto-Hoffman by-product method); Proximate and ultimate analysis of coal.

Solar cells-Introduction, Solar Panels, Applications; **Fuel Cells**: Hydrogen – Oxygen Fuel Cell; **Batteries** – Alkaline Battery, Lead – acid, Nicad and Lithium Batteries

UNIT – IV

Engineering Materials:

Refractories: Classification – Acidic, Basic and Neutral refractories; Properties: refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling; Properties and applications 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.

TEXT BOOK:

1. P.C. Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2010), 15th edition.

REFERENCE BOOKS:

1. S.S Dara & Mukkanti K. "A text book of engineering chemistry" S. Chand & Co. Ltd., New Delhi (2006).
2. "Text Books of Engineering Chemistry" by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).
3. B.K. Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
4. B. Sivasankar "Engineering Chemistry" Tata McGraw Hills co., New Delhi (2008).
5. Engineering Chemistry J.C Kuriacase & J.Rajaram, Tata McGraw Hills co., New Delhi 1. (2004).
6. "Chemistry of Engineering Materials" by R.P. Mani and K.N. Mishra, CENGAGE learning.
7. "Applied Chemistry – A test for Engineering & Technology" – Springar (2005).
8. "Text Book of Engineering Chemistry" - Shasi Chawla, Dhanpat Rai publishing company, New Delhi (2008).
9. "Engineering Chemistry" – R. Gopalan, D. Venkatappayya, D.V. Sulochana Nagarajan – Vikas Publishers (2008).

Basic Electrical and Electronics Engineering
(Common for all branches)
I B.Tech – I Semester (Code: 14EE104 / 14EE204)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)		:	60

UNIT – I

Basic Concepts of Electric Circuits: Introduction, Electric Current, Ohm's Law, Work, Power, and Energy, Dynamically Induced EMF and Statically Induced EMF, Self-induced EMF and Mutually Induced EMF, Self-inductance of a Coil, Mutual Inductance, Energy Stored in a Magnetic Field, Electrical Circuit Elements, Energy Stored in a Capacitor, Capacitor in Parallel and in Series.

DC Networks and Network Theorems: DC Network Terminologies, Voltage and Current Sources, Series Parallel Circuits, Voltage and Current Divider Rules, Kirchhoff's Laws, Maxwell's Mesh Current Method, Nodal Voltage Method (Nodal Analysis), Network Theorems (Superposition Theorem, Thevenin's Theorem, Norton's Theorem).

UNIT – II

AC Fundamentals: Introduction, Generation of Alternating Voltage in an Elementary Generator, Concept of Frequency, Cycle, Time Period, Instantaneous Value, Average Value, and Maximum Value, Sinusoidal and Non-sinusoidal Wave Forms, Concept of Average Value and Root Mean Square (RMS) Value of an Alternating Quantity, Analytical Method of Calculation of RMS Value, Average Value, and Form Factor, RMS and Average Values of Half-wave rectified Alternating Quantity, Concept of Phase and Phase Difference.

Transformers: Introduction, Basic Principle and Constructional Details, EMF Equation.

UNIT – III

Semiconductor Devices: Introduction, Review of Atomic Theory, Binding Forces Between Atoms in Semiconductor Materials, Extrinsic Semiconductors, Semiconductor Diodes; Volt-ampere Characteristic of a Diode, An Ideal Diode, Diode Parameters and Diode Ratings, Zener Diode; Zener Diode As Voltage Regulator, Zener Diode As a Reference Voltage, Bipolar Junction Transistors; Working of a n-p-n Transistor, Working of a p-n-p Transistor, Transistor Configurations, Transistor As an Amplifier, Transistor As a Switch, Rectifiers and Other Diode Circuits.

Rectifiers: Introduction, Half-Wave, Full wave Rectifiers and their analysis, Comparison of Half-Wave and Full-Wave Rectifiers.

UNIT – IV

Digital Electronics: Introduction, Number System, Octal Number System, Hexadecimal Number System, Application of Binary Numbers in Computers, Logic Gates, Boolean Algebra, De Morgan's Theorem, Combinational Circuits, Simplification of Boolean Expressions Using De Morgan's Theorem.
Integrated Circuits: Introduction, Fabrication of Monolithic ICs, Hybrid Integrated Circuits, Linear and Digital ICs.

TEXT BOOK: "Basic Electrical and Electronics Engineering", S.K. Bhattacharya, Pearson Publications

REFERENCE BOOKS:

1. "Basic Electrical, Electronics and Computer Engineering", Muthusubramanian R, Salivahanan S and Muraleedharan K A, Tata McGraw Hill, Second Edition, (2006).

2. "Basics of Electrical and Electronics Engineering", Nagsarkar T K and Sukhija M S, Oxford press University Press.

Engineering Mechanics

(Common for all branches)

I B.Tech – I Semester (Code: 14EM105 / 14EM205)

Lectures	4	Tutorial	1	Practical	0	Self Study	0
Continuous Internal Assessment	:	40	Semester End Examination (3 Hours)	:	60		

UNIT – I

Concurrent Forces in a Plane: Principles of statics – composition and resolution of forces – equilibrium of concurrent forces in a plane –Method of moments.

Parallel Forces in a Plane: Two parallel forces – general case of parallel forces in a plane – center of parallel forces – Centroids of composite plane figures and curves-Distributed force in a plane.

General Case of Forces in a Plane: Composition of forces in a plane – Equilibrium of forces in a plane – Plane trusses: methods of joints.

UNIT – II

Forces in space: Concurrent forces in space: method of projections – parallel forces in space.

Friction: Characteristics of friction – problems involving dry friction.

Principle of Virtual Work: Equilibrium of Ideal systems.

UNIT – III

Rectilinear Translation: Kinematics of rectilinear motion – principles of dynamics – Differential equations of rectilinear motion D'Alemberts principle – momentum and impulse – work and energy – ideal systems: conservation of energy.

Curvilinear Translation: Kinematics of curvilinear motion – Differential equations of curvilinear motion – D'Alembert's principle – Work and Energy.

UNIT – IV

Moments of Inertia of Plane Figures: Moment of inertia of a plane figure with respect to an axis in its plane – Moment of Inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem.

Moments of Inertia of Material Bodies: Moment of inertia of rigid body – Moment of inertia of a lamina – Moments of inertia of three – dimensional bodies.

Rotation of a Rigid Body about a Fixed Axis: Kinematics of rotation – Equation of motion for a rigid body rotating about a fixed axis – D'Alembert's principle.

TEXT BOOKS:

1. 'Engineering mechanics" by S. Timoshenko and D. H. Young – Mc Graw-Hill International edition (For concepts and symbolic problems)
2. 'Engineering mechanics statics and dynamics" by A. K. Tayal – Umesh publication, Delhi (For numerical problems using S.I. system of units)

REFERENCE BOOKS:

1. "Vector mechanics for engineers statics and dynamics" by Beer and Johnston, Tata Mc Graw-Hill publishing company, New Delhi
2. "Engineering mechanics statics and dynamics" by R. C. Hibbeler and Ashok Gupta - Pearson (For numerical problems using S.I. system of units)

Problem Solving with Programming

(Common for all branches)

I B.Tech – I Semester (Code: 14CP106 / 14CP206)

Lectures	4	Tutorial	0	Practical	0	Self Study	1
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)		:	60

UNIT – I

Basics and Introduction to C, The C Declarations, Operators and Expressions, Input and Output in C, Decision Statements, 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

Loop Control, Data Structure: Array, 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

Strings and Standard Functions, Pointers, Dynamic Memory Allocation and Linked List: Dynamic Memory Allocation, Memory Models, Memory Allocation Functions.

Functions, Storage Class, 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.

UNIT – IV

Preprocessor Directives: Introduction, The #define Directive, Undefining a Macro, Token Pasting and Stringizing Operators, The #include Directive, Conditional Compilation, The #ifndef Directive.

Structure and Union, Files, 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, sorting a list of names using command line arguments.

TEXT BOOK:

1. Ashok N.Kamthane, "Programming in C", PEARSON 2nd Edition.

REFERENCE BOOKS:

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

Physics Laboratory
(Common for all branches)
I B.Tech – I Semester (Code: 14PHL101 / 14PHL201)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	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. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
11. Draw the load characteristic curves of a solar cell.
12. Determination of Hall coefficient of a semiconductor.
13. Determination of voltage and frequency of an A.C. signal using C.R.O.
14. Determination of Forbidden energy gap of Si &Ge.
15. Determination of wavelength of laser source using Diode laser.

TEXT BOOK:

1. "Engineering physics laboratory manual" P.Srinivasa rao & K.Muralidhar,Himalaya publications.

Hardware Laboratory
(Common for all branches)
I B.Tech – I Semester (Code: 14HWL102 / 14HWL202)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	: 40			Semester End Examination (3 Hours)		:	60

LIST OF EXPERIMENTS

1. Identification and testing of various electronic components. (Resistors, Inductor, Capacitor, Transistor, ICs and Bread board)
2. Study of Oscilloscope, Function generator, Power supply and Multi meter.
3. KCL & KVL verification for simple circuits on Bread board.
4. Study of Ceiling fan.
5. Study of Florescent lamp.
6. Study of Single Phase Transformer.
7. Identifying all parts of computers.
8. Install and Uninstall system and application software.
9. Assembling a Computer.
10. Connecting computers in a network.

Problem Solving with Programming Laboratory
(Common for all branches)
I B.Tech – I Semester (Code: 14CPL103 / 14CPL203)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)		:	60

LIST OF EXPERIMENTS

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) $1 + x^2/2! + x^4 / 4!+$ …upto ten terms
   b) $x + x^3/3! + x^5/5!+$ … 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.
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 student name
    c) To print the names of students
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 students’ records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

Engineering Mathematics – II
(Common for all branches)
I B.Tech – II Semester (Code: 14MA201)

Lectures	4	Tutorial	1	Practical	0	Self Study	0
Continuous Internal Assessment	:	40	Semester End Examination (3 Hours)	:	60		

UNIT – I

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 – II

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.

UNIT – III

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 – 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, 9th edition, John Wiley & Sons.

REFERENCE BOOK:

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

Engineering Physics – II
(Common for all branches)
I B.Tech – II Semester (Code: 14PH202)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	: 40			Semester End Examination (3 Hours)		:	60

UNIT – I

Electron theory of solids & semiconductor physics:

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, concepts of energy band gap and hole.

Semiconductor physics: Classification of semiconductors, density of states, carrier concentration in intrinsic and extrinsic semiconductors, law of mass action, conductivity in semiconductors (drift and diffusion), Equation of continuity, P-N junction diode and its V-I characteristics.

UNIT – II

Magnetic, Dielectric and Ferro-electric materials:

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

Dielectric materials: Types of polarizations, internal field (qualitative), Classius – Mossotti equation, Frequency dependence of polarization, Ferroelectrics and its applications, strength of dielectrics and dielectric breakdown.

UNIT – III

Advanced materials:

Nano-materials: Introduction to nano-materials, surface to volume ratio, quantum confinement, properties of nano materials, Fabrication of nano-materials(CVD and sol-gel methods) , carbon nano tubes and its properties, Applications of nano materials.

Superconductivity: Critical temperature, critical magnetic field and critical current. Meissner effect, type-I and type-II superconductors, attractive interactions, qualitative treatment of BCS theory and, Josephson's junction, Applications of superconductors.

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

UNIT – IV

Analytical techniques:

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 and Ultrasonic imaging.

Industral applications: NDT (Pulse echo technique) and cavitation effect. Time of flight diffraction technique.

Structure determination: Crystal lattices (Bravais), and planes, Miller indices, Bragg's law, structural analysis of crystals using X-Ray powder diffraction method.

TEXT BOOK:

1. "A Text Book of Engineering Physics", M.N.Avadhanulu& P. Krushisagar, S.Chand Publication., (Edition – 2013).

REFERENCE BOOKS:

2. "Engineering physics" by R.K.Gour and S.L.Gupta. Dhanpat rai publications.
3. "Basic Engineering Physics" by P.Srinivasa rao & K.Muralidhar,Himalaya publications.
4. "Engineering physics" by M.R.Sreenivasan. New age international publications.
5. "Engineering physics" by Palani swamy. Scitech publications.

Engineering Chemistry – II

(Common for all branches)

I B.Tech – II Semester (Code: 14CY203)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	60	

UNIT – I

Electro Chemistry:

Electrode potential, Determination of single electrode potential; Nernst equation (problems); Electrochemical series – significance; Electro chemical cells, Reversible and irreversible cells, EMF – measurement of emf, Reference electrodes – Standard Hydrogen electrode, Calomel electrode, Ion selective electrode – glass electrode – measurement of pH; Potentiometric titrations (redox – Fe^{2+} *vs* dichromate, and precipitation – Ag^{+} *vs* Cl^{-} titrations) and Conductometric titrations (acid-base).

UNIT – II

Corrosion and Corrosion Control:

Types of corrosion - Chemical or dry corrosion, Pilling – Bedworth rule; Electrochemical or wet corrosion; Galvanic corrosion, pitting, stress and differential aeration corrosion; factors influencing corrosion; Corrosion control – sacrificial anode method and impressed current cathodic methods, corrosion inhibitors; Protective coatings: Paints – constituents and functions, Metallic coatings – electro plating (Au) and electroless plating (Ni).

Green Chemistry: Introduction, principles of green chemistry; engineering applications.

UNIT – III

Liquid and Gaseous Fuels:

Petroleum based: Petroleum processing and fractions; Cracking – catalytic cracking 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.

Phase rule:

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).

UNIT – IV

Analytical Techniques:

Beer-Lambert's law; Principle, instrumentation (with block diagram) and applications of UV-visible spectroscopy and IR spectroscopy; Estimation of iron by Colorimetry; Flame photometry: principle, instrumentation (with block diagram) and estimation of sodium; Atomic absorption spectroscopy: principle, instrumentation (with block diagram) and estimation of nickel.

TEXT BOOK:

1. P.C. Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2010), 15th edition.

REFERENCE BOOKS:

1. S.S Dara & Mukkanti K. "A text book of engineering chemistry" S. Chand & Co. Ltd., New Delhi (2006).
2. B. Sivasankar "Engineering Chemistry" Tata McGraw Hills co., New Delhi (2008).
3. B.K. Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
4. 'Engineering Chemistry" J.C Kuriacase & J.Rajaram, Tata McGraw Hills co., New Delhi 1. (2004).
5. "Chemistry of Engineering Materials" by R.P. Mani and K.N. Mishra, CENGAGE learning.
6. "Applied Chemistry – A test for Engineering & Technology" – Springar (2005).
7. "Text Book of Engineering Chemistry" - Shasi Chawla, Dhanpat Rai publishing company, New Delhi (2008).
8. 'Engineering Chemistry" – R. Gopalan, D. Venkatappayya, D.V. Sulochana Nagarajan – Vikas Publishers (2008).

Communicative English

(Common for all branches)

I B.Tech – II Semester (Code: 14EL204 / 14EL104)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	60	

UNIT – I

a) Text: (i) *Study Skills for a Successful Semester (*page 5)
(ii) *Concerning the Unknown Engineer* (page 27)

b) Grammar: Parts of Speech, Subject-Verb agreement

c) Vocabulary Development: Vocabulary in the lessons *Study Skills for a Successful Semester and Concerning the Unknown Engineer*

d) Writing Skills: Writing a Good Paragraph with Notes, Writing a cohesive text, clutter free writing.

UNIT – II

a) Text: (i) A Shadow by R.K.Narayanan (page no116)
(ii) Clutter (page no 69)

b) Grammar: Tenses.

c) Vocabulary Development: Vocabulary in the lessons *A Shadow and Clutter.*

d) Writing Skills: Essay Writing.

UNIT – III

a) Text: (i)*Bionics* (pg.no:157)
(ii) *Primping the pump* by Zig Ziglar (Pg.No: 138)

b) Grammar: Auxiliary Verbs, Conditionals, Articles and Determiners.

c) Vocabulary Development: Vocabulary in the lessons *Bionics and primping the pump* by Zig Ziglar.

d) Writing Skills: Letter writing, E-Mail writing

UNIT – IV

a) Text: (i) *Human Cloning* (Pg.no 194)
(ii) *The Stranger within* (Pg.No: 237)

b) Grammar: Voice, Reported Speech, Gerund

c) Vocabulary Development: Vocabulary in the Lessons *Human Cloning* and *the Stranger Within.*

d) Writing Skills: Abstract, Proposal and executive summary writing on Technical basis.

TEXT BOOK: "*Innovate with English*" by T.Samson, First Edition,Cambridge University Press: New Delhi.

REFERENCE BOOKS:

1. "Practical English Usage" by Michael Swan, 3rd Edition, OUP.
2. "Intermediate English Grammar" by Raymond Murphy, CUP.
3. "Study: Reading" by Eric H .Glendinning, 2nd Edition CUP.
4. "Business Correspondence and Report writing" by R.C Sharma, Tata McGrawhill.

Environmental Studies
(Common for all branches)
I B.Tech – II Semester (Code: 14ES205 / 14ES105)

Lectures	4	Tutorial	0	Practical	0	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	60	

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries).

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation.

UNIT – II

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. Forest: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. Water: Uses, floods and drought, Dams - benefits and problems. Energy: Importance of energy, Renewable and Non renewable energy resources.

Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management.

UNIT – III

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting.

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment.

UNIT – IV

Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act. Case Studies: Silent Valley Project, Chipko movement, Narmada Bachao Andolan, Bhopal Tragedy, Mathura Refinery and TajMahal, Chernobyl Nuclear Disaster and Ralegan Siddhi (Anna Hazare).

Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.

TEXT BOOKS:

1. "Environmental Studies" by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. "Comprehensive environmental studies"- JP Sharma, Laxmi Publications.

REFERENCE BOOKS:

1. "Environmental studies", R.Rajagopalan, Oxford University Press.
2. "Introduction to Environmental Science", Anjaneyulu Y, B S Publications
3. "Environmental Science", 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

Engineering Graphics
(Common for all branches)
I B.Tech – II Semester (Code: 14EG206 / 14EG106)

Lectures	4	Tutorial	1	Practical	0	Self Study	1
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	60	

UNIT – I

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures.

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

UNIT – II

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

UNIT – III

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

UNIT – V

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

TEXT BOOK:

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

REFERENCE BOOKS:

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

Chemistry Laboratory

(Common for all branches)

I B.Tech – II Semester (Code: 14CYL201 / 14CYL101)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)	:	60	

LIST OF EXPERIMENTS

1. **Introduction to Chemistry Lab** (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and 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 Active Chlorine Content in Bleaching Powder
   c. Estimation of Mohr's salt by permanganometry.
3. **Analysis of Water:**
   a. Estimation of total hardness of ground water sample by EDTA method
   b. Estimation of Alkalinity of water.
   c. Estimation of Dissolved oxygen in water.
4. **Estimation of properties of oil**:
   a. Estimation of Acid Number
   b. Estimation of Saponification value
5. **Preparations:**
   a. Preparation of Soap
   b. Preparation of Urea-formaldehyde resin
   c. Preparation of Phenyl benzoate
6. **Demonstration Experiments (Any two of the following):**
   5.1 Determination of dissociation constant of weak acid by pH meter.
   5.2 Determination of conductivity of given sample by conductometer
   5.3 Determination of Mohr's salt/Iron by potentiometric method

TEXT BOOKS:

1. "Practical Engineering Chemistry" by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

REFERENCE BOOK:

1. "Text Book of engineering chemistry" by R.N. Goyal and Harrmendra Goel.
2. "A Text book on experiments and calculations- Engineering Chemistry". S.S. Dara.
3. "Instrumental methods of chemical analysis", Chatwal, Anand, Himalaya Publications.

English Communication Skills Laboratory
(Common for all branches)
I B.Tech – II Semester (Code: 14ELL202 / 14ELL102)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	: 40			Semester End Examination (3 Hours)		:	60

UNIT – I

Communication Skills: Introduction to Communication, differences between communication and communication skills, Types of communication: Verbal and Non-Verbal, Barriers to communication, LSRW Skills.

UNIT – II

Functional English: Small talk, Conversation Starters, Greeting, Parting, Offering, Requesting, Daily activities, Asking about activities, General activities, Meeting at Railway Station, Asking Questions at railway station, Getting Information at Airport, Asking Directions, Finding one's way, Asking about busses, Travelling by Bus, Going by Taxi, Taking A Trip by Car, Arriving Early or Late, Using the Telephone, Getting Help in stores, Going Shopping, Talking about shopping, Shopping for Clothes, Asking about Prices, Talking About money, Shopping for Groceries, Talking about eating, Ordering food, Personal Health and Common health problems, At the Doctor's office.

UNIT – III

Phonetics (Oral drills), British English and American English, Stress and Rhythm, intonation

UNIT – IV

Vocabulary Development: Classified Vocabulary, Word Roots, Prefixes and Suffixes Idioms (100) and Phrasal verbs (100), Homonyms, Homophones, Homographs and Eponyms and One word Substitutes.

UNIT – V

Oratory Skills: JAM, Elocution

UNIT – VI

Manners and Etiquette: Giving & Receiving Feedback, Telephone &E-mail Etiquettes, and Gender Sensitive Language, Discussion forum, web notes.

REFERENCE BOOKS:

1. **New Interchange**, 3rd Edition by Jack C Richards, Cambridge University Press.
2. **English Conversation Practice** by Grant Taylor, Mc Graw Hill
3. **English Vocabulary in Use** by Micheal Mc Carthy, Felicity O dell.

Software:

Buzzers for conversations, New Interchange series.
English in Mind series, telephoning in English.
Speech Solutions, A course in Listening and Speaking.
Face to Face series.

Workshop

(Common for all branches)

I B.Tech – II Semester (Code: 14WSL203 / 14WSL103)

Lectures	0	Tutorial	0	Practical	3	Self Study	0
Continuous Internal Assessment	:	40		Semester End Examination (3 Hours)		:	60

LIST OF EXPERIMENTS

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

MATHEMATICS – III

II B.Tech –III Semester (Code: **14EI 301/ 14MA 301**)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

Fourier Integrals: From Fourier series to 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 ints inverse, Linearity, Fourier transform derivatives and convolution.

UNIT -I I

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

Numerical Methods in General: introduction, solution of equation 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, and error of Simpson's rule.

UNIT – IV

Numerical Methods in Linear Algebra : linear systems: Gauss elimination method, LU factorization, Gauss-Seidel method, method of least squares, method of first order differential equations: Euler's method, Runge -Kutta methods, Method of Elliptic Partial Differential Equations: Laplace equation, Poison equation.

TEXT BOOKS:

1. Advanced Engineering Mathematics by Erwin Krezig, 9th Edition , John Wiely & Sons.

REFERENCE BOOKS:

1. Advanced Engineering Mathematicvs by Peter V. O'Neil, Thomsons Books/Cole.

DATA STRUCTURES USING C (14 EI 302)

II B.Tech –III Semester (Code: **14EI 302**)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT I

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

Linked Lists: Concepts of linked lists, operations performed on singly linked list, doubly linked list, circular linked list.

UNIT II

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

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

UNIT III

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

UNIT IV

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

TEXT BOOK:

1. Data Structures using C by Kashi Nath Dey and Samir Kumar Bandyopadhyay Pearson Education India, 2009

REFERENCE BOOKS:

1. Data Structures using C by E Balagurusamy, Tata McGraw-Hill Education,2013
2. Data Structures using C by Krishnamoorthy, Tata McGraw-Hill Education.,2010
3. Data Structures and Algorithm Analysis in C , Second Edition, Mark Allen Weiss, Pearson Edition, 2006.

ELECTRONIC DEVICES

II B.Tech –III Semester (Code: **14EI 303**)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT- I

Transport Phenomena in Semiconductors: Mobility and Conductivity, Electrons and holes in an Intrinsic Semi conductors, Donor and Acceptor impurities, Charge densities in a Semi conductor, Hall effect, Generation and Recombination of Charges, Diffusion, Continuity Equation, Injected Minority Carrier charge, The potential variation within a Graded Semiconductor, Energy Density, Fermi Dirac Function, Carrier Concentrations in an Intrinsic semiconductor, Fermi level in Intrinsic and Extrinsic Semiconductors, Band structure of an open circuit p-n junction, Basic Semiconductor equations.

UNIT- II

Junction Diode Characteristics: The Open circuited P N Junction, The p-n Junction as a Rectifier, The Current components in p-n Diode, The p-n diode Volt-Ampere equation, The Temperature Dependence of p-n characteristics, Diode Resistance(Static and Dynamic), Space Charge Capacitance, Diffusion Capacitance.

Special Diodes: Varactor Diode, Break Down diodes, Tunnel Diode, V-I characteristics of tunnel diode with the help of Energy Band Diagrams, Photo Diode, Light emitting diode.

UNIT- III

Transistors Characteristics: The Junction transistor, Transistor current components, Transistor as an amplifier, Common Base Configuration, Common Emitter Configuration, CE cutoff region, CE Saturation region, CE current gain, Common Collector Configuration, Photo Transistor.

Field Effect Transistors:

The Junction Field Effect Transistor, Pinch-Off voltage, JFET V-I Characteristics, FET Small signal model, Metal-Oxide-Semiconductor FET.

UNIT-IV

Transistor Biasing and Thermal Stabilization : Operating point, Bias Stability, Self Bias, Stabilization against variations in I_{CO}, V_{BE},, and β, Bias Compensation, Thermistor and Sensistor compensation, Thermal runaway, Thermal stability.

PNPN and Other Devices: SCR, DIAC, TRIAC, UJT, and The Phototransistor (their characteristics only).

TEXT BOOKS

1. Integrated Electronics-Jacob Millman, Chritos C. Halkies,Tata Mc-Graw Hill, 2009.
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, Tata McGraw Hill, Second Edition.

REFERENCE BOOKS

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-Graw Hill.
2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, 8th Edition, PHI,2003.

ELEMENTS OF MECHANICAL ENGINEERING

II B.Tech –III Semester (Code: **14EI 304**)

Lectures: 4 Tutorial: 0 Practical: 0 Self Study: 0

Continuous Internal Assessment: 40 Semester End Examination (3 Hours): 60

UNIT – I

METROLOGY:

Standards of measurement: system of measurement, Imperial standard meter, line and end standards

Linear measurement: linear measurement Instrument, steel rule, calipers, surface plates, slip gauges

Comparators: Need of comparator, basic principle of operation, classification of comparators-sigma comparator & Pneumatic comparator.

Angular measurements: Instruments for Angular measurement: vernier bevel Bevel protractor, Universal bevel protractor, sine bar

UNIT – II

POWER TRANSMISSION:

Drives: Belts, expression for the ratios of tensions on the slack and tight side, power Transmitted, V-belts, chain drives.

Gears: Spur, helical, Bevel gear trains – simple and compound.

Bearings: Purpose of bearings, slipper bearing, thrust bearing, ball and roller bearings.

Couplings: Flange, flexible couplings, hooks joint, universal coupling.

(Qualitative treatment only)

UNIT – III

THERMODYNAMICS:

Basic Concepts, equilibrium, Zeroth Law and First Law Of thermodynamics definitions and steady flow processes and applications, 2nd Law statements, reversibility, Carnot's Theorem, concept of entropy

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. M. Mahajan , A text book of Metrology, Dhanpat Rai & Co Publications
2. K.P Roy & SKH Choudary , Elements of mechanical Engineering-.
3. P.K.NAG Engineering Thermodynamics ,TMH
4. RK Bansal, Fluid Mechanics and Hydraulic Machines, 8th Ed, Lakshmi Pub.,

DIGITAL ELECTRONICS

II B.Tech –III Semester (Code: **14EI 305**)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

Binary Systems: Complements: The r's complement, The (r-1)'s complement, subtraction using method of complements. **Binary codes:** Decimal codes, Reflected code, Error detecting codes, Alphanumeric codes.

Sign magnitude representation: Signed Magnitude form, Signed 1's complement form, Signed 2's complement form.

Boolean Algebra and Logic Gates: Basic definitions, Axiomatic definitions of Boolean algebra, Basic Theorems and properties of Boolean algebra, Boolean functions. Canonical and standard forms, Digital Logic gates.

UNIT – II

Simplification of Boolean Functions: The map method, Two-and Three-variable Maps, Four variable Maps, Five variable Maps, POS simplification, NAND and NOR implementation, Other Two-level implementations, Don't care conditions, The Tabulation Method, Determination of prime-implicants, Selection of prime –implicants.

Combinational Logic: Introduction, Design procedure, Adders, Subtractors, Code conversion, Multilevel NAND circuits, Multilevel NOR circuits, EX-OR and EX-NOR circuits.

UNIT – III

Combinational Logic with MSI and LSI: Binary parallel adder, Carry propagation, Decimal adder, Magnitude comparator, Decoders, Demultiplexers, Encoders, Multiplexers.

Sequential Logic: Flip-flops, Triggering of Flip-Flops, Analysis of clocked Sequential Circuits, state reduction and assignment, Flip-Flop excitation tables, Conversions of Flip-Flops, Design of Sequential circuits.

UNIT – IV

Registers, Counters and Memory Unit: Registers, shift registers, Ripple counters, Synchronous counters.

Digital Integrated Circuits: Introduction, Characteristics of logic families, RTL and DTL circuits , I^2 L, TTL, MOS, CMOS Logic families.

Programmable Logic Devices: PLA, PAL, ROM.

TEXT BOOK:

1. Digital Logic and Computer Design, M Morris Mano, PHI/Pearson Education, 2003.

REFERENCE BOOKS:

1. Digital Integrated Electronics, Taub and Schilling, Mc-Graw Hill, 1977.
2. Fundamental of Digital Circuits, A.Anand Kumar, Pearson Education, 4th Edition.

CIRCUIT THEORY (14 EI 306)

II B.Tech –III Semester (Code: **14EI 306**)

Lectures: 4 Tutorial: 1 Practical: 0 Self Study: 1

Continuous Internal Assessment: 40 Semester End Examination (3 Hours): 60

UNIT-I

Voltage and current Laws: Introduction, nodes, paths, loops and branches, Kirchhoff's current and voltage laws, series and parallel connected sources, resistors in series and parallel, voltage and current division.

Basic Nodal and Mesh Analysis: Nodal analysis, The super node, Mesh analysis, The super mesh, Nodal vs. Mesh analysis: A comparison.

Network Topology: Introduction, formation of Incidence matrix, Tieset matrix formation, Cutset matrix formation.

UNIT II

Useful circuit analysis techniques: Linearity and superposition, source transformations, Thevenin and Norton equivalent circuits, maximum power transfer Theorem , Reciprocity Theorem Millman's Theorem ,Compensation Theorem , delta-wye conversion, selecting an approach: A comparison of various techniques.

Basic RL and RC Circuits: The source free RL circuit, properties of the exponential response, the source free RC circuit, driven RL circuits, natural and forced response, driven RC circuits.

UNIT III

The RLC Circuit: The source free Parallel circuit, The over damped Parallel RLC circuit, Critical damping, The under damped parallel RLC circuit, The complete response of the RLC circuit

Sinusoidal steady state Analysis: Characteristics of sinusoids, forced response to sinusoidal functions, the complete forcing function, the phasor, phasor relationships for R, L and C, impedance, admittance, phasor diagrams.

AC circuit Power analysis: Instantaneous power, average power, effective values of current and voltage, apparent power and power factor, complex power, comparison of power terminology.

UNIT IV

Complex frequency and the Laplace transform: complex frequency, the damped sinusoidal Forcing function, Definition of the Laplace Transform, Laplace transform of simple time functions, inverse transform techniques, basic theorems for the Laplace transforms, initial and final value theorems.

Frequency Response: Parallel Resonance, Bandwidth and High Q circuits, Series resonance, other resonant forms, scaling.

TEXT BOOK:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 7th Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. Circuits & Networks: Analysis and Synthesis, A.Sudhakar and Shyammohan S.Pilli, Tata McGraw Hill , 2007
2. Network Analysis, M.E.Vanvalkenburg, 3rd Edition, PHI, 2003.

DATA STRUCTURES Lab

II B.Tech –III Semester (Code:**14 EIL 301**)

Lectures: 0 Tutorial: 0 Practical: 3 Self Study: 0
Continuous Internal Assessment: 40 Semester End Examination (3 Hours): 60

LIST OF LAB PROGRAMS

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

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

ELECTRONIC DEVICESS Lab

II B.Tech –III Semester (Code:**14 EIL 302**)

Lectures: 0 Tutorial: 0 Practical: 3 Self Study: 0
Continuous Internal Assessment: 40 Semester End Examination (3 Hours): 60

LIST OF LAB EXPERIMENTS

1. Characteristics of Silicon and Germanium diodes.

2. Characteristics of Zener diode and its regulation characteristics.

3. Characteristics of BJT in Common Base configuration.

5. Characteristics of BJT in Common Emitter configuration.

6. Characteristics of Emitter follower circuit.

7. Output and Transfer Characteristics of JFET.

8. Characteristics of UJT.

9. Design and verification of self bias circuit for BJT.

10. Design and verification of collector to base bias circuit for BJT.

11. Design and verification of Fixed bias circuit for BJT.

12. Voltage Regulator using BJT.

13. Characteristics of SCR.

14. Study of CRO.

15. Characteristics of Triac.

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

DIGITAL ELECTRONICS Lab

II B.Tech –III Semester (Code:**14 EIL 303**)

Lectures: 0 Tutorial: 0 Practical: 3 Self Study: 0
Continuous Internal Assessment: 40 Semester End Examination (3 Hours): 60

LIST OF LAB EXPERIMENTS

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 Subtractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Encoders like 4:2 and 8:3 encoder.
6. Design of Decoders like BCD – Decimal decoder.
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

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

ENGINEERING MATHEMATICS-IV

II B.Tech., IV SEMESTER (CODE: 14MA401)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

Complex numbers and functions: Introduction to Complex Numbers, Complex Plane, Polar form of Complex numbers, Powers and roots, Derivative, Analytic Function, Cauchy - Riemann Equations, Laplace's equation.

Complex Integration: Cauchy's Integral Theorem, Cauchy's Integral Formula.

UNIT – II

Taylor, Laurent series and Residue Integration: Taylor Series (without proof) and Maclaurin series, Laurent Series(without proof), singularities and zeros, infinity, Residue Integration method, Evaluation of real integrals.

UNIT – III

Probability Densities: Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Joint Distributions, Discrete and Continuous.

Sampling Distribution: Populations and Samples, Sampling Distribution of the Mean (σ known), Sampling Distribution of the Mean (σ Unknown), Sampling Distribution of the Variance.

UNIT – IV

Inferences Concerning Means: Point Estimation, Interval Estimation, Tests of Hypotheses, Null Hypotheses and significance of tests, Hypotheses Concerning one Mean, Inferences Concerning Two Means.

Inferences Concerning Variances: Estimation of Variances, Hypotheses Concerning One Variance, Hypotheses Concerning Two Variances.

Inferences Concerning Proportions: Estimation of Proportions, Hypotheses Concerning One Proportion

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 9th Edition, John Wiley, 2000.
2. Miller & Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 8th Edition, PHI.

REFERENCE BOOK:

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

ELECTRONIC CIRCUITS-1

II B.Tech., IV SEMESTER (CODE: 14EI402)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

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

BJT AT LOW FREQUENCY: Transistor Hybrid model, Determination of h parameters from Characteristics, 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

UNIT-II

FET AT LOW FREQUENCY: FET small signal model, CS / CD / CG configurations at low frequencies

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.

TEXT BOOKS:

1.S.Salivahanan and N.Suresh Kumar, Electronic Devices and Circuits, 3rd Edition, TMH,2012.

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

REFERENCE BOOK:

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

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

ELECTRICAL TECHNOLOGY

II B.Tech., IV SEMESTER (CODE: 14EI403)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

MICROPROCESSROS AND INSTERFACING

II B.Tech., IV-SEMESTER (CODE: 14EI404)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 1
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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, interface Microprocessor to keyboards.

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

UNIT – IV

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

TEXT BOOKS:

1. Microprocessor and Interfacing by Duglus V. Hall, TMH Edition.
2. Microprocessor and Interfacing by Nagurkani , Pearson edition

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.

ELECTRICAL & ELECTRONIC MEASUREMENTS

II B.Tech.,IV SEMESTER (CODE: 14EI405)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

SIGNALS AND SYSTEMS

II B.Tech.,IV SEMESTER (CODE: 14EI406)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

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.

ELECTRONIC CIRCUITS-1 LAB

II B.Tech.,IV SEMESTER (CODE: 14EIL401)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

List of Lab Experiments

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

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

MEASUREMENTS LAB

II B.Tech.,IV SEMESTER (CODE: 14EIL402)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

List of Lab Experiments

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. Design and Development of Regulated Current Source
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.

MICROPROCESSOR AND INTERFACING LAB

II B.Tech.,IV SEMESTER (CODE: 14EIL403)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

LINEAR INTEGRATED CIRCUITS

III B.Tech., V SEMESTER (CODE: 14EI501)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

LINEAR CONTROL SYSTEMS

III B.Tech., V SEMESTER (CODE: 14EI502)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

ELECTRONIC CIRCUITS - II

III B.Tech., V SEMESTER (CODE: 14EI503)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

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

UNIT – II

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

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

UNIT – III

MULTISTAGE AMPLIFIERS:

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

UNIT – IV

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

TEXT BOOKS:

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

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

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

REFERENCE BOOK:

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

ANALOG AND DIGITAL COMMUNICATIONS
III B.Tech., (SEMESTER – V) -SUB CODE: 14EI504

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 1
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

TRANSDUCERS

III B.Tech., V SEMESTER (CODE: 14EI505)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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)

PULSE AND SWITCHING CIRCUITS

III B.Tech., V SEMESTER (CODE: 14EI506/A)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

ELECTROMAGNETIC FIELD THEORY

III B.Tech., V SEMESTER (CODE: 14EI506/B)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

COMPUTER ORGANIZATION

III B.Tech., V SEMESTER(CODE: 14EI506/C)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT I

BASIC STRUCTURE OF COMPUTERS

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions andinstruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC. ALU design – Fixed point and floating point operations.

UNIT II

BASIC PROCESSING UNIT

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT III

PIPELINING

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

UNIT IV

MEMORY SYSTEM

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

I/O ORGANIZATION -Accessing I/O devices – Programmed Input/Output -Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill, 2002.

REFERENCES:

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, Third Edition, Elsevier, 2005.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Sixth Edition, Pearson Education, 200UNIT III
3. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998.
4. V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2004.

OOPS AND OPERATING SYSTEMS

III B.Tech., V SEMESTER (CODE: 14EI506/D)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

TRANSDUCERS LAB

III B.Tech., V SEMESTER (CODE: 14EIL501)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

PULSE AND INTEGRATED CIRCUITS LAB

III B.Tech., V SEMESTER (CODE: 14EIL502)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

PSPICE & Signals Simulation LAB

III B.Tech., (SEMESTER – V) -SUB CODE: 14EIL503

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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 using MATLAB

7. Verification of Fourier series & Fourier transform.
8. Linear convolution and Circular convolution.
9. Simulation of Amplitude Modulation.
10. Simulation of Frequency modulation
11. Simulation of LPF
12. Simulation of HPF
13. Correlation of two signals.

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

PROFESSIONAL ETHICS AND HUMAN VALUES

III B.Tech., VI SEMESTER (CODE: 14EI601)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

INDUSTRIAL INSTRUMENTATION

III B.Tech., VI SEMESTER (CODE: 14EI602)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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. Principles of Measurement systems (PHI) *Author:* Allan s Morris
2. A.K.Sawheny Electrical & Electronic Measurements and Instrumentation Dhanpath Rai)
3. JB Guptha Electrical & Electronic Measurements and Instrumentation, S.K. Kataria
4. Introduction to Instrumentation and Control (PHI) *Author:* A.K.Ghosh.

DIGITAL SIGNAL PROCESSING

III B.Tech., VI SEMESTER (CODE: 14EI603)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 1
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

PROCESS CONTROL

III B.Tech., VI SEMESTER (CODE: 14EI604)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

OBJECT ORIENTED PROGRAMMING WITH JAVA

III B.Tech., VI SEMESTER (CODE: 14EI605)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

UNIT-III

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

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

UNIT-IV

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

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

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.

ADAPTIVE CONTROL SYSTEMS

III B.Tech., VI SEMESTER (CODE: 14EI606/A)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

Text Books:

1. Goodwin G.C. and Sin K.S. Jersey,, “Adaptive filtering, prediction and control”, Prentice Hall, inc., 1984.
2. Mendel J.M., Marcel, Dekker, “Discrete techniques of parameter estimation”, New York, 1994.

Reference Books:

1. Hsia T.C.H.A., “System Identification”, Lexington books, 1974.
2. Harris C.J. and Billings S.A. Peter ,“Self Tuning and Adaptive control”, Peregnius Ltd., 1984.

ADVANCED COMPUTER ARCHITECTURES

III B.Tech., VI SEMESTER (CODE: 14EI606/B)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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. Hardback,2005,

ISBN: 9780195154559.

Reference books:

1.Advanced Computer Architecture and computing by S.S.Jadhav,second reviced edition,2009,Technical Publications,Pune.

2.Advanced Computer Architecture,2nd Edition,Kai Hwang,Jotwani,TMH,ISBN-9780070702103.

PROGRAMMABLE LOGIC CONTROLLERS

III B.Tech., VI SEMESTER (CODE: 14EI606/C)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

EMBEDDED SYSTEMS

III B.Tech., VI SEMESTER (CODE: 14EI606/D)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT - I

Introduction, Microcontrollers and microprocessors, History of Micro controllers ,Microprocessors, Embedded versus External Memory Devices, CISC& RISC processors, 8051 Microcontrollers , MCS-51 Architecture, Registers in MCS-51, Pin configuration, Parallel I/O ports, Memory Organization, addressing modes and Instructions.

UNIT – II

8051 Addressing Modes, Instruction Set, 8051 simple programs ,8051 interrupts ,Timers/Counters&Serial Communication.

UNIT – III

Atmel Microcontrollers, Pin description of 89C51, Design with Microcontrollers, Applications of 8951 ,Square wave generator, PulseWidth Modulation.

UNIT – IV

PIC CONTROLLERS :- Overview & features, PIC reset Actions,PIC oscillator connections, PIC Memory Organization. PIC16C6x/7x Instructions, Adressing modes, I/O Ports, Interrupts in PIC 16c61/71

TEXT BOOKS:

1.Microcontrollers: Theory & Applications by ” AJAY V.DESHMUKH”.TMH ,ISBN-0070585954

2.The 8051 Microcontroller and Embedded Systems using Assembly language and C ,2nd edition, Mazidi,Pearson Education,ISBN-9788731710265.

REFERENCE BOOKS:

1.8051 Microcontroller by Kenneth J. Ayala, 3rd edition,Thomson publishers.

2.Embedded Systems by B.Kanta Rao,PHI Learning,2011,ISBN-9788120340817.

SOFTSKILLS LAB

III B.Tech., VI SEMESTER (CODE: 14EIL601)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

1. **BODY LANGUAGE**
   a. Facial Expressions.
   b. Kinesics.
   c. Oculesics.
   d. Haptics.
   e. Proxemics.
   f. Para Linguistics.
2. **LIFE SKILLS**
   a. Positive Attitude
   b. Social Behaviour &Social Norms.
   c. Ethics, Values and Positive Work Ethics.
   d. Time Management
   e. Goal Setting, Vision, Mission.
3. **EMOTIONAL INTELLIGENCE**
   a. Self Awareness through Johari Window and SWOT analysis.
   b. Self Control.
   c. Self Motivation.
   d. Empathy.
   e. Social Skills.
   f. Self Esteem.
   g. Managing stress.
   h. Assertiveness.
4. **PROBLEM SOLVING SKILLS**
   a. Critical Thinking and Brain Storming
   b. Lateral Thinking and Six Thinking Hats.
   c. Creative Thinking.
   d. Conflict Management.
5. **EMPLOYABILITY SKILLS**
   a. Group Discussion.
   b. Team Building and Leadership Qualities
   c. Interview Skills.

RFFERENCE BOOKS:

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

PROCESS CONTROL LAB

III B.Tech., VI SEMESTER (CODE: 14EIL602)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

DSP AND OOPS LAB

III B.Tech., VI SEMESTER (CODE: 14EIL603)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

OOPS LAB USING JAVA

1. **a)**Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c anduse the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no realsolutions.

b) The Fibonacci sequence is defined by the following rule:The fist two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it.Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonaccisequence.

2 a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

b) Write a Java program to multiply two given matrices.

c) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers(Use StringTokenizer class of java.util)

3 a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

b) Write a Java program for sorting a given list of names in ascending order.

c) Write a Java program to make frequency count of words in a given text.

4 a) Write a Java program that reads a file name from the user, then displays information about whether the file exists,whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file.

5 a) Write a Java program that:i) Implements stack ADT.ii) Converts infix expression into Postfix formiii) Evaluates the postfix expression

6 a) Develop an applet that displays a simple message.

b) Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it inanother text field, when the button named “Compute” is clicked.

7 Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the+, -,*, % operations. Add a text field to display the result.

8 a) Write a Java program for handling mouse events.

9 a) Write a Java program that creates three threads. First thread displays “Good Morning” every one second, thesecond thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter threadcommunication.

10 Write a program that creates a user interface to perform integer divisions. The user enters two numbers in thetextfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button isclicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 wereZero, the program would throw an ArithmeticException Display the exception in a message dialog box.

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

INDUSTRIAL MANAGEMENT and ENTREPRENEURSHIP DEVELOPMENT

IV B.Tech., VII SEMESTER (CODE: 14EI701)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

BIOMEDICAL INSTRUMENTATION

IV B.Tech., VII SEMESTER (CODE: 14EI702)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

ANALYTICAL INSTRUMENTATION

IV B.Tech., VII SEMESTER (CODE: 14EI703)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

REFERENCE BOOKS:

4. Mann C.K., Vicker T.J. & Gullick W.H. – Instrumental Analysis, Harper and Row Publishers.

OPTO ELECTRONICS AND LASER INSTRUMENTATION

IV B.Tech., VII SEMESTER (CODE: 14EI704)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

ROBOTICS AND AUTOMATION

IV B.Tech., VII SEMESTER (CODE: 14EI705/A)

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

ADVANCED SENSORS

IV B.Tech., VII SEMESTER (CODE: 14EI705/B)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

COMPUTER NETWORKS

IV B.Tech., VII SEMESTER (CODE: 14EI705/C)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

WIRELESS SENSORS NETWORKS

IV B.Tech., VII SEMESTER (CODE: 14EI705/D)

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

UNIT – I

OVERVIEW OF WIRELESS SENSOR NETWORKS

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks. Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT – II

NETWORKING SENSORS

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing,Geographic Routing.

UNIT – III

INFRASTRUCTURE ESTABLISHMENT

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT – IV

SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Text Books

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

OPEN ELECTIVE

INDUSTRIAL POLLUTION & CONTROL
14OE706/ChE01

Lectures	:	4 Periods/Week, 0 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.

ENERGY ENGINEERING
14OE706/ChE 02

Lectures	:	4 Periods/Week, 0 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.

AIR POLLUTION AND CONTROL
14OE706/CE01

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.

REMOTE SENSING AND GIS
14OE706/CE02

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.

DATABASE MANAGEMENT SYSTEMS

14OE706/CS01

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, 3rdEdition.
3. "Data base System Concepts", Silberschatz, Korth, McGraw hill, 5th edition.

JAVA PROGRAMMING
14OE706/CS02

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 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

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

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

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:

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

OPTIMIZATION TECHNIQUES
14OE706/EE01

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.

NON-CONVENTIONAL ENERGY SOURCES
14OE706/EE02

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.

CONSUMER ELECTRONICS
14OE706/EC01

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.

EMBEDDED SYSTEMS
14OE706/EC02

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.

VIRTUAL INSTRUMENTATION USING LABVIEW
14OE706/EI01

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.

SENSORS and TRANSDUCERS
14OE706/EI02

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.

WEB PROGRAMMING
14OE706/IT01

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

UNIT – I

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

UNIT - II

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

UNIT – III

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

UNIT - IV

Servlets and Java Server Pages.

TEXT BOOK:
Harvey M. Deitel and Paul J. Deitel,"Internet & World Wide Web How to Program", 4/e,Pearson Education.

REFERENCE BOOKS:
Jason Cranford Teague, "Visual Quick Start Guide CSS, DHTML &AJAX", 4e, Pearson Education.
Tom NerinoDoli smith, "JavaScript & AJAX for the web", Pearson Education 2007.
Joshua Elchorn, "Understanding AJAX", Prentice Hall 2006.
Marty Hall, Larry Brown, "Core Servlets and JavaServer Pages™: Volume 1: Core Technologies", 2nd Edition, Prentice Hall.

MOBILE APPLICATION DEVELOPMENT
14OE706/IT02

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

UNIT – I

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

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

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

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

UNIT – II

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

Strings: Exploring the String class.

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.

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

UNIT – III

Introduction: 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 & Email: Sending SMS & e-mail.
Working with Location: Obtaining the location of mobile using GPS and A-GPS, Displaying the Location on Maps.
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 &II)
2. Beginning Android application development, Wei-Meng Lee, Wiley Publishing Inc.(for UNIT - III & IV)

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.

ROBOTICS
14OE706/ME 01

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.

POWER PLANT ENGINEERING

14OE706/ME02

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.

AUTOMATION TECHNOLOGY
14OE706/BR01

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

BUSINESS COMMUNICATIONS and PRESENTATION SKILLS LAB

IV B.Tech., VII SEMESTER CODE: 14EIL701

Lectures: 0	Tutorial: 0	Practical: 2	Self Study: 0
Continuous Internal Assessment: 20		Semester End Examination (3 Hours): 30	

UNIT-I

Identity Management Communication: – Face to Face Impression Management & Mediated Communication (Self Introduction & Self Promoting– Over Stating and Under Stating – Strategies to Overcome Communicative Inhibitions – Creating Positive Self-image through words - Appearance- Verbal and Non Verbal Manners) – Giving Polite Yet Assertive Responses – Responsive strategies to handle criticism - Accepting Failure and Declaring Success.

UNIT-II

Business Presentations:– Oral and Power Point Presentations; Preparing Successful Presentations; Assessing Audience, Making Effective Use of Visual Aids, Delivering Presentation, Using Prompts, Handling With Questions and Interruptions, Mock Presentations.

UNIT-III

Oratory Skills: –Advanced Group Discussion skills, Extempore, Mock Parliament and Mock Press.

UNIT-IV

Interview Management: – Resume Preparation, Types of Interviews, Preparing For Interviews, Facing Interviews, Handling Tough & Tricky Questions, Reviewing Performance, Participating In Mock Interviews.

REFERENCES:

1. "Personality Development and Soft Skills", Barun K.Mitra, Oxford University Press, Delhi:2007
2. Technical Communication Principles and Practices, Meenakshi Raman, Sangeeta Sharma: OUP: 2011.

ADVANCED INSTRUMENTATON and BIOMEDICAL INSTRUMENTATON LAB

IV B.Tech., VII SEMESTER (CODE: 14EIL702)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

ADVANCED INSTRUMENTATION LAB

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

BIOMEDICAL 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.

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

VIRTUAL INSTRUMENTATION LAB

IV B.Tech., VII SEMESTER (CODE: 14EIL703)

Lectures: 0	Tutorial: 0	Practical: 3	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

1. Basic arithmetic operations

2. Boolean operations

3. Sum of 'n' numbers using 'for' loop

4. Factorial of a give number using 'for 'loop

5. Sum of 'n' natural numbers using 'while' loop

6. Factorial of a give number using 'while' loop

7. Sorting even numbers using 'while' loop in an array

8. Array maximum and minimum

9. Bundle and unbundle cluster

10. Flat and stacked sequence

11. Application using formula node

12. Median filter

13. Discrete cosine transform

14. Convolution of two signals

15. Windowing technique

16. Instrumentation of an amplifier to acquire an ECG signal

17. Acquire, analyse and present an EEG using virtual instrumentation

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

TERM PAPER

IV B.Tech., VII SEMESTER (CODE: 14EIL704)

Lectures: 0	Tutorial: 0	Practical: 2	Self Study: 0
Continuous Internal Assessment: 20		Semester End Examination (3 Hours): 30	

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

COMPUTER CONTROL OF PROCESS

IV B.Tech., VIII SEMESTER CODE: 14EI801**)**

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

VLSI DESIGN

IV B.Tech., VIII SEMESTER CODE: 14EI802

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

PC BASED INSTRUMENTATION

IV B.Tech., VIII SEMESTER CODE: 14EI803/A

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

TELEMETRY AND TELECONTROL

IV B.Tech., VIII SEMESTER CODE: 14EI803/B

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

POWER PLANT INSTRUMENTATION

IV B.Tech., VIII SEMESTER CODE: 14EI803/C

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

INSTRUMENTATION IN AEROSPACE AND NAVIGATION

IV B.Tech., VIII SEMESTER CODE: 14EI803/D

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS

IV B.Tech., VIII SEMESTER CODE: 14EI804/A

Lectures: 4	Tutorial: 1	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

DIGITAL IMAGE PROCESSING

IV B.Tech., VIII SEMESTER CODE: 14EI804/B

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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.

ARTIFICIAL INTELLIGENCE

IV B.Tech., VIII SEMESTER CODE: 14EI804/C

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

INSTRUMENTATION IN PETRO CHEMICAL INDUSTRIES

IV B.Tech., VIII Semester Code: 14EI804/D

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 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

VERILOG & HDL Lab

IV B.Tech., VIII SEMESTER CODE: 14EIL801

Lectures: 4	Tutorial: 0	Practical: 0	Self Study: 0
Continuous Internal Assessment: 40		Semester End Examination (3 Hours): 60	

VERILOG HDL

1. LOGIC GATES
2. ADDERS
    a) HALF ADDER
    b) FULL ADDER
    c) FULL ADDER USING TWO HALF ADDERS
3. SUBTRACTORS
    a) HALF SUBTRACTOR
    b) FULL SUBSTRACTOR
    c) FULL SUBSTRACTOR USING TWO HALF SUBTRACTORS
4. MULTIPLEXERS
    a) 2 X 1 MUX
    b) 4 X 1 MUX
    c) 8 X 1 MUX
    d) 16 X 1 MUX
5. DECODERS
    a) 2 TO 4 DECODER
    b) 3 TO 8 DECODER (IC 74138)
    c) 4 TO 16 DECODER USING TWO 74138s.
6. COMPARATOR
7. PRIORITY ENCODER (IC 74148)
8. FLIP – FLOPS
    a) D FLIP – FLOP
    b) T FLIP – FLOP
    c) SR FLIP – FLOP
    d) JK FLIP – FLOP
9. REGISTERS
    a) SERIAL – IN SERIAL – OUT SHIFT REGISTER
    b) SERIAL – IN PARALLEL – OUT SHIFT REGISTER
    c) PARALLEL – IN PARALLEL – OUT SHIFT REGISTER
10. COUNTERS
    a) SYNCHRONOUS UP/DOWN COUNTER
    b) SYNCHRONOUS BCD COUNTER
    c) RIPPLE BINARY COUNTERS
    d) RING COUNTER
    e) JOHNSON COUNTER
11. FSM
    a) MEALY STATE MACHINE
    b) MOORE STATE MACHINE

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

PROJECT AND VIVA VOCE

IV B.Tech., VIII SEMESTER CODE: 14EIL802

Lectures: 0	Tutorial: 0	Practical: 12	Self Study: 0
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 100	

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.

DISCIPLINE AND CODE OF CONDUCT FOR STUDENTS

The following are some of the important rules of discipline. All students are required to be aware of and act consistently with these values.

1. Students must punctually attend all lectures, practicals, tutorials, assignments, tests, examinations, etc. A student whose attendance and/or progress in the various tests and examinations are not satisfactory and who does not perform the required number of assignments, tutorials and/or practicals are likely to lose their terms. Prolonged absence even on ground of ill health may also lead to loss of terms. Defaulters will not be sent up for Final /University Examinations.
2. The identity card is meant for identifying bonafied students and is used for permitting the students to participate in various activities and programs of the college. Every student must wear Identity card as long as he/she is in the college campus. It must be produced by the student whenever demanded by the member of the teaching or non-teaching staff of the college. Every student must wear his/her Identity card in the college every day. He/She must take proper care of it to avoid its misuse by other students and outsiders. In case the Identity card is lost, the matter should be immediately reported to the Principal and an application should be made for a duplicate Identity card, which will be issued on payment of charges.
3. The conduct of the students in the classes and in the premises of the college shall be such as will cause no disturbance to teachers, fellow students or other classes.
4. Every student shall wear a clean formal dress while coming to the college also when representing the college for various activities out station.
5. No Society or Association shall be formed in the College and no person should be invited in the college campus without the specific permission of the Principal.
6. No student is allowed to display any Notice/Circular/Poster/Banner in the College premises without the prior permission of the Principal.
7. No student will be allowed to conduct any political activity in the college premises.
8. Outsiders are not permitted in the college premises without the prior permission of the Principal. College students are not allowed to bring their relatives/friends to the college premises without the permission of the principal.
9. All meetings, cultural programs, debates, elocutions etc. organized on the college premises must be held in presence of teaching staff members and with the prior permission of the Principal. The subjects of debates/elocutions must have the prior approval of the principal.

10. Students must take proper care of the college property. Strict action will be taken against students damaging College property and will be required to compensate the damage.
11. Students should not be involved in academic offences including cheating or plagiarism in academic course work malpractices at the College/Board/University Examinations
12. Smoking is strictly prohibited in the college premises.
13. If, for any reason, the continuance of a student in the College is found detrimental to the best interest of the college, the Management may ask the student to leave the college without assigning any reasons and the decision will be final and binding on the student.
14. Playing music on Transistors, Tape-Recorders, Car Stereos, Mobile phones or any other similar gadgets with or without earphones is strictly prohibited in the college premises. Defaulters will be punished and their instrument shall be confiscated.
15. Use of Mobile phones is strictly prohibited in the academic area of the college, Defaulters will be penalized and their instrument confiscated.
16. Students who are travelling to college on personal vehicles (2/4 wheelers) need to have valid driving license issued by RTO and follow all the rules listed by RTO. Students have to park the vehicle in the parking area of the college.
17. Students must not hang around in the college premises while the classes are at work.
18. Students must not attend classes other than their own without the permission of the authority concerned.
19. Students shall do nothing inside or outside the college that will interface with the discipline of the college or tarnish the image of the college.
20. Students are not allowed to communicate any information about college matters to Press.
21. Matters not covered above will be decided at the discretion of the Principal.

Acts of misbehavior, misconduct, indiscipline or violation of the Rules of Discipline mentioned above liable for one more punishments as stated below:

A. Warning to the students.
B. Warning to the student as well as inform the parents.
C. Imposition of a fine.
D. Denial of gymkhana, library, laboratory, N.C.C., N.S.S. student aid or any other facility for a specified period or for the whole Term/Year.
E. Expulsion from College for a specified period
F. Cancellation of Terms.
G. Refusal of admission in the term or academic year.

H. Cancellation of admission.
I. Rustication.

Anti Ragging Rules and Regulations

(As per AICTE Norms)

1. **What constitutes Ragging: -** Ragging constitutes one or more of any of the following acts:

a. any conduct by any student or students whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness a fresher or any other student;
b. indulging in rowdy or undisciplined activities by any student or students which causes or is likely to cause annoyance, hardship, physical or psychological harm or to raise fear or apprehension thereof in any fresher or any other student;
c. asking any student to do any act which such student will not in the ordinary course do and which has the effect of causing or generating a sense of shame, or torment or embarrassment so as to adversely affect the physique or psyche of such fresher or any other student;
d. any act by a senior student that prevents, disrupts or disturbs the regular academic activity of any other student or a fresher;
e. exploiting the services of a fresher or any other student for completing the academic tasks assigned to an individual or a group of students.
f. any act of financial extortion or forceful expenditure burden put on a fresher or any other student by students;
g. any act of physical abuse including all variants of it: sexual abuse, homosexual assaults, stripping, forcing obscene and lewd acts, gestures, causing bodily harm or any other danger to health or person;
h. any act or abuse by spoken words, emails, posts, public insults which would also include deriving perverted pleasure, vicarious or sadistic thrill from actively or passively participating in the discomfiture to fresher or any other student;
i. any act that affects the mental health and self-confidence of a fresher or any other student with or without an intent to derive a sadistic pleasure or showing off power, authority or superiority by a student over any fresher or any other student.

Actions to be taken against students for indulging and abetting ragging in technical institutions Universities including Deemed to be University imparting technical education:-

1. The punishment to be meted out to the persons indulged in ragging has to be exemplary and justifiably harsh to act as a deterrent against recurrence of such incidents.
2. Every single incident of ragging a First Information Report (FIR) must be filed without exception by the institutional authorities with the local police authorities.
3. The Anti-Ragging Committee of the institution shall take an appropriate decision, with regard to punishment or otherwise, depending on the facts of each incident of ragging and nature and gravity of the incident of ragging.
4. a) Depending upon the nature and gravity of the offence as established the possible punishments for those found guilty of ragging at the institution level shall be any one or any combination of the following:-
    (i) Cancellation of admission
    (ii) Suspension from attending classes
    (iii) Withholding/withdrawing scholarship/fellowship and other benefits
    (iv) Debarring from appearing in any test/examination or other evaluation process
    (v) Withholding results
    (vi) Debarring from representing the institution in any regional, national or international meet, tournament, youth festival, etc.
    (vii) Suspension/expulsion from the hostel
    (viii) Rustication from the institution for period ranging from 1 to 4 semesters
    (ix) Expulsion from the institution and consequent debarring from admission to any other institution.

(x) Collective punishment: when the persons committing or abetting the crime of ragging are not identified, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.