HINDUSTAN UNIVERSITY

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

(Estd. u/s 3 of the UGC Act, 1956)

Padur, Kancheepuram District - 603 103.

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM
&
SYLLABUS 2013-14

B.Tech. ELECTRONICS & COMMUNICATION ENGINEERING

ACADEMIC REGULATIONS (B.Tech)

(Full /Part Time) (Effective 2013-14)

1. Vision, Mission and Objectives

1.1 The Vision of the Institute is "To make every man a success and no man a failure".

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

1.2 Further, the Institute always strives

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.
- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.
- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the nation and the society.
- To promote research in the field of Science, Humanities, Engineering, Technology and allied branches.

1.3 Aims and Objectives of the Institute are focused on

- Providing world class education in engineering, technology, applied sciences and management.
- Keeping pace with the ever changing technological scenario to help the students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation.
- To inculcate a flair for research, development and entrepreneurship.

2. Admission

2.1 The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each branch of the B.Tech programme will be decided by BOM as per the directives from MHRD, Government of India and taking into account the market demands. Some seats for Non Resident Indians and a few seats for foreign nationals shall be made available.

2.2 (i) Full-Time :

At the time of applying for admission, the candidates should have passed / appeared and be awaiting results of the final examination of the 10+2 system or its equivalent with Mathematics, Physics and Chemistry as subjects of study.

(ii) Part -Time:

At the time of applying for admission, the candidates should have a Diploma in Engineering/Technology in the relevant branch of specialization awarded by the State Board of Technical Education, Tamil Nadu or any other authority accepted by the Board of Management of the University as equivalent thereto and a minimum of one year practical experience.

2.3 The selected candidates will be admitted to the B.Tech. programme after he/she fulfills all the admission requirements set by the Institute and after the payment of the prescribed fees.

2.4 In all matters relating to admission to the B.E. / B.Tech. programme, the decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.5 If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute, the Institute may revoke the admission of the candidate with information to the Academic Council.

3. Structure of the programme

3.1 The programme of instruction will have the following structure:

i) A general (common) core programme comprising basic sciences, engineering sciences, humanities, technical arts and mathematics.

ii) An engineering core programme introducing the student to the foundations of engineering in the respective branch.

iii) An elective programme enabling the student to opt and undergo a set of courses of interest to him/ her.

iv) Professional practice including project, seminar and industrial training.

v) General elective courses, such as, Environmental Studies, Physical Education, Professional ethics, and National Service Scheme.

The distribution of total credits required for the degree programme into the above five categories will nominally be 20%, 50%, 15%, 5%, and 10% respectively.

3.2 (i) Full-Time:

The duration of the programme will be a minimum of 8 semesters. Every branch of the B.E. / B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council.

ii) Part - Time:

The duration of the programme will be a minimum of 7 semesters. Every branch of the B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council

3.3 The academic programmes of the Institute follow the credit system. The general pattern is:

- One credit for each lecture hour per week per semester;
- One credit for each tutorial hour per week per semester;
- Two credits for each laboratory practical/ drawing of three hours per week per semester.
- One credit for 4 weeks of industrial training and
- One credit for 4 hours of project per week per semester

3.4 (i) Full-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 190-200.

(ii) Part-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the

relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 110-120.

3.5 The medium of instruction, examination and the language of the project reports will be English.

4. Faculty Advisor

4.1 To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

5. Class Committee

5.1 A Class Committee consisting of the following will be constituted by the Head of the Department for each class:

(i) A Chairman, who is not teaching the class.

(ii) All subject teachers of the class.

(iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during a semester.

The functions of the Class Committee will include:

(i) Addressing problems experienced by students in the classroom and the laboratories.

(ii) Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.

(iii) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching / learning process.

6. Grading

6.1 A grading system as below will be adhered to.

Range of Marks	Letter Grade	Grade points
95 -100	S	10
85 - 94	A	09
75 - 84	B	08
65 -74	C	07
55 - 64	D	06
50 - 54	E	05
< 50	U	00
	I (Incomplete)	–

6.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i " and the grade points Pi earned for that course taken over all courses "i" registered by the student to the sum of Ci for all "i ". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from the first semester onwards.

6.3 For the students with letter grade I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades.

6.4 Raw marks will be moderated by a moderation board appointed by the Vice-Chancellor of the University. The final marks will be graded using an absolute grading system. The Constitution and composition of the moderation board will be dealt with separately.

7. Registration and Enrolment

7.1 Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.

7.2 A student will be eligible for enrollment only if he/she satisfies regulation 10 (maximum duration of the programme) and will be permitted to enroll if (i) he/she has cleared all dues in the Institute, Hostel and Library up to the end of the previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.

7.3 Students are required to submit registration form duly filled in.

8. Registration requirement

8.1 (i) Full -Time:

A full time student shall not register for less than 16 credits or more than 30 credits in any given semester.

(ii) Part -Time:

A part time student shall not register for less than 10 credits or more than 20 credits in any given semester

8.2 If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw from the courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor and HOD. However the student should ensure that the total number of credits registered for in any semester should enable him/her to earn the minimum number of credits per semester for the completed semesters.

9. Continuation of the programme

9.1 For those students who have not earned the minimum required credit prescribed for that particular semester examination, a warning letter to the concerned student and also to his/her parents regarding the shortage of his/her credit will be sent by the HOD after the announcement of the results of the university examinations.

10. Maximum duration of the programme

10.1 (i) Full - Time

The normal duration of the programme is eight semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 14 semesters excluding the semesters withdrawn on medical grounds or other valid reasons.

(ii) Part - Time

The normal duration of the programme is seven semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 12 semesters excluding the semesters withdrawn on medical grounds or other valid reasons

11. Temporary discontinuation

11.1 A student may be permitted by the Director (Academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

12. Discipline

12.1 Every student is required to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

12.2 Any act of indiscipline of a student reported to the Director (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Director (Academic) to recommend to the Vice-Chancellor the implementation of the decision. The student concerned may appeal to the Vice-Chancellor whose decision will be final. The Director (Academic) will report the action taken at the next meeting of the Council.

12.3 Ragging and harassment of women are strictly prohibited in the University campus and hostels.

13. Attendance

13.1 A student whose attendance is less than 75% in a semester is not eligible to appear for the end-semester examination for that semester. The details of all students who have less than 75% attendance in a course will be announced by the teacher in the class. These details will be sent to the concerned HODs and Director (Academic).

13.2 Those who have less than 75% attendance will be considered for condonation of shortage of attendance. However, a condonation of 10% in attendance will be given on medical reasons. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Director (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.

13.3 As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the condition that these students take prior approval from the officer - in-charge. All such applications should be recommended by the concerned HOD and forwarded to Director (Academic) within seven instructional days after the programme / activity.

14. Assessment Procedure

14.1 The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.

14.2 For each theory course, the assessment will be done on a continuous basis as follows:

Test / Exam	Weightage	Duration of Test / Exam
First Periodical Test *	10%	2 Periods
Second Periodical Test *	10%	2 Periods
Model Exam	20%	3 hours
Seminar/Assignments/Quiz	10%	-
Attendance	10%	
End - semester examination	50%	3 Hours

*Best out of the two tests will be considered.

14.3 For practical courses, the assessment will be done by the subject teachers as below:

(i) Weekly assignment/Observation note book / lab records - weightage 60%.

(ii) End semester examination of 3 hours duration including viva - weightage 40%.

14.4 For courses on Physical Education, NSS, etc the assessment will be as satisfactory/not satisfactory only.

15. Make up Examination/Model Exam

15.1 Students who miss the end-semester examinations / model examination for valid reasons are eligible for make-up examination /model examination. Those who miss the end-semester examination / model examination should apply to the Head of the Department concerned within five days after he / she missed examination, giving reasons for absence.

15.2 Permission to appear for make-up examination / model examination will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of examination / model exam and the same should be duly endorsed by parent / guardian and also by a medical officer of the University within 5 days.

16. Project evaluation

16.1 For Project work, the assessment will be done on a continuous basis as follows:

Review / Examination	Weightage
First Review	10%
Second Review	20%
Third Review	20%
End-semester Examination	50%

For end-semester examination, the student will submit a Project Report in a format specified by the Director (Academic). The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end-semester examination will be conducted by a Committee constituted by the Registrar / Controller of examination. This will include an external expert.

17. Declaration of results

17.1 A candidate who secures not less than 50% of total marks prescribed for a course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

(ii) To be Eligible to appear for the end semester examinations for a particular course, a candidate will have to secure a minimum of 40% marks in the sessional for that course.

(iii) Candidates are required to obtain all credits assigned to the first two semesters of the programme within the first four semesters of the programme.

Candidates failing to satisfy this requirement will not be allowed to proceed to the fifth semester until the condition is satisfied. Further, candidates will not be allowed to proceed to seventh semester if they have not cleared all the courses assigned during third & fourth semesters.

17.2 After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of UG programmes constituted by the Vice-Chancellor. The recommendations of the Result Passing Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examination/ Registrar.

17.3 If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end-semester examination, he/she shall register and re-appear for the end-semester examination during the following semester. However, the sessional marks secured by the candidate will be retained for all such attempts.

17.4 If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end-semester examination, and wishes to improve on his/her sessional marks, he/she will have to register for the particular course and attend the course with permission of the HOD concerned and Director(Academic) with a copy marked to the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.

17.5 A candidate can apply for the revaluation of his/her end-semester examination answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/ Controller of Examinations through the Head of the Department. The Registrar/ Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

17.6 After ten semesters, the sessional marks of the candidate will not be considered for a pass in a course. A candidate who secures 50% in the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

18. Grade Card

18.1 After results are declared, grade sheet will be issued to each student which will contain the following details:

(i) Program and branch for which the student has enrolled.

(ii) Semester of registration.

(iii) List of courses registered during the semester and the grade scored.

(iv) Semester Grade Point Average (GPA)

(v) Cumulative Grade Point Average (CGPA).

19. Class/Division

19.1 Classification is based on CGPA and is as follows:

CGPA $\geq$ 8.0: **First Class with distinction**

6.5 $\leq$ CGPA < 8.0 : **First Class**

5.0 $\leq$ CGPA < 6.5 : **Second Class.**

19.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance within the minimum duration of the programme.

(ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses **within 10 semesters.**

(iii) The period of authorized discontinuation of the programme (vide clause 11.1) will not be counted for the purpose of the above classification.

20. Transfer of credits

20.1. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so consulted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

20.2 The Academic Council may also approve admission of lateral entry (who hold a diploma in Engineering/ technology) candidates with advance credit based on the recommendation of the transfer of credits committee on a case to case basis.

21. Eligibility for the award of B.Tech. Degree

21.1. A student will be declared to be eligible for the award of the B.Tech. Degree if he/she has

i) registered and successfully acquired the credits for the core courses;

ii) successfully acquired the credits in the different categories as specified in the curriculum corresponding to the discipline (branch) of his/her study within the stipulated time;

iii) has no dues to all sections of the Institute including Hostels, and

iv) has no disciplinary action pending against him/her.

The award of the degree must be recommended by the Academic Council and approved by the Board of Management of the University.

22. Change of Branch

22.1 If the number of students in any branch of B.Tech. class as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said branches can be filled by transferring students from other branches. All such transfers will be allowed on the basis of merit of the students. The decision of the Chancellor shall be final while considering such requests.

22.2 All students who have successfully completed the first semester of the course will be eligible for consideration for change of branch subject to the availability of vacancies.

23. Power to modify

23.1. Notwithstanding all that has been stated above, the Academic Council shall modify any of the above regulations from time to time subject to approval by the Board of Management.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I
(COMMON TO ALL BRANCHES)

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	EL 2101	Technical English	3	0	0	3	3
2.	MA 2101	Engineering Mathematics-I	3	1	0	4	4
3.	PH 2001/ CY 2001	Engineering Physics / Engineering Chemistry *	3	0	0	3	3
4.	ME 2101	Engineering Graphics	1	0	3	3	4
5.	CS 2101	Computer Programming	3	0	0	3	3
PRACTICAL							
6.	CS 2131	Computer Programming Laboratory	0	0	3	2	3
7.	GE 2131	Engineering Practices Laboratory-I	0	0	3	2	3
8.	EL 2131	Communication Skills Laboratory-I	0	0	3	2	3
9.	PH 2031/ CY 2031	Physics Laboratory / Chemistry Laboratory *	1	0	3	3	4
		Total				**25**	**30**

Note: * Depending upon the number of batches, it will be alternated between semesters 1 & 2

SEMESTER II

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MA2201	Engineering Mathematics-II #	3	1	0	4	4
2	CY2001/ PH 2001	Engineering Chemistry / Engineering Physics * #	3	0	0	3	3
3	EC2201	Electron Devices & Circuits	3	1	0	4	4
4	EE2311	Electrical Machines **	3	0	0	3	3
5	CY2002	Environmental Science and Engineering ***	3	0	0	3	3

Practical							
6	CY2031/ PH2031	Chemistry Laboratory/ Physics Laboratory* #	1	0	3	3	4
7	GE2231	Engineering Practices Laboratory-II #	0	0	3	2	3
8	EL 2231	Communication Skills Laboratory-II #	2	0	2	3	4
9	EC2231	Circuits and Devices Laboratory	0	0	3	2	3
		Total				**27**	**31**

Note: *Depending upon the number of batches, it will be alternated between semesters 1&2

 # Common to all Branches

**** Common to ECE, EIE**

***** Common to ECE, Automobile, Aeronautical, Electronics & Instrumentation, Mechanical, EEE, CSE & AeroSpace Engineering.**

SEMESTER III

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MA2301	Engineering Mathematics-III *	3	1	0	4	4
2	CS2311	Data Structures and Object Oriented Programming in C++	3	0	0	3	3
3	EC2301	Electronic Circuits-I	3	1	0	4	4
4	EC2302	Digital Systems***	3	1	0	4	4
5	EC2303	Electromagnetic Fields and Waves	3	1	0	4	4
Practical							
6	EE2335	Electrical Machines Lab **	0	0	3	2	3
7	CS2335	Data Structures and Object Oriented Programming in C++ Lab	0	0	3	2	3
8	EC2331	Electronic Circuits Lab-I	0	0	3	2	3
9	EC2332	Digital Systems Lab***	0	0	3	2	3
		Total				**27**	**31**

* **Common to ECE, Aeronautical, Automobile, Mechanical,EEE,CSE,AeroSpace & Chemical Engineering**

** **Common to ECE & EIE**

*** **Common to ECE, CSE**

SEMESTER IV

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MA2402	Random Processes	3	1	0	4	4
2	EC2401	Electronic Circuits-II	3	1	0	4	4
3	EC2402	Linear Integrated Circuits	3	0	0	3	3
4	EC2403	Signals and Systems	3	1	0	4	4
5	EC2404	Analog Communication	3	0	0	3	3
Practical							
6	EC2431	Electronic Circuits & Simulation Lab	0	0	3	2	3
7	EC2432	Linear Integrated Circuits Lab	0	0	3	2	3
8	EC2433	Analog Communication Lab	0	0	3	2	3
9	EC2434	Project Work	0	0	6	2	6
		Total				**26**	**33**

SEMESTER V

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MA2502	Computational Methods	3	1	0	4	4
2	EI2511	Measurements and Instrumentation	3	0	0	3	3
3	EC2501	Data Communication and Networks	3	0	0	3	3
4	EC2502	Microprocessors & Microcontroller*	3	1	0	4	4
5	EI2512	Control Systems	3	1	0	4	4
6	EC2503	Transmission Lines and Waveguides	3	1	0	4	4
Practical							
7	EC2531	MATLAB and Simulink Lab	0	0	3	2	3
8	EC2532	Data Communication and Networks Lab	0	0	3	2	3
9	EC2533	Microprocessors & Microcontroller Lab*	0	0	3	2	3
		Total				**28**	**31**

*** Common to ECE,CSE**

SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MG2001	Principles of Management *	3	0	0	3	3
2	EC2601	Digital Communication	3	0	0	3	3
3	EC2602	Digital Signal Processing	3	1	0	4	4
4	EC2603	Antennas & Wave Propagation	3	1	0	4	4
5	CS2612	Cloud Computing	3	0	0	3	3
6	EC2604	Mobile Communication	3	0	0	3	3
Practical							
7	EC2631	Digital Communication Lab	0	0	3	2	3
8	EC2632	Digital Signal Processing Lab	0	0	3	2	3
9	EL2431	Communication Skills & Personality Development **	2	0	2	3	4
		Total				**27**	**30**

* **Common to ECE, Automobile, Civil,CSE,EEE,IT and Mechanical Engineering.**

** **Common to ECE, Automobile, Civil,CSE,EIE,EEE,IT, AeroSpace, Aeronautical, Chemical and Mechanical Engineering**

SEMESTER VII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	EC2701	Optical Communication	3	0	0	3	3
2	EC2702	Microwave Engineering	3	0	0	3	3
3	EC2703	VLSI Design	4	0	0	4	4
4	EC2704	Embedded Systems	3	0	0	3	3
5		Elective-I	3	0	0	3	3
6		Elective-II	3	0	0	3	3
Practical							
7	EC2731	Microwave & Optical Communication Lab	0	0	3	2	3
8	EC2732	VLSI Design Lab	0	0	3	2	3
		Total				**23**	**25**

SEMESTER VIII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	GE2001	Professional Ethics & Human Values*	3	0	0	3	3
2		Elective-III	3	0	0	3	3
3		Elective-IV	3	0	0	3	3
Practical							
4	EC2831	Project & Viva Voce	0	0	24	6	24
		Total				**15**	**33**

*** Common to ECE, EEE, CSE & Aero Space Engineering.**

Total Credits: 198

ELECTIVE -VII SEMESTER

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	EC2751	Biomedical Instrumentation	3	0	0	3	3
2	EC2752	Advanced Microprocessors	3	0	0	3	3
3	EC2753	Advanced Digital Signal Processing	3	0	0	3	3
4	EC2754	High Speed Networks	3	0	0	3	3
5	EC2755	Satellite Communication	3	0	0	3	3
6	EC2756	Engineering Acoustics	3	0	0	3	3
7	EC2757	Consumer Electronics	3	0	0	3	3
8	EC2758	Digital Image Processing	3	0	0	3	3
9	EC2759	Telecommunication Switching & Networks	3	0	0	3	3
10	EC2760	Nano Electronics and Devices	3	0	0	3	3
11	MG2002	Total Quality Management*	3	0	0	3	3
12	EC2771	Fundamentals of Avionics	3	0	0	3	3
13	EC2772	Navigation Systems	3	0	0	3	3

*** Common to Civil, Aeronautical, EEE, CSE, IT, Chemical & Mechanical Engineering**

ELECTIVE- VIII SEMESTER

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	EC2851	Television & Video Engineering	3	0	0	3	3
2	EC2852	Speech Processing	3	0	0	3	3
3	EC2853	Communication Network Security	3	0	0	3	3
4	EC2854	Wireless Networks	3	0	0	3	3
5	EC2855	Optoelectronic Devices	3	0	0	3	3
6	EC2856	Remote Sensing	3	0	0	3	3
7	EC2857	Telecommunication System Modeling & Simulation	3	0	0	3	3
8	MG2003	Entrepreneurship Development *	3	0	0	3	3
9	EC2858	Wireless Sensor Networks	3	0	0	3	3
10	EC2859	Solid State Electronic Devices	3	0	0	3	3
11	EC2860	Electromagnetic Interference & Compatibility	3	0	0	3	3
12	EC2871	Embedded Automotive Systems	3	0	0	3	3

***Common to ECE, EIE, Mechanical Engineering, EEE & IT.**

SEMESTER I

EL 2101 TECHNICAL ENGLISH

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

The goal of the programme is to provide a theoretical input towards nurturing accomplished learners who can function effectively in the English language skills; to cultivate in them the ability to indulge in rational thinking, independent decision-making and lifelong learning; to help them become responsible members or leaders of the society in and around their workplace or living space; to communicate successfully at the individual or group level on engineering activities with the engineering community in particular, and on multi-disciplinary activities in general, with the world at large.

OBJECTIVES

The course should enable the students to :

1. Widen the capacity of the learners to listen to English language at the basic level and understand its meaning.
2. Enable learners to communicate in an intelligible English accent and pronunciation.
3. Assist the learners in reading and grasping a passage in English.
4. Learn the art of writing simple English with correct spelling, grammar and punctuation.
5. Cultivate the ability of the learners to think and indulge in divergent and lateral thoughts.

Outcome

At the end of the course the student should be able to:

1. The learners will have the self-confidence to improve upon their informative listening skills by an enhanced acquisition of the English language.
2. The learners will be able to speak English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate.
3. The learners will be able to read, comprehend and answer questions based on literary, scientific and technological texts.
4. The learners will be able to write instructions, recommendations, checklists, process-description, letter-writing and report writing.
5. The learners will have the confidence to develop thinking skills and participate in brainstorming, mind-mapping, audiovisual activities, creative thinking and also answer tests in the job-selection processes.

UNIT I LISTENING SKILL **9**

Listening to short and extended dialogues, telephone conversations, discussions, soliloquies - Listening to prose & poetry reading -- Listening to sounds, silent letters, stressed syllables in English

-- Listening to video clips, documentaries, feature films, presentations, interviews -- Listening for the gist of the text, for identifying a topic, general meaning and specific information -- Listening for multiple-choice questions, for positive & negative comments, for interpretation -- Listening for advanced interpretation.

UNIT II SPEAKING SKILL **9**

Introducing oneself or expressing personal opinion -- Simple oral or casual interaction - Dialogue -- Conversation - Giving and receiving feedback using Johari window - Debates -- Brief presentations -- Differences between disagreeing and being disagreeable -- Participating in group discussions, role plays and interviews -- Generating talks based on visual or written prompts -- Addressing a small group or a large formal gathering - Comparing, contrasting, justifying, agreeing and disagreeing on advanced topics - Speaking about present and past experiences and future plans - Debates, discussions and role plays on advanced topics - Job interviews - Preparing HR questions with possible answers -- Brief presentations - Arguing out a topic without verbal fights -- Power point presentation.

UNIT III READING SKILL **9**

Reading for skimming and scanning -- Reading for the gist of a text, for specific information, for information transfer and interpretation -- Reading and interpreting anecdotes, short stories, poems, prose passages for intellectual and emotional comments - Reading a Fishbone diagram for strengths and weaknesses, for pros and cons - Reading comprehension exercises for multiple-choice questions, for contextual meaning -- Reading newspapers, magazine articles for critical comments.

UNIT IV WRITING SKILL **9**

Writing emails, messages, notices, agendas, leaflets, brochures, instructions, recommendations, functional checklists, minutes of a meeting -- Writing paragraphs, comparing, contrasting, presentations with an Introduction, Body and Conclusion -- Arranging appointments, asking for permission, apologizing and offering compensation - Writing formal business letters -- Letter inviting, accepting, declining the invitation -- Letter to the editor -- Requesting permission for industrial visits or implant training, enclosing an introduction to the educational institution -- Letter applying for a job, enclosing a CV or Resume -- Writing short reports -- Industrial accident reports -- Writing short proposals.

UNIT V THINKING SKILL **9**

Developing the acquisition and imparting the knowledge of English using thinking skills -- Eliciting thinking blocks for critical interpretation -- Decoding diagrammatic and pictorial representations into English orthographic version in the form of words, phrases, expressions, idioms, sayings and proverbs.

TOTAL: 45

REFERENCES

1. Norman Whitby. Business Benchmark: Pre-Intermediate to Intermediate - BEC Preliminary. New Delhi: Cambridge University Press, 2008 (Latest South Asian edition).
2. Devaki Reddy & Shreesh Chaudhary. Technical English. New Delhi: Macmillan, 2009.
3. Rutherford, Andrea J. Basic Communication Skills for Technology. 2nd edition. New Delhi: Pearson Education, 2010.

MA2101 ENGINEERING MATHEMATICS - I

L	T	P	C
3	1	0	4

Prerequisite Nil

Goal

To provide comprehensive knowledge in engineering mathematics and create an awareness of their application.

Objectives

The course should enable the students to:

1. Find the inverse of the matrix by using Cayley Hamilton Theorem and Diagonalisation of matrix using transformation.
2. Understand the Evolutes and Envelope of the curve.
3. Learn the solutions of second order linear differential equations of standard types and Legendre's linear differential equation.
4. Learn partial differentiations involving two and three variables and expansions of functions using Taylor series.
5. Learn the expansions of trigonometric, hyperbolic functions and their relations.

Outcome

At the end of the course the student should be able to:

1. Identify Eigen value problems in engineering fields and obtain their solutions and using orthogonal transformation diagonalise matrix.
2. Find out effectively the geometrical aspects of curvature and construct evolutes and envelopes in mechanics and engineering drawing.
3. Recognize and to model mathematically and solve, the differential equations arising in science and engineering.
4. Understand and model the practical problems and solve them using maxima and minima as elegant applications of partial differentiation.
5. Acquire skills in using trigonometric and hyperbolic and inverse hyperbolic functions.

UNIT I MATRICES **12**

Review: Basic concepts of matrices-addition, subtraction, multiplication of matrices - adjoint -inverse - solving cubic equations.

Characteristic equation - Properties of Eigen values - Eigen values and Eigen vectors - Cayley Hamilton theorem (without proof) - Verification and inverse using Cayley Hamilton theorem. Diagonalisation of matrices - Orthogonal matrices - Quadratic form - Reduction of symmetric matrices to a Canonical form using orthogonal transformation - Nature of quadratic form.

UNIT II DIFFERENTIAL CALCULUS **12**

Review: Basic concepts of differentiation - function of function, product and quotient rules.

Methods of differentiation of functions - Cartesian form - Parametric form - Curvature - Radius of curvature - Centre of curvature - Circle of curvature. Evolutes of parabola, circle, ellipse, hyperbola and cycloid - Envelope.

UNIT III ORDINARY DIFFERENTIAL EQUATIONS **12**

Review: Definition, formation and solutions of differential equations.

Second order differential equations with constant coefficients - Particular integrals - , eaxCosbx, eaxSinbx. Euler's homogeneous linear differential equations - Legendre's linear differential equation - Variation of parameters.

UNIT IV PARTIAL DIFFERENTIATION **12**

Partial differentiation - differentiation involving two and three variables - Total differentiation -Simple problems. Jacobian - verification of properties of Jacobians - Simple problems. Taylor's series - Maxima and minima of functions of two and three variables.

UNIT V TRIGONOMETRY **12**

Review: Basic results in trigonometry and complex numbers - De Moivre's theorem.Expansions of sinn, cosn, tann where n is a positive integer. Expansions of in terms of sines and cosines of multiples of where m and n are positive integers. Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers - Separation of complex functions into real and imaginary parts - Simple problems.

Note: Questions need not be asked from review part.

L = 45, T = 15, TOTAL: 60

TEXT BOOKS

1. Erwin Kreyzig, A Text book of Engineering Mathematics, John Wiley, 1999.
2. Grewal B.S, Higher Engineering Mathematics, Thirty Eighth Editions, Khanna Publisher, Delhi, 2004.
3. Chandrasekaran A, A Text book of Engineering Mathematics I, Dhanam Publications, Chennai, 2010.

REFERENCES

1. Venkataraman M.K, Engineering Mathematics, Volume I, The National Publishing Company, Chennai, 1985.
2. Kandaswamy P, Thilagavathy K and Gunavath K, Engineering Mathematics, Volume I & II, S.Chand and Company, New Delhi, 2005.
3. Bali N.P, Narayana Iyengar. N.Ch., Engineering Mathematics, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
4. Veerarajan T, Engineering Mathematics (for first year), Fourth Edition, Tata McGraw - Hill Publishing Company Limited, New Delhi, 2005.

PH2001 ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To impart fundamental knowledge in various fields of Physics and its applications.

Objectives

The course should enable the students to:

1. Develop strong fundamentals of properties and behavior of the materials.
2. Enhance the knowledge of theoretical and modern technological aspects in acoustics and ultrasonics.
3. Enable the students to correlate the theoretical principles with application oriented study of optics.
4. Provide a strong foundation in the understanding of solids and materials testing,
5. Enrich the knowledge of students in modern engineering materials.

Outcome

At the end of the course the student should be able to:

1. Understand the properties and behavior of materials.
2. Have a fundamental knowledge of acoustics which would facilitate in acoustical design of buildings and on ultrasonics and be able to employ it as an engineering tool.
3. Understand the concept, working and application of lasers and fiber optics.
4. Know the fundamentals of crystal physics and non destructive testing methods.
5. Have an understanding of the production, characteristics and application of the new engineering materials. This would aid them in the material selection stage.

UNIT I PROPERTIES OF MATTER **9**

Elasticity - types of moduli of elasticity - Stress-Strain diagram - Young's modulus of elasticity - Rigidity modulus - Bulk modulus - Factors affecting elasticity - twisting couple on a wire - Torsional pendulum - determination of rigidity modulus of a wire - depression of a cantilever - Young's modulus by cantilever - uniform and non-uniform bending - viscosity - Ostwald's viscometer - comparison of viscosities.

UNIT II ACOUSTICS AND ULTRASONICS **9**

Classification of sound - characteristics of musical sound - intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time(Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies. Ultrasonics - production - Magnetostriction and Piezoelectric methods - properties

- applications of ultrasonics with particular reference to detection of flaws in metal (Non - Destructive testing NDT) - SONAR.

UNIT III LASER AND FIBRE OPTICS 9

Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission - population inversion - pumping action - active medium - laser characteristics - Nd-Yag laser - CO2 laser - Semiconductor laser - applications - optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers - single and multimode, step index and graded index fibers - applications - fiber optic communication system.

UNIT IV CRYSTAL PHYSICS AND NON- DESTRUCTIVE TESTING 9

Crystal Physics: Lattice - Unit cell - Bravais lattice - Lattice planes - Miller indices - 'd' spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - coordination number - Packing factor for SC, BCC, FCC and HCP structures.

Non Destructive Testing: Liquid penetrate method - Ultrasonic flaw detection - ultrasonic flaw detector (block diagram) - X-ray Radiography - Merits and Demerits of each method.

UNIT V MODERN ENGINEERING MATERIALS AND SUPERCONDUCTING MATERIALS 9

Modern Engineering Materials: Metallic glasses: Preparation properties and applications. Shape memory alloys (SMA): Characteristics, applications, advantages and disadvantages of SMA. Nano Materials: Synthesis -Properties and applications.

Superconducting Materials: Superconducting phenomena - Properties of superconductors - Meissner effect - Type I and Type II superconductors - High Tc superconductors (qualitative) - uses of superconductors.

TOTAL = 45

TEXT BOOKS

1. Gaur R.K. and Gupta S.L., "Engineering Physics ", 8th edition, Dhanpat rai publications (P) Ltd., New Delhi 2010.
2. P.Mani, "Engineering Physics", Vol-I, Dhanam Publications, Chennai 2011.
3. Rajendran V. an Marikani A., "Applied Physics for engineers" , 3rd edition, Tata Mc Graw -Hill publishing company Ltd., New Delhi,2003.

REFERENCES

1. Uma Mukherji, "Engineering Physics", Narosa publishing house, New Delhi, 2003.
2. Arumugam M., "Engineering Physics ", Anuradha agencies, 2007.
3. Palanisamy P.K., "Engineering Physics ", SciTech Publications, Chennai 2007.
4. Arthur Beiser, "Concepts of Modern Physics", Tata Mc Graw -Hill Publications, 2007.
5. P.Charles, Poople and Frank J. Owens, "Introduction to Nanotechnology", Wiley India, 2007.

CY2001 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

Prerequisite **Nil**

Goal

To impart basic principles of chemistry for engineers.

Objectives

The course should enable the students to:

1. Make the students conversant with the basics of
   (a) Water technology and
   (b) Polymer science,
2. Provide knowledge on the requirements and properties of a few important engineering materials,
3. Educate the students on the fundamentals of corrosion and its control.
4. Give a sound knowledge on the basics of a few significant terminologies and concepts in thermodynamics.
5. Create an awareness among the present generation about the various conventional energy sources.

Outcome

At the end of the course the student should be able to:

1. (a) Gain basic knowledge in water analysis and Suitable water treatment method.
   (b) Get an idea on the type of polymers to be used in engineering applications,
2. Get exposure to the common engineering materials which will create the awareness to search for new materials.
3. Gain knowledge on the effects of corrosion and protection methods will help the young minds to choose proper metal / alloys and also to create a design that has good corrosion control.
4. Understand advanced level thermodynamics in engineering applications.
5. Have awareness on the need to utilize the fuel sources effectively and also for exploring new alternate energy resources.

UNIT I WATER TECHNOLOGY AND POLYMER CHEMISTRY 9

Hardness (Definition, Types, Units) - problems - Estimation of Hardness (EDTA Method) - Water softening - Carbonate conditioning and Calgon conditioning - Demineralization (Ion-Exchange Method) - Water Quality Parameters - Municipal Water Treatment- Desalination - Reverse Osmosis.

Classification of Polymers - PVC, Bakelite - preparation, properties and applications - Effect of Polymer Structure on Properties - Compounding of Plastics- Polymer Blends and Polymer Alloys - Definition, Examples.

UNIT II ENGINEERING MATERIALS **9**

Properties of Alloys - Heat Treatment of Steel - Polymer Composites - types and applications.- Lubricants - Classification, properties and applications - Mechanism of Lubrication - MoS2 And Graphite - Adhesives - classification and properties - Epoxy resin (Preparation, properties and applications) - Refractories - Classification, Properties and General Manufacture - Abrasives - Classification , Properties and Uses - Carbon nano tubes - preparation, properties and applications.

UNIT III ELECTROCHEMISTRY AND CORROSION **9**

Conductometric Titration - HCl vs NaOH and mixture of acids vs NaOH - Electrochemical Series and its applications - Nernst Equation - problems - Polarization, Decomposition Potential, Over-voltage (definitions only) - Galvanic series - Corrosion (Definition, Examples, effects) - Mechanism of Dry Corrosion and Wet Corrosion - Differential aeration Corrosion , examples - Factors Influencing Corrosion - Metal and Environment - Corrosion Control - Design -Cathodic Protection methods - Protective Coatings - Galvanising - Anodising - Electroplating (Cu and Ni) and Electroless plating (Cu and Ni) - Constituents of Paints and varnish.

UNIT IV CHEMICAL THERMODYNAMICS **9**

Thermodynamic terminology- First Law of Thermodynamics-Internal energy- enthalpy - heat capacity - work done in isothermal expansion of an ideal gas -problems - second law of thermodynamics - entropy change - phase transformations and entropy change - problems - Work Function & Free Energy Function- Maxwell's Relations-Gibbs Helmholtz equation- van't Hoff Isotherm- van't Hoff Isochore - Problems.

UNIT V FUELS AND ENERGY SOURCES **9**

Fuels - classification - Calorific Value - Dulong's Formula - Problems - Determination of Calorific Value by Bomb Calorimeter - Coal - Proximate Analysis - problems - Octane Number - Cetane Number - Diesel Index (Definitions only) - Bio Gas - Producer Gas -Water Gas - Preparation, Properties and Uses - Batteries - Primary Cells - Leclanche Cell -Secondary Cell - Nickel Cadmium Battery - Fuel Cells - Hydrogen -Oxygen Fuel Cell - Solar Battery - Lead Acid Storage Cell - Nuclear Energy - Light water nuclear power plant.

TOTAL : 45

TEXT BOOKS

1. S. S. Dara, Text Book of Engineering Chemistry, S. Chand & Company Ltd., New Delhi, 2003
2. Murthy, Agarwal & Naidu, Text Book of Engineering Chemistry, BSP, 2003.
3. S.Sumathi, Engineering Chemistry, Dhanam Publications, 2008.
4. S.Sumathi and P.S.Raghavan, Engineering Chemistry II, Dhanam Publications, 2008.

REFERENCES

1. B. K. Sharma, Engineering chemistry, Krishna Prakasam Media (P) Ltd., 2003.
2. A 1. Vogel, A text book of Qualitative Inorganic Analysis, ELBS, London, 2004.

3. A. Gowarikar, Text Book of Polymer Science, 2002

4. Kuriacose & Rajaram, Vols. 1 & 2, Chemistry in Engineering and Technology, 2004

5. Puri, Sharma and Pathania, Principles of Physical Chemistry, Vishal Publishing Co. Jalandar, 2004.

ME 2101 ENGINEERING GRAPHICS

L	T	P	C
1	0	3	3

Prerequisite Nil

Goal

To develop graphical skills for communicating concepts, ideas and designs of engineering products and to give exposure to national standards relating to technical drawings.

Objectives

The course should enable the students to:

1. Understand drawing standards and use of drawing instruments.
2. Understand first angle projection.
3. Practice of engineering hand sketching and learn computer aided drafting.
4. Be familiarized with different type of projections.
5. Know the process of design from sketching to parametric 3D CAD and 2D orthographic drawings to BIS.

Outcome

At the end of the course the student should be able to:

1. Develop Parametric design and the conventions of formal engineering drawing.
2. Produce and interpret 2D & 3D drawings.
3. Communicate a design idea/concept graphically.
4. Examine a design critically and with understanding of CAD - and interpret drawings, and produce designs using a combination of 2D and 3D software.
5. Have detailed knowledge of an engineering artifact.

Note: Only first angle projection is to be followed

BASICS OF ENGINEERING GRAPHICS **2**

Importance of graphics Use of drawing instruments - BIS conventions and specifications - drawing sheet sizes, layout and folding - lettering - Dimensioning - Geometrical constructions - Scales. Construction of curves like ellipse, parabola, cycloids and involutes.

UNIT I PROJECTION OF POINTS, LINES AND SURFACES 15

General principles of presentation of technical drawings as per BIS - Introduction to Orthographic projection - Naming views as per BIS - First angle projection. Projection of points. Projection of straight lines located in first quadrant (using rotating line method only). Projection of plane surfaces like polygonal lamina and circular lamina. Drawing views when the surface of the lamina is inclined to one reference plane.

UNIT II PROJECTION OF SOLIDS 10

Projections of simple solids like prism, pyramid, cylinder and cone - Drawing views when the axis of the solid is inclined to one reference plane.

UNIT III DEVELOPMENT OF SURFACES 10

Introduction to sectioning of solids. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

UNIT IV ORTHOGRAPHIC PROJECTIONS 10

Orthographic projections - Conversion of orthographic views from given pictorial views of objects, including dimensioning. Free hand sketching of Orthographic views from Pictorial views.

UNIT V PICTORIAL PROJECTIONS 10

Isometric projection - Isometric scale - Isometric views of simple solids like prisms, pyramids, cylinders and cones. Introduction to perspective Projections.

COMPUTER AIDED DRAFTING (Demonstration Only) 3

Introduction to computer aided drafting and dimensioning using appropriate software. 2D drawing commands Zoom, Picture editing commands, Dimensioning, Isometric drawing, Iso-Planes and 3D drafting. Plotting of drawing. Practice includes drawing the projection of lines and solids. Prepare isometric view of simple solids like prisms, pyramids, cylinders and cones.

TOTAL : 60

TEXT BOOKS

1. Jeyapoovan T, "Engineering Drawing and Graphics Using AutoCAD", Vikas Publishing House Pvt. Ltd., New Delhi, 2010.
2. Warren J. Luzadder and Jon. M.Duff, "Fundamentals of Engineering Drawing", Prentice Hall of India Pvt. Ltd., Eleventh Edition, 2003.

REFERENCES

1. Bhatt N.D and Panchal V.M, "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House, Anand-3001, 2007.
2. Thomas E. French, Charles J.Vierck and Robert J.Foster, " Engineering Drawing and Graphic Technology, McGraw- Hill Book company 13th Edition.1987.
3. Venugopal K., "Engineering Graphics", New Age International (P) Limited, New Delhi, 2008.

CS2101 COMPUTER PROGRAMMING

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To introduce computers and programming and to produce an awareness of the power of computational techniques that are currently used by engineers and scientists and to develop programming skills to a level such that problems of reasonable complexity can be tackled successfully.

Objectives

The course should enable the students to:

1. Learn the major components of a computer system.
2. Learn problem solving techniques.
3. Develop skills in programming using C language.

Outcome

At the end of the course the student should be able to:

1. Understand the interaction between different components of computer system and number system.
2. Device computational strategies for developing applications.
3. Develop applications (Simple to Complex) using C programming language.

UNIT I COMPUTER FUNDAMENTALS **9**

Introduction - Evolution of Computers - Generations of Computer - Classification of Computers - Application of Computers - Components of a Computer System - Hardware - Software - Starting a Computer (Booting) - Number Systems.

UNIT II COMPUTER PROGRMMING AND LANGUAGES **9**

Introduction - Problem-Solving Techniques: Algorithms, Flowchart, Pseudo code - Program Control Structures - Programming Paradigms - Programming languages - Generations of Programming Languages - Language Translators - Features of a Good Programming Languages.

UNIT III PROGRAMMING WITH C **9**

Introduction to C - The C Declaration - Operators and Expressions - Input and Output in C - Decision Statements - Loop Control Statements.

UNIT IV FUNCTIONS, ARRAYS AND STRINGS **9**

Functions - Storage Class - Arrays - Working with strings and standard functions.

UNIT V POINTERS, STRUCTURES AND UNION **9**

Pointers - Dynamic Memory allocation - Structure and Union - Files.

TOTAL: 45

TEXT BOOK:

1. ITL Education Solution Limited, Ashok Kamthane, "Computer Programming", Pearson Education Inc 2007 (Unit: I to V).

REFERENCES:

1. Byron S. Gottfried, "Programming with C", Second Edition, Tata McGraw Hill 2006.
2. Yashvant Kanetkar, "Let us C", Eighth edition, BPP publication 2007.
3. Stephen G.Kochan, "Programming in C - A Complete introduction to the C programming language" , Pearson Education, 2008.
4. T.JeyaPoovan, "Computer Programming Theory and Practice", Vikas Pub, New Delhi.

CS2131 COMPUTER PROGRAMMING LABORATORY
(Common to all branches)

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

To develop the programming skills using computer languages.

Objectives

The course will enable the students to:

1. Gain knowledge about Microsoft office.
2. Know about spread sheet
3. Learn a programming concept in C.

Outcome

At the end of this course the students should be able to design and test:

1. Use MS Word to create document, table, text formatting and Mail merge options.
2. Use Excel for small calculations using formula editor, creating different types of charts and including pictures etc.
3. Write and execute the C programs for small applications.

LIST OF EXPERIMENTS

a) Word Processing 12

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet 9

5. Chart - Line, XY, Bar and Pie.

6. Formula - formula editor.

7. Spread sheet - inclusion of object, Picture and graphics, protecting the document

c) Programming in C : 24

8. To write a C program to prepare the electricity bill.

9. Functions:

(a) Call by value (b) Call by reference.

10. To write a C program to print the Fibonacci series for the given number.

11. To write a C program to find the factorial of number using recursion.

12. To write a C program to implement the basic arithmetic operations using Switch Case statement.

13. To write a C program to check whether the given number is an Armstrong number.

14. To write a C program to check whether the given string is a Palindrome.

15. To write a C program to create students details using Structures.

16. To write a C program to demonstrate the Command Line Arguments.

17. To write a C program to implement the Random Access in Files.

18. To write C programs to solve some of the Engineering applications

TOTAL : 45

HARDWARE/SOFTWARE REQUIRED FOR BATCH OF 30 STUDENTS

HARDWARE

LAN system with 33 nodes (OR) Standalone PCs - 33 Nos

Printers - 3 Nos

SOFTWARE

OS - Windows / UNIX

Application package - MS office

Software - C language

GE 2131 ENGINEERING PRACTICES LABORATORY- I
(Common to all branches)

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

To provide the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering.

Objectives

The course should enable the students to:

1. Relate theory and practice of basic Civil and Mechanical Engineering.
2. Learn concepts of welding and machining practice
3. Learn concepts of plumbing and carpentry practice.

Outcome

At the end of the course the student should be able to:

1. Identify and use of tools, types of joints used in welding, carpentry and plumbing operations,
2. Have hands on experience on basic fabrication techniques such as carpentry and plumbing practices,
3. Have hands on experience on basic fabrication techniques of different types of welding and basic machining practices.

LIST OF EXPERIMENTS

1. Mechanical Engineering: 24

1. Welding

Arc welding - butt joints, lap joints and T joints.

2. Basic Machining

Facing, Turning, Threading and Drilling practice.

3. Machine assembly practice

Study of centrifugal pump

4. Study on

a. Smithy operations- Production of hexagonal headed bolt.

b. Foundry operations - mould preparation for gear and step cone pulley.

2. Civil Engineering 21

1. Basic pipe connection using valves, couplings, unions, reducers, elbows in household fitting.

2. Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.
3. Wood work: Sawing, Planning and making common joints.
4. Study of joints in door panels, wooden furniture.

TEXT BOOK

1. T. Jeyapoovan, M.Saravanapandian and S. Pranitha, "Engineering Practices Lab Manual", 3rd Edition 2006, Vikas Publishing house (P) Ltd., New Delhi.

TOTAL : 45

List of equipment and components

(For a Batch of 30 Students)

CIVIL

1. Assorted components for plumbing consisting of metallic pipes,plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
3. Standard woodworking tools 15 Sets.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools:
   (a) Rotary Hammer 2 Nos
   (b) Demolition Hammer 2 Nos
   (c) Circular Saw 2 Nos
   (d) Planer 2 Nos
   (e) Hand Drilling Machine 2 Nos
   (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer,wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and otherwelding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each.

EL2131 COMMUNICATION SKILLS LABORATORY -I

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

The goal of the programme is to provide a practical input towards nurturing accomplished learners who can function effectively in the English language skills.

Objectives

The course should enable the students to:

1. Extend the ability of the learners to be able to listen to English and comprehend its message,
2. Enable the learners to have a functional knowledge of spoken English.
3. Assist the learners to read and grasp the meaning of technical and non-technical passages in English.
4. Help the learners develop the art of writing without mistakes,
5. Expand the thinking capability of the learners so that they would learn how to view things from a different angle.

Outcome

At the end of the course the student should be able to:

1. The learners will be able to listen to and evaluate English without difficulty and comprehend its message,
2. The learners would have developed a functional knowledge of spoken English so as to use it in the institution and at job interviews,
3. The learners will be able to read and comprehend the meaning of technical and non-technical passages in English,
4. The learners will have developed the art of writing so as to put down their thoughts and feelings in words,
5. At the end of the course, the learners will be able to think independently and contribute creative ideas.

UNIT I LISTENING SKILL **9**

Topics: Listening to conversations and interviews of famous personalities in various fields -- Listening practice related to the TV-- Talk shows - News - Educative programmes -- Watching films for critical comments - Listening for specific information - Listening for summarizing information - Listening to monologues for taking notes - Listening to answer multiple-choice questions.

UNIT II SPEAKING SKILL **9**

Topics: Self-introduction -- Group discussion - Persuading and negotiating strategies - Practice in dialogues -- Presentations based on short stories / poems -- Speaking on personal thoughts and

feelings -- academic topics - News reading - Acting as a compere -- Speaking about case studies on problems and solutions - Extempore speeches.

UNIT III READING SKILL **9**

Topics: Reading anecdotes to predict the content - Reading for interpretation -- Suggested reading - - Short stories and poems -- Critical reading - Reading for information transfer - Reading newspaper and magazine articles for critical commentary - Reading brochures, advertisements, pamphlets for improved presentation.

UNIT IV WRITING SKILL **9**

Topics: At the beginning of the semester, the students will be informed of a mini dissertation of 1000 words they need to submit individually on any non-technical topic of their choice. The parts of the dissertation will be the assignments carried out during the semester and submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V THINKING SKILL **9**

Topics: Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms and proverbs - Inculcating interest in English using thinking blocks. Making pictures and improvising diagrams to form English words, phrases and proverbs -- Picture reading.

TOTAL=45

REFERENCES:

1. Raman, Meenakshi, and Sangeetha Sharma. Technical Communication: English Skills for Engineers. 2nd edition. New Delhi: Oxford University Press, 2010.
2. Riordian, Daniel. Technical Communication. New Delhi. Cengage Learning, 2009

WEBSITES FOR LEARNING ENGLISH

1. British: Learn English-British Council (Listen & Watch) <http://learnenglish.britishcouncil.org>
2. American: Randall's ESL Cyber Listening Lab - <http://www.esl-lab.com/>
3. Intercultural: English Listening Lesson Library Online http://www.elllo.org/

Equipments required

1. Career Lab:1 room
2. 2 Computers as a Server for Labs (with High Configuration)
3. LCD Projectors - 4 Nos
4. Headphones with Mic (i-ball) - 100 Nos
5. Speakers with Amplifiers, Wireless Mic and Collar Mic - 2 Sets
6. Teacher table, Teacher Chair - 1 + 1
7. Plastic Chairs - 75 Nos

PH 2031 PHYSICS LABORATORY

L	T	P	C
1	0	3	3

OBJECTIVE

To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Physics

OUTCOME

Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

S.No.	List of Experiments	Batch 2 (30)			Batch 1 (30)		
		Week	Periods allotted		Week	Periods allotted	
			L	P		L	P
1	Torsional Pendulum - Determination of rigidity modulus of the material of a wire.	1	1	3	2	1	3
2	Non Uniform Bending - Determination of Young's Modulus.	3	1	3	4	1	3
3	Viscosity -Determination of co-efficient of Viscosity of a liquid by Poiseuille's flow.	5	1	3	6	1	3
4	Lee's Disc - Determination of thermal conductivity of a bad conductor.	7	1	3	8	1	3
5	Air Wedge - Determination of thickness of a thin wire.	9	1	3	10	1	3
6	Spectrometer - Refractive index of a prism.	11	1	3	12	1	3
7	Semiconductor laser - Determination of wavelength of Laser using Grating.	13	1	3	14	1	3
	TOTAL	**7**	**2**	**1**	**7**	**2**	**1**
							56 Periods

LIST OF EQUIPMENTS REQUIRED FOR A BATCH OF 30 STUDENTS

1	Torsional Pendulum	(500 gm, wt, 60 cm wire Al-Ni Alloy)	5 nos.
2	Travelling Microscope	(X10)	15 nos.
3	Capillary tube	(length 10cm, dia 0.05mm)	5 nos.
4	Magnifying lens	(X 10)	15 nos.
5	Lee's disc apparatus	(std form)	5 nos.
6	Stop watch	(+/- 1 s)	5 nos.
7	Meter scale	1m length	5 nos.
8	Spectrometer	(main scale 360 deg, ver 30")	5 nos.
9	Grating	(2500 LPI)	5 nos.
10	Laser	(632.8 nm)	5 nos.
11	Semi transparent glass plate Al coating, 65 nm thickness	50% visibility	5 nos.
12	Equilateral prism	(n = 1.54)	5 nos.
13	Thermometer	+/- 1 deg	8 nos.
14	Screw gauge	(+/- 0.001cm)	12 nos.
15	Vernier caliper	(+/- 0.01 cm)	8 nos.
16	Steam Boiler	1 L	5 nos.
17	Scale	50 cms	5 nos.
18	Cylindrical mass	100 gms	10 sets
19	Slotted wt	300 gms	5 sets
20	Heater	1.5 KW	5 nos.
21	Transformer sodium vapour lamp	1 KW	10 nos.
22	Sodium vapour lamp	700 W	5 nos
23	Burette	50 mL	5 nos
24	Beaker	250 mL	5 nos
25	Spirit level		10 nos

REFERENCES

- P.Mani, Engineering Physics Practicals, Dhanam Publications, Chennai, 2005.

CY 2031 CHEMISTRY LABORATORY

L	T	P	C
1	0	3	3

OBJECTIVE

To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Chemistry.

OUTCOME

Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

S.No.	List of Experiments (Any Five)	Batch 2 (30)			Batch 1 (30)		
		Week	Periods allotted		Week	Periods allotted	
			L	P		L	P
1	Estimation of Commercial soda by acid-base titration	1	1	3	2	1	3
2	Determination of Percentage of nickel in an alloy	3		3	4		3
3	Determination of Temporary, permanent and total hardness of water by EDTA method	5	1	3	6	1	3
4	Determination of Chloride content in a water sample	7		3	8		3
5	Potentiometric Estimation of iron	9	1	3	10	1	3
6	Conductometric Titration of a strong acid with a strong base	11	1	3	12	1	3
7	Conductometric Titration of mixture of acids.	13	1	3	14	1	3
8	Determination of Degree of polymerization of a polymer by Viscometry	15	1	3	16	1	3
	TOTAL		**6**	**24**		**6**	**24**
							60 Periods

List of Glassware and Equipments required for a batch of 30 students

1	Burette	(50 mL)	30 nos.
2	Pipette	(20 mL)	30 nos.
3	Conical Flask	(250 mL)	30 nos.
4	Distilled water bottle	(1 L)	30 nos.
5	Standard flask	(100 mL)	30 nos.
6	Funnel	(small)	30 nos.
7	Glass rod	20 cm length	30 nos.
8	Reagent Bottle	(250 mL)	30 nos.
9	Reagent Bottle	(60 mL)	30 nos.
10	Beaker	(100 mL)	30 nos.
11	Oswald Viscometer	Glass	30 nos.
12	Measuring Cylinder	(25 mL)	30 nos.
13	Digital Conductivity Meter	PICO make	8 nos.
14	Conductivity cell	(K=1)	12 nos.
15	Digital Potentiometer	PICO make	8 nos.
16	Calomel Electrode	Glass	12 nos.
17	Platinum Electrode	Polypropylene	12 nos.
18	Burette Stands	Wooden	30 nos.
19	Pipette stands	Wooden	30 nos.
20	Retard stands	Metal	30 nos.
21	Porcelain Tiles	White	30 nos.
22	Clamps with Boss heads	Metal	30 nos.

REFERENCES

1. J.Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantative Chemical Analysis, 6th Edition, Pearson Education, 2004.
2. C. W. Garland, J. W. Nibler, D. P. Shoemaker, ;"Experiments in Physical Chemistry, 8th ed.," McGraw-Hill, New York, 2009.
3. S. Sumathi, Engineering Chemistry Practicals, Dhanam Publications, 2011.

SEMESTER-II

MA 2201 ENGINEERING MATHEMATICS -II

L	T	P	C
3	1	0	4

Prerequisite MA 2101

Goal

To provide comprehensive knowledge in engineering mathematics and create an awareness of their applications.

Objectives

The course should enable the students to:

1. Understand the evaluation of the double and triple integrals in Cartesian and polar forms,
2. Know the basics of Vector calculus,
3. Know Cauchy - Riemann equations, Milne - Thomson method and Conformal mapping,
4. Grasp the concept of Cauchy's integral formula, Cauchy's residue theorem and contour integration,
5. Know Laplace transform and inverse Laplace transform and their properties.

Outcome

At the end of the course the student should be able to:

1. Find area as double integrals and volume as triple integrals in engineering applications,
2. Evaluate the gradient, divergence, curl, line, surface and volume integrals along with the verification of classical theorems involving them,
3. Apply analytic functions and their interesting properties in science and engineering,
4. Evaluate the basics of complex integration and the concept of contour integration which is important for evaluation of certain integrals encountered in practice,
5. Have a sound knowledge of Laplace transform and its properties and their applications in solving initial and boundary value problems.

UNIT I MULTIPLE INTEGRALS **12**

Review: Basic concepts of integration - Standard results - Substitution methods - Integration by parts - Simple problems.

Double integrals: Cartesian and polar co-ordinates - Change of variables - simple problems - Area as a double integral. Triple integrals: Cartesian co ordinates - Volume as a triple integral - simple problems.

UNIT II VECTOR CALCULUS **12**

Review: Definition - vector, scalar - basic concepts of vector algebra - dot and cross products-properties.

Gradient, Divergence and Curl - Unit normal vector, Directional derivative - angle between surfaces-Irrotational and solenoidal vector fields. Verification and evaluation of Green's theorem - Gauss divergence theorem and Stoke's theorem. Simple applications to regions such as square, rectangle, triangle, cuboids and rectangular parallelopipeds.

UNIT III ANALYTIC FUNCTIONS **12**

Review: Basic results in complex numbers - Cartesian and polar forms - Demoivre's theorem.

Functions of a complex variable - Analytic function - Necessary and sufficient conditions (without proof) - Cauchy - Riemann equations - Properties of analytic function - Harmonic function - Harmonic conjugate - Construction of Analytic functions by Milne - Thomson method. Conformal mapping: w = z + a, az, 1/z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION **12**

Statement and application of Cauchy's integral theorem and Integral formula - Evaluation of integrals using the above theorems - Taylor and Laurent series expansions -Singularities - Classification. Residues - Cauchy's residue theorem (without proof) - Contour integration over unit circle and semicircular contours (excluding poles on boundaries).

UNIT V LAPLACE TRANSFORM **12**

Laplace transform - Conditions of existence - Transform of elementary functions - properties - Transforms of derivatives and integrals - Derivatives and integrals of transforms - Initial and final value theorems - Transforms of unit step function and impulse function - Transform of periodic functions. Inverse Laplace transform - Convolution theorem - Solution of linear ODE of second order with constant coefficients.

L= 45, T=15, TOTAL: 60

Note: Questions need not be asked from review part.

TEXT BOOKS

1. Venkatraman M.K, Mathematics, Volume - II, National Publishing Company, Chennai, 1985.
2. Grewal B.S, Higher Engineering Mathematics, Thirty Eighth Editions, Khanna Publisher, Delhi, 2004.
3. Chandrasekaran A, Engineering Mathematics, Volume - II, Dhanam Publication, 2008.

REFERENCES

1. Kandasamy P, Engineering Mathematics Volume II, S. Chand & Co., New Delhi, 1987.
2. Grewal B.S, "Engineering Maths - II", Sultan Chand, New Delhi, 1993.
3. Bali N.P, Manish Goyal, Text book of Engineering Mathematics, 3rd Edition, Lakshmi Publications, 2003.

EC2201 ELECTRON DEVICES & CIRCUITS

L	T	P	C
3	1	0	4

Prerequisite Nil

Goal

The aim of this course is to understand the concepts and analysis of basic electrical circuits using laws and theorems, to know about the basic analysis and synthesis techniques in electrical networks and to familiarize the student with the principle of operation, capabilities and limitations of various electron devices so that he will be able to use these devices effectively.

Objectives

The course should enable the students to:

1. Understand the use of circuit analysis theorems and methods,
2. Understand basic concepts of DC and AC circuit behavior and develop and solve mathematical representations for simple RLC circuits,
3. Understand the Diode operation and switching characteristics,
4. Understand the Operation of BJT, FET, MOSFET metal semiconductor rectifying and ohmic contacts,
5. Study the characteristics of special type semiconductor diodes.

Outcome

At the end of the course the student should be able to:

1. Use network techniques, like node analysis and loop analysis, to write equations for large linear circuits; Apply Thevenin and Norton theorems to analyze and design for maximum power transfer. Apply the concept of linearity and the associated technique of superposition to circuits and networks,
2. Explain the concept of steady state, apply phasor analysis to AC circuits in sinusoidal steady state and analyze the frequency response of circuits containing inductors and capacitors,
3. Develop through basic knowledge on the behavior and the characteristics of semiconductor junction,
4. Acquire knowledge on the applications of BJT, FET, MOSFET,
5. Learn the usage of different types of devices for various applications.

UNIT I CIRCUIT ANALYSIS TECHNIQUES **9**

Kirchoff's current and voltage laws - series and parallel connection of independent sources - R, L and C - Network Theorems - Thevenin, Superposition, Norton, Maximum power transfer and duality - Star-delta conversion.

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS **9**

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs - frequency response - Parallel and series resonances - Q factor - single tuned and double tuned circuits.

UNIT III SEMICONDUCTOR DIODES **9**

Review of intrinsic & extrinsic semiconductors - Theory of PN junction diode - Energy band structure - current equation - space charge and diffusion capacitances - effect of temperature and breakdown mechanism - Zener diode and its characteristics.

UNIT IV TRANSISTORS **9**

Principle of operation of PNP and NPN transistors - study of CE, CB and CC configurations and comparison of their characteristics - Breakdown in transistors - operation and comparison of N-Channel and P-Channel JFET - drain current equation - MOSFET - Enhancement and depletion types - structure and operation - comparison of BJT with MOSFET - thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only) **9**

Tunnel diodes - PIN diode, varactor diode - SCR characteristics and two transistor equivalent model - UJT - Diac and Triac - Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells - LED, LCD.

L = 45, T = 15, TOTAL: 60

TEXT BOOKS

1. Jacob . Millman & Halkias, "Electronic Devices & Circuits",Tata McGraw Hill, Edition-II, 2008.
2. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" - Shaum series,Tata McGraw Hill, (2001)
3. David A. Bell, "Electronic Devices and Circuits", Oxford UniversityPress, 5 Edition, (2008).

REFERENCES

1. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, (2006).
2. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis",Tata McGraw Hill, 6 Edition, 2002.
3. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits",Tata McGraw Hill, 2 Edition, (2008).

EE2311 ELECTRICAL MACHINES

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To expose the students to the concepts of various types of electrical machines and transmission and distribution of electrical power

Objectives

The course should enable the students to:

1. Give a through theoretical knowledge on the principle, e.m.f equation constructions losses, and characteristics of D.C generators and more about the torque & speed relations of D.C. motors.
2. Learn the e.m.f equation construction, Testing and losses.
3. Learn the Performance of induction machines with a sound knowledge of the principle, construction losses etc.
4. Learn the principle construction and e.m.f of alternators and synchronous motors special machines.
5. Gain knowledge of generation Transmissions & Distribution systems.

Outcome

At the end of the course the student should be able to:

1. The theory behind D.C generators, and to do experiments which will help the student to become expert in D.C. generators, to select different motors for practical applications.
2. The Knowledge implement to for practical experiments and apply them in day today life.
3. To think practically to conduct experiments.
4. Conduct experiments to obtain the regulations and to select special machines for project.
5. Give more contributions in turn practical field of power system which will in help the society.

UNIT I D.C. MACHINES **9**

Constructional details - emf equation - Methods of excitation - Self and separately excited generators - Characteristics of series, shunt and compound generators - Principle of operation of D.C. motor - Back emf and torque equation - Characteristics of series, shunt and compound motors - Starting of D.C. motors - Types of starters - Testing, brake test and Swinburne's test - Speed control of D.C. shunt motors.

UNIT II TRANSFORMERS **9**

Constructional details - Principle of operation - emf equation - Transformation ratio - Transformer on no load - Parameters referred to HV/LV windings - Equivalent circuit - Transformer on load - Regulation - Testing - Load test, open circuit and short circuit tests.

UNIT III INDUCTION MOTORS **9**

Construction - Types - Principle of operation of three-phase induction motors - Equivalent circuit - Performance calculation - Starting and speed control - Single-phase induction motors (only qualitative treatment).

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES **9**

Construction of synchronous machines-types - Induced emf - Voltage regulation; emf and mmf methods - Brushless alternators - Reluctance motor - Hysteresis motor - Stepper motor.

UNIT V TRANSMISSION AND DISTRIBUTION **9**

Structure of electric power systems - Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems - Substation layout - Insulators - cables.

TOTAL : 45

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill publishing company ltd, second edition, 2002.
2. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.

REFERENCES

1. S.K.Bhattacharya, 'Electrical Machines', Tata McGraw Hill Publishing company ltd, second edition, 1998.
2. V.K.Mehta and Rohit Mehta, 'Principles of Power System', S.Chand and Company Ltd, third edition, 2003.

CY 2002 ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to all Branches except CIVIL Engineering)

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To impart basic knowledge on the significance of environmental science for engineers.

Objectives

The course should enable the students to:

1. Make the students aware of the existing natural resources such as forest water resources and to educate them to understand the need for preserving the resources,
2. Educate the students about the functions of various ecosystems and biodiversity,
3. Provide knowledge on the various aspects of different types of pollution such as air pollution, water pollution and soil pollution,

4. Give a basic knowledge on the social issues such as global warming, acid rain, ozone layer depletion, nuclear hazards etc. and to educate them about the various Environmental Protection Acts,

5. Create awareness among the present generation about the various aspects of human population and their effect on environment.

Outcome

At the end of the course the student should be able to:

1. Realize the effects on over exploitation of water resources, forest resources etc. and their impact on day to day life on earth.

2. Design the processes that are eco friendly.

3. Device effective control measures to reduce rate of pollution.

4. Know the significances of sustainable development and the need to enforce Environmental Acts.

5. Have an awareness of population control for effective utilization of the resources and the need to explore new alternate energy resources for a healthy environment.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, scope and importance - Need for public awareness - Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification - Role of an individual in conservation of natural resources - Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets - river / forest / grassland / hill / mountain.

UNIT II ECOSYSTEMS AND BIODIVERSITY 14

Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) - Introduction to Biodiversity - Definition: genetic, species and ecosystem diversity - Biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems - pond, river, hill slopes, etc.

UNIT III ENVIRONMENTAL POLLUTION **8**

Definition - Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards - Soil waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.

Field Study of local polluted site - Urban / Rural / Industrial / Agricultural

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **7**

From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. - Wasteland reclamation - Consumerism and waste products - Environment Production Act - Air (Prevention and Control of Pollution) Act - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act - Issues involved in enforcement of environmental legislation - Public awareness

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **6**

Population growth, variation among nations - Population explosion - Family Welfare Programme - Environment and human health - Human Rights - Value Education - HIV / AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health - Case studies.

TOTAL : 45

TEXT BOOKS

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co., 1971.
3. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, 1999.
4. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications, 1998.

REFERENCES

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India, 2004.
2. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.

GE 2231 - ENGINEERING PRACTICES LABORATORY-II

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

S.No	LIST OF EXPERIMENTS	HOURS
	ELECTRICAL ENGINEERING:	
1.	Wiring for a tube light.	6
2.	Wiring for a lamp and fan.	6
3.	Staircase wiring	3
4.	Study of (i) Iron box and (ii) Fan with Regulator	6
	ELECTRONICS ENGINEERING:	
5.	Study of Electronic components and Equipments	3
6.	Characteristics of PN junction diode & measurement of Ripple factor of half wave and full wave rectifier.	9
7.	Applications of OP-AMP - Inverter, Adder and Subtractor.	9
8.	Study and verification of Logic Gates	3

TOTAL : 45

Components Required:

Electrical Engineering	
Choke	2 nos
Starter	2 nos
Tubelight stand	2 nos
36W tubelight	2 nos
Fan	2nos
40W lamp	5nos
Single way switch	10 nos
Two way switch	5 nos
Iron box	2nos
Fan with regulator opened	1no (demo purpose)
Wires	

Electronics Engineering

IC Trainer Kit, Resistors, Capacitors, CRO, Function Generator,BreadBoard,Regulated Power Supply, Zener Diode, PN Junction Diode, Potentiometer, Digital Multimeter,Ammeter, Voltmeter, Wattmeter, IC 7408,IC 7432,IC 7486, IC 7400, IC 7404, IC 7402

TEXT BOOK

1. T. Jeyapoovan, M.Saravanapandian and S. Pranitha, Engineering Practices Lab Manual, 3rd Edition 2006, Vikas Publishing house (P) Ltd., New Delhi.

EL2231 COMMUNICATION SKILLS LABORATORY - II

L	T	P	C
2	0	2	3

Prerequisite EL2101

Goal

The goal of the programme is to provide an advanced practical input towards moulding student-achievers who can use the English language with ease.

Objectives

The course should enable the students to:

1. Extend the power of the learners to listen to English at an advanced level and comment on it.
2. Guide the learners to speak English at the formal and informal levels.
3. Enable learners to read and grasp the in-depth meaning of technical and non-technical passages in English.
4. Help the learners develop the art of writing at the formal and informal levels.
5. Expand the thinking capability of the learners so that they would learn how to be original in their thoughts.

Outcome

At the end of the course the student should be able to:

1. Listen to and understand English at an advanced level and interpret its meaning.
2. Develop English at the formal and informal levels and thus gained the confidence to use it without fear.
3. Read and grasp the in-depth meaning of technical and non-technical passages in English.
4. Develop the art of formal and informal writing.
5. Think independently and creatively and also verbalize their thoughts fearlessly.

UNIT I LISTENING SKILL **12**

Topics: Listening to telephonic conversations -- Listening to native British speakers -- Listening to

native American speakers -- Listening to intercultural communication -- Listening to answer questions as one-liners and paragraphs -- Listening practice to identify ideas, situations and people -- Listening to group discussions -- Listening to films of short duration.

UNIT II SPEAKING SKILL **12**

Topics: Interview skills - People skills - Job interview - Body language and communication -- How to develop fluency -- Public speaking -- Speaking exercises involving the use of stress and intonation - Speaking on academic topics - Brain storming & discussion - Speaking about case studies on problems and solutions - Extempore speeches - Debating for and against an issue - Mini presentations - Generating talks and discussions based on audiovisual aids.

UNIT III READING SKILL **12**

Topics: Reading exercises for grammatical accuracy and correction of errors -- Reading comprehension exercises with critical and analytical questions based on context - Evaluation of contexts - Reading of memos, letters, notices and minutes for reading editing and proof reading -- Extensive reading of parts of relevant novels after giving the gist of the same.

UNIT IV WRITING SKILL **12**

Topics: At the beginning of the semester, the students will be informed of a mini dissertation of 2000 words they need to submit individually on any non-technical topic of their choice. The parts of the dissertation will be the assignments carried out during the semester and submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V THINKING SKILL **12**

Topics: Practice in preparing thinking blocks to decode pictorial representations into English words, expressions, idioms and proverbs - Eliciting the knowledge of English using thinking blocks -- Picture rereading -- Finding meaning in the meaningless - Interpreting landscapes, simple modern art and verbal and non-verbal communication.

L : 30, P : 30, TOTAL : 60

REFERENCE BOOKS

1. Ibbotson, Mark. Cambridge English for Engineering. New Delhi: Cambridge University Press, 2009.
2. Smith-Worthington Jefferson. Technical Writing for Success. New Delhi. Cengage Learning, 2007.

WEBSITES FOR LEARNING ENGLISH

1. British: Learn English - British Council (Business English) - <http://learnenglish. british council. org/>
2. BBC Learning English (General and Business English) - <http://www.bbc.co.uk/worldservice/learningenglish/>

3. Intercultural: English Listening Lesson Library Online http://www.elllo.org/

Equipments required

1. Career Lab:1 room
2. 2 Computers as a Server for Labs (with High Configuration)
3. LCD Projectors - 4 Nos
4. Headphones with Mic (i-ball) - 100 Nos
5. Speakers with Amplifiers, Wireless Mic and Collar Mic - 2 Sets
6. Teacher table, Teacher Chair - 1 + 1
7. Plastic Chairs - 75 Nos

EC2231 CIRCUITS AND DEVICES LABORATORY

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

To Provide practical knowledge about various electric circuits and electron devices

Objectives

This lab experiments should enable the students to:

1. Verify KVL and KCL,
2. Verify Thevenin and Norton Theorems,
3. Verify superposition Theorem,
4. Verify Maximum power transfer and reciprocity theorems,
5. Analyze the frequency response of series and parallel resonance circuits,
6. Analyze the characteristics of PN and Zener diode,
7. Analyze the characteristics of BJT under CE configuration,
8. Analyze the characteristics of UJT and SCR,
9. Analyze the characteristics of JFET
10. To design and verify various electric circuits using multisim software tool.

Outcome

At the end of the course the student should be able to:

1. Understand KVL and KCL,
2. Understand Thevenin and Norton Theorems,

3. Understand superposition Theorem,
4. Understand Maximum power transfer and reciprocity theorem,
5. Understand frequency response of series and parallel resonance circuits,
6. Understand, design and verify the characteristics of PN and Zener diode,
7. Understand, design and verify the characteristics of BJT under CE configuration,
8. Understand,design and verify the characteristics of UJT and SCR,
9. Understand, design and verify the characteristics of JFET,
10. Learn and use multisim software tool to design various electric circuits.

EXPT NO.	LIST OF EXPERIMENTS	CONTACT HOURS
1	Verification of KVL and KCL	3
2	Verification of Thevenin and Norton Theorems.	6
3	Verification of superposition Theorem.	3
4	Verification of Maximum power transfer and reciprocity theorems.	3
5	Frequency response of series and parallel resonance circuits.	6
6	Characteristics of PN and Zener diode.	3
7	Characteristics of BJT under CE configuration.	3
8	Characteristics of UJT and SCR.	6
9	Characteristics of JFET.	6
10	To design and verify various electric circuits using multisim software tool.	6
	Total	**45**

LIST OF EQUIPMENTS

Sl. No	Equipment and components	Range
1.	RPS	(0-30)V
2.	Ammeter	(0-1)mA, (0-5)mA, (0-10)mA, (0-30)mA,(0-50)mA, (0-500)μA
3.	Voltmeter	(0-10)V,(0-1)V,(0-30)V
4.	Resistors	1 KΩ, 22 KΩ, 5.8 KΩ ,560 Ω, 470 Ω, 1,829.10Ω, 10 KΩ, 5.6 KΩ ,5.1 KΩ
5.	Capacitor	(0.1)μF, (0.01) μF, (0.001) μF
6.	Function Generator	(0-3)MHz

7.	CRO with Probes	20 MHz
8.	Bread Board	
9.	Connecting Wires	
10.	Decade Inductance Box	
11.	Diode	IN4007
12.	Zener Diode	ECZ5V1
13.	Transistor	BC107
14.	UJT	2N2646
15.	SCR	TYN616
16.	FET	BFW 10
17.	Multisim Software	

SEMESTER-III

MA2301 MATHEMATICS-III

L	T	P	C
3	1	0	4

Prerequisite MA2101

Goal

The course aims to develop the skills of the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

Objectives

The course should enable the students to:

1. Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results,
2. Have gained a well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data,
3. Have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results,
4. Have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair, and specialization on Fourier transform pair, their properties, the possible special cases with attention to their applications,
5. Understand the problems using Z-transform and learn their properties.

Outcome

At the end of the course the student should be able to:

1. Formulate mathematically certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
2. Use the knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
3. Formulate and identify certain boundary and initial value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve the vibration and heat flow problems and then interpret the results.
4. Apply Fourier transform pair, their properties, with the possible special cases with attention to their applications.

5. Apply the basics of Z - transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z - transform technique bringing out the elegance of the procedure involved.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 12

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series - Half range cosine series - Complex form of Fourier Series - Parseval's identify - Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 12

Classification of second order quasi linear partial differential equations - Solutions of one dimensional wave equation - One dimensional heat equation - Steady state solution of two-dimensional heat equation (Insulated edges excluded) - Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM 12

Fourier integral theorem (without proof) - Fourier transform pair - Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem.

UNIT V BESSEL FUNCTION AND LEGENDRE POLYNOMIAL 12

Bessel's equation, Bessel functions, recurrence relations, orthogonality property, generating function. Legendre's equation, Legendre Polynomials, Rodrigue's formula, generating function, recurrence relations, orthogonality property.

L = 45, T = 15, TOTAL: 60

TEXT BOOKS

1. Venkatraman M. K., "Higher Mathematics for Engineering and Science", National Publishing Company, 1999.
2. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
3. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company ltd., New Delhi, 1996.

REFERENCES

1. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians," Macmillan, New York, 1988.
2. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
3. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw-Hill Book Co., Singapore, 1987.

CS2311 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++

L	T	P	C
3	0	0	3

Prerequisite CS2101

Goal

To provide in-depth knowledge in Object oriented programming and data structures.

Objectives

The course should enable the student to:

1. Learn the systematic way of solving problems,
2. Learn object oriented Programming,
3. Practice problem solving using C++,
4. Learn different data structures and write programs.

Outcome

At the end of the course the student should be able to:

1. Acquire knowledge in problem solving techniques,
2. Become familiar with object oriented programming concepts,
3. Write programs in C++,
4. Implement various data structures in C++.

UNIT I INTRODUCTION **9**

Basic concepts of object oriented programming-Benefits of OOP's-Application OOP-Structure of C++ program-Basic Data type-Derived Data type-User defined data type-Operators in C++,Control Statements, inline function, function Overloading-Specifying a class-defining member function-nesting of member function-array of object-friend function-constructor-parameterized constructor-copy of constructor-destructor.

UNIT II OVERLOADING AND POLYMORPHISM **9**

Defining operator overloading-overloading unary operator- overloading binary operator-rules for operator overloading-inheritance-single inheritance-multilevel inheritance-multiple inheritance-hierarchal inheritance-hybrid inheritance-virtual base class -polymorphism-pointer-pointer to object-this pointer-virtual function -pure virtual function.

UNIT III LINEAR DATA STRUCTURES **9**

Arrays-Introduction-Linear arrays-representation of linear arrays in memory -Traversing linear arrays-Sorting-Linear Search-Binary Search-Multidimensional Array-pointers-Records-Representation of records in memory-Matrices-Sparse matrices.

UNIT IV LIST and QUEUES **9**

Linked list-Introduction-Representation of Linked List in memory-Traversing a linked list-Searching a

linked list-memory allocation- insertion and deletion in linked list-implementation of stack using array and linked representation-An application of Stack-recursion-Queues-linked representation of queues.

UNIT V NONLINEAR DATA STRUCTURES 9

Trees-Introduction-Binary trees-Types of Binary trees-Representation of binary trees-Binary tree Traversal-Binary search trees- Searching & Insertion in binary search trees.

TOTAL:45

TEXT BOOKS

1. Ira Pohl, "Object Oriented Programming using C++", 2nd Ed, Pearson Edu., 2009. (Unit I, II)
2. Seymour LIpschurtz, "Data Structures", Tata MCGraw Hill, 2006. (Unit III, IV, V).

REFERENCES

1. Nell Dale, Chips Weens, "Programming and Problem Solving with C++", Jones and Bartlett Publications, 5th Ed., 2010
2. Behrouz A. Forouan, Richrad F. Gilberg, "Computer Science - A Structural Approach Using C++", Cengage Learning, 2004.

EC2301 ELECTRONIC CIRCUITS - I

L	T	P	C
3	1	0	4

Prerequisite EC2201

Goal

The aim of this course is to familiarize the student with the analysis and design of basic transistor, amplifier circuits and power supplies.

Objectives

The course should enable the students to:

1. Study transistor biasing and simple amplifier circuits.
2. Study mid - band analysis of small - signal amplifier circuits.
3. Study frequency response of amplifiers.
4. Study large signal amplifiers.
5. Study rectifiers and power supplies.

Outcome

At the end of the course the student should be able to:

1. Understand the methods of biasing transistors and design of simple amplifier circuits,
2. Understand the mid - band analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance,

3. Understand the method of calculating cutoff frequencies and to determine bandwidth,

4. Understand the design of power amplifiers and heat sinks,

5. Understand the analysis and design of power supplies and power control using SCR.

UNIT I TRANSISTOR BIASING 9

BJT - Need for biasing - Load line and quiescent point. Variation of quiescent point due to he variation within manufacturers tolerance. Different types of biasing circuits and their stability factors. FET biasing. Use of JFET as a voltage variable resistor.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

Midband analysis of single stage BJT amplifiers .Methods of increasing input impedance using Darlington connection and bootstrapping. Multistage amplifiers. Basic emitter coupled differential amplifier circuit. CMRR, transfer characteristics. CS, CG and CD (FET) amplifiers.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS 9

Low frequency and High frequency analysis of BJT amplifiers High frequency equivalent circuit and analysis of FET amplifiers. Gain-bandwidth product of FETs. General expression for frequency response of multistage amplifiers. Calculation of overall upper and lower cut off frequencies of multistage amplifiers. Amplifier rise time and sag and their relation to cut off frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-coupled power amplifiers. Class B complementary-symmetry, push-pull power amplifiers. Calculation of power output, efficiency and power dissipation. Crossover distortion and methods of eliminating it. Heat sink design.

UNIT V RECTIFIERS AND POWER SUPPLIES 9

Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for Vdc and ripple voltage with C, CL, L-C and C-L-C filters. Voltage multipliers Zener diode regulator. Electronically regulated d.c power supplies. Line regulation, output resistance and temperature coefficient. Switched mode power supplies. Power control using SCR.

L = 45, T = 15, TOTAL = 60

TEXT BOOK

1. Milman and Halkias,Integrated Electronics McGraw Hill publishers 2nd edition 2010

REFERENCES

1. Boylestad Nashelsky - Electronic devices and Circuit Theory- Pearson Education India 10th edition, 2009.

2. S Salivahanan and N Suresh Kumar, Electronic devices and Circuits Tata McGraw Hill publishers 2nd edition 2011.

3. Floyd, Electronic Devices, Sixth edition, Pearson Education, 2003.

EC2302 DIGITAL SYSTEMS

L	T	P	C
3	1	0	4

Prerequisite EC2201

Goal

To learn the basic methods and provide the fundamental concepts used in the design of digital systems.

Objectives

The course should enable the students to:

1. Learn number systems, codes, basic postulates of Boolean algebra and show the correlation between Boolean expressions,
2. Gain knowledge about the methods for simplifying Boolean expressions,
3. Outline the formal procedures for the analysis and design of combinational circuits,
4. Learn about several structural and behavioral models for synchronous sequential circuits,
5. Gain knowledge about the concept of memories and programmable logic devices.

Outcome

At the end of the course the student should be able to:

1. Reduce complex logical expressions using various postulates of Boolean algebra.
2. Use different graphical methods for the simplification of complex logical expressions
3. Use the design methodology for combinational logic circuits.
4. Make use of design concepts of sequential circuits
5. Understand the structure of various semiconductor storage devices.

UNIT I NUMBER SYSTEMS AND BOOLEAN SWITCHING ALGEBRA 12

Introduction to Number Systems - Positional Number Systems, Number System conversion, Binary codes -Binary arithmetic, Binary logic functions - Switching algebra - Functionally complete operation sets, Reduction of switching equations using Boolean algebra, Realization of switching function. DeMorgan's Theorem.

UNIT II COMBINATIONAL LOGIC CIRCUIT DESIGN 12

Logic Gates, Minimal two level networks - Minimization of POS and SOP - Design of two level gate networks - Two level NAND-NAND and NOR-NOR networks - Karnaugh maps - Advantages and Limitations - Quine McClusky's method.

UNIT III ARITHMETIC AND STANDARD COMBINATIONAL MODULE 12

Adders - Subtractors - Binary parallel adders, Parallel subtractors, Parallel adder/subtractors, Binary decoders and encoders - Priority encoders - Multiplexers - MUX as universal combinational modules

- Demultiplexers- Introduction to Hardware Description Language (HDL Arithmetic, Multiplexer. Demultiplexer Module Only])

UNIT IV SEQUENTIAL CIRCUIT **12**

Flip flops - SR, JK, D and T flip flops, Master - Slave flip flops, Characteristic and excitation table - Shift registers - Counters - Synchronous and Asynchronous counters - Modulus counters, Up/Down counters - State diagram, State table, State minimization, Implication chart method.

UNIT V MEMORIES AND PROGRAMMABLE LOGIC DEVICES **12**

Classification of memories -RAM organization - Write operation -Read operation - Memory cycle - Timing wave forms - Memory decoding - memory expansion - Static RAM Cell-Bipolar RAM cell - MOSFET RAM cell -Dynamic RAM cell -ROM organization - PROM -EPROM -EEPROM -EAPROM -Programmable Logic Devices -Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Field Programmable Gate Arrays (FPGA).

L = 45, T = 15, Total=60

TEXT BOOK:

1. Morris Mano, "Digital design", 3 rd Edition, Prentice Hall of India, 2008.

REFERENCE BOOKS:

1. Milos Ercegovac, Jomas Lang, "Introduction to Digital Systems", Wiley publications, 1998.
2. John M. Yarbrough, "Digital logic: Applications and Design", Thomas - Vikas Publishing House, 2002.
3. R.P.Jain, "Modern digital Electronics",4th Edition, TMH, 2010.
4. William H. Gothmann, "Digital Electronics", Prentice Hall, 2001.

EC2303 ELECTROMAGNETIC FIELDS AND WAVES

L	T	P	C
3	1	0	4

Prerequisite MA2201

Goal

To familiarize the student to the concepts, calculations pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, Waveguides is possible

Objectives

The course should enable the student to

1. Review the basics of Coordinate systems and Vector Calculus, Static Electric fields and Electric Potential, flux density.
2. Be familiarized with the fundamental theory of static magnetic fields, Obtain field distribution of various sources, to introduce the fundamentals of Magnetic forces and torque.

3. Understand the Laplace's and Poisson's equations, Capacitance of various geometries, boundary conditions for electric fields, Study the Inductance, Study Magnetic boundary conditions.

4. Study Maxwell's equations, the meaning and physical significance, Express Maxwell's four equations in integral and differential forms, Study the power flow, Poynting Vector.

5. Know the concept of plane waves, mathematically represent it in various forms, study wave propagation through various media and wave passage between dissimilar media.

Outcome

At the end of the course the student should be able to

1. Solve problems of 3D coordinate systems and vector calculus, Coulomb's law to solve problems related to electrical force, Solve problems related to charge, electric field, and forces,

2. Develop field equations starting from a basic knowledge of Biot-Savart Law, Ampere's law, Develop field equations for various sources of magnetic field and plot the field distribution using any of the software,

3. Solve problems using Laplace and Poisson's equations, Calculate capacitance of various geometries, Apply boundary conditions to solve electromagnetic problems, Understand the inductance of different types of conductors, Apply boundary conditions to solve electromagnetic problems,

4. Solve problems using Maxwell's equations, Apply Maxwell's theory to understand the concept of wave propagation, Solve problems of Power flow using Poynting vector,

5. Know how the electromagnetic waves are propagating, Solve problems using various conditions of field propagation, differentiate between different media based on wave propagation and related phenomena and solve problems of reflection and refraction of complex wave propagation.

UNIT I STATIC ELECTRIC FIELDS 9

Introduction to Co-ordinate System - Rectangular - Cylindrical and Spherical Co-ordinate System - Introduction to line, Surface and Volume Integrals - Definition of Curl, Divergence and Gradient - Meaning of Strokes theorem and Divergence theorem Coulomb's Law in Vector Form - Definition of Electric Field Intensity - Principle of Superposition- Electric Field due to discrete charges - Electric field due to continuous charge distribution -Electric Field due to charges distributed uniformly on an infinite and finite line - Electric Field onthe axis of a uniformly charged circular disc - Electric Field due to an infinite uniformly chargedsheetElectric Scalar Potential - Relationship between potential and electric field - Potential due toinfinite uniformly charged line - Potential due to electrical dipole - Electric Flux Density - GaussLaw - Proof of Gauss Law - Applications.

UNIT II STATIC MAGNETIC FIELDS 9

The Biot-Savart Law in vector form - Magnetic Field intensity due to a finite and infinite wirecarrying a current I - Magnetic field intensity on the axis of a circular and rectangular loop carryinga current I - Ampere's circuital law and simple applications.Magnetic flux density - The Lorentz force equation for a moving charge and applications -Force on a wire carrying a current I placed in a magnetic field - Torque on a loop carrying a current I - Magnetic moment - Magnetic Vector Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

Poisson's and Laplace's equation - Electric Polarization-Nature of dielectric materials- Definition of Capacitance - Capacitance of various geometries using Laplace's equation - Electrostatic energy and energy density - Boundary conditions for electric fields - Electric current - Current density - point form of ohm's law - continuity equation for current.Definition of Inductance - Inductance of loops and solenoids - Definition of mutual inductance -simple examples.Energy density in magnetic fields - Nature of magnetic materials - magnetization and permeability - magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faraday's law - Maxwell's Second Equation in integral form from Faraday's Law - Equation expressed in point form.Displacement current - Ampere's circuital law in integral form - Modified form of Ampere's circuital law as Maxwell's first equation in integral form - Equation expressed in point form.Maxwell's four equations in integral form and differential form.Poynting Vector and the flow of power - Power flow in a co-axial cable - Instantaneous, Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES 9

Derivation of Wave Equation - Uniform Plane Waves - Maxwell's equation in Phasor form -Wave equation in Phasor form - Plane waves in free space and in a homogenous material.Wave equation for a conducting medium - Plane waves in lossy dielectrics - Propagation in good conductors - Skin effect.Linear, Elliptical and circular polarization - Reflection of Plane Wave from a conductor - normal incidence - Reflection of Plane Waves by a perfect dielectric - normal and oblique incidence. Dependence on Polarization.Brewster angle.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. William H. Hayt, Jr. John. A. Buck "Engineering Electromagnetics" 7th edition, Tata McGraw Hill, 2005
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003. (Unit IV, V). McGraw-Hill, 9th reprint
3. Mathew . N. O. Sadiku " Principles of Electromagnetics", "4th edition, Oxford university Press, 2009

REFERENCE BOOKS

1. Narayana Rao.N : "Elements of Engineering Electromagnetics" 6th edition, Prentice Hall of India, New Delhi, 2012.
2. David. K. Cheng, "Field and Wave electromagnetics, 2nd edition, Pearson Education, 2004

EE2335 ELECTRICAL MACHINES LAB

L	T	P	C
0	0	3	2

Prerequisite EE2311

Goal

To expose the students to the basic operations of electrical machines and help them to develop experimental skills.

Objectives

The course will enable the students to :

1. By conduct open circuit load test, obtain the open circuit & load characteristics.
2. Conduct actual load test for D.C Shunt Motor.
3. Conduct actual load test D.C Series Motor.
4. Predetermine the efficiency of a D.C. machines.
5. Obtain the performance characteristics of single phase transformer.
6. Obtain the regulation by e.m.f , m.m.f Method
7. Obtain the torque slip characteristics
8. Obtain performance of induction Characteristics
9. Obtain performance characteristics of single phase induction motor.

Outcome

At the end of this course the students should be able to:

1. Know the magnetic characteristics and critical resistances from open circuit. And study analysis of variation of load voltage can be studied.
2. The performance of D.C Shunt motor can be studied.
3. Obtain the Performance characteristics of D.C Series motor.
4. Predetermine the efficiency at different loads.
5. Select motor for practical applications
6. Predict the variations in terminal voltage of alternator
7. Select the motor for particular applications
8. select motor for particular application
9. To select among several motors.

LIST OF EXPERIMENTS

SL.NO	TITLE OF EXPERIMENT	HRS
1.	Introduction	3
2.	Open circuit and load characteristics of separately excited and self excited D.C. generator	6
3.	Load test on D.C. shunt motor	3
4.	Load test on D.C. series motor	3
5.	Speed Control of DC Shunt Motor	3
6.	Swinburne's test and speed control of D.C. shunt motor	3
7.	Load test on single phase transformer and open circuit and short circuit test on single phase transformer	3
8.	Regulation of three phase alternator by EMF and MMF methods.	3
9.	Load test on three phase induction motor.	3
10.	No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)	3
11.	Load test on single-phase induction motor.	3
12.	Study of D.C. motor and induction motor starters.	3
13	Repeat Class	3
14	Model Exam	3
	Total Hours	45

LIST OF EQUIPMENTS

S.No.	Description of Equipment	Quantityrequired
1.	D.C motor - Shunt Generator	2 set
2.	D.C. Shunt Motor	2 Nos.
3.	D.C. Series Motor	1 No.
4.	D.C. Compound Motor	1 No.
5.	DC shunt motor coupled three phase alternator	2 Nos
6.	Three phase induction motors -Squirrel cage	
	Slip ring	2 Nos 1 No
7.	Single phase transformers	7 Nos.
8.	Three phase transformers	2 Nos.
9.	Single phase induction motors	1 No

10.	Resistive load	3 phase - 2 , single phase - 3 5 Nos.
11.	Single phase Auto transformer	5 Nos.
13.	Three phase Auto transformer	3 Nos.
14.	Moving Coil Ammeter of different ranges	25 Nos.
15.	Moving Coil Voltmeter of different ranges	25 Nos.
16.	Moving Iron Ammeter of different ranges	25 Nos.
17.	Moving Iron voltmeter of different ranges	20 Nos.
18.	Wire wound Rheostats of different ratings	30 Nos.
19.	Tachometers	10 Nos.
20.	Single element watt -meters of different ranges	20 Nos.

CS2335 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++ LAB

L	T	P	C
0	0	3	2

Prerequisite CS2101

Goal

To teach the principles of good programming practice and to give a practical training in writing efficient programs in C++

Objectives

The course should enable the student to

1. Write simple programs in C++ to understand the concepts in object oriented programming,
2. Write programs for various data structures leaned in CS2311.

Outcome

At the end of the course the student should be able to:

1. Understand C++ programming through practice,
2. Implement various data structures in C++.

LIST OF EXPERIMENTS

Implementation of OOP Concepts

1. Programs using Constructor and Destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs using function overloading and operator overloading.

5. Programs using inheritance.

6. Program using friend functions.

7. Program using virtual function.

Program Development based on Understanding

8. Write a C++ program to create a database of personnel information system containing following information. Name, birth- date, blood group, weight, height, policy number, telephone no., driving license. Design base class with name, Date of Birth, blood group, and another class consist of height and weight. Design another base class consisting of policy number and address. Design a derived class using the base classes to store information such as telephone number and driving license number.

9. Create a message class with a constructor that takes a single string with a default value. Create a private member string and in the constructor assign the argument string to the internal string. Create two overloaded member functions called Print(): one that takes no argument and one that takes string argument.

10. Write a C++ program to perform String operations

    i. = Equality

    ii. == String Copy

    iii. + Concatenation

    iv. << To display a string

    v. >> To reverse a string

    vi. Function to determine whether a string is a palindrome

    vii. To find occurrence of a sub-string. Use Operator Overloading.

11. Write C++ program using three classes as

    b. Student's personal information (name, address, phone, birth date etc)

    c. Student's academic information (Xth, XIIth and Graduation)

    d. Student's other information (project done, seminar, hobbies, sports record etc)

Use multiple inheritance and print bio-data of a particular student

12. Create a simple "shape" hierarchy. A base class called shape and derived classes called circle, square and triangle. In the base class write a virtual function "draw" and override this in derived classes.

13. Consider a bookshop that sells both books and tapes. Book is having title and number of pages and cost. Tape has time and cost. Using virtual functions, print the required information about book or tape. Use files to store information.

14. Code the following list ADT operations using array, single linked list, double linked list.

a. void is_emptyList(List 1)

b. List makeNullList(size n)

c. Position firstPost(List 1)

d. Position endPost(List 1)

e. Position nextPost(List 1, Position p)
f. Position prevPos(List 1, position p)
g. Position find)List 1, Element x)
h. Position findKth(List 1, int k)
i. void insert(List 1, Position p)
j. void delete(List 1, Position p)
k. void append(List 1, Element x)
l. int cmp(List 1, Position p1, Position p2)
m. int cmp2(List11, List12, Position p1, Position p2)
n. void swap(List 1, Position p1, Position p2)
o. Element retrieveElement(List 1, Position p)
p. void print element(List 1, Position p)

15. Using the above List ADT operations, Write a menu driven program to support following higher level list operations:

a. Create null list
b. Read a list of elements into the list.
c. Insert an element in the Kth position of the list
d. Delete an element in the Kth position of the list
e. Delete a given element from the list
f. Find whether given element is present in the list
g. Display the elements of the list

16. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list.

17. Implement stack ADT and write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Extend the program to handle parenthesized expression also.

18. Implement Binary Tree ADT and write a program that reads postfix Arithmetic expression form, builds the expression tree and performs tree Traversal on it.

19. Implement Binary search Tree ADT and write a program that interactively allows

(a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations

TOTAL:45

List of Equipments

Software: C++

Hardware: Computer

EC2331 ELECTRONIC CIRCUITS LAB - I

L	T	P	C
0	0	3	2

Prerequisite EC2201

Goal

To make students familiar with characteristics and behaviour of various solid state electronic components and devices.

Objectives

The course should enable the students to:

1. Study the semiconductor devices,
2. Study the biasing circuits of BJT,
3. Study the complementary symmetry Class B power amplifier,
4. Study the differential amplifiers ,
5. Study the Source follower Bootstrap circuit

Outcome

At the end of the course the student should be able to:

1. Understand the characteristics of diodes, transistors and other semiconductor devices,
2. Understand the design of BJT amplifies using different biasing techniques,
3. Understand the performance, cross over distortions and efficiency of power amplifiers,
4. Understand the performance of differential amplifiers and calculate the CMRR,
5. Understand the improvement in input impedance by Bootstrap circuits.

LIST OF EXPERIMENTS

1.	Diode Forward characteristics.	3
2.	Input and Output characteristics of BJT.	3
3.	Output characteristics of JFET.	3
4.	Fixed Bias amplifier circuits using BJT.	3
5.	BJT Amplifier using voltage divider bias (self bias) with un bypassed emitter resistor.	6
6.	Source follower with Bootstrapped gate resistance.	6
7.	Class B Complementary symmetry power amplifier	3
8.	Differential amplifier using BJT.	6
9.	Power supply Full wave rectifier with simple capacitor filter.	6

10. Measurement of UJT and SCR Characteristics. 6

TOTAL = 45

List of Equipments

1. Diode IN4007, BY 126.
2. Resistors 10 k ?,330 ?,4.7K? ,47K? ,2.2K ? ,DRB ,8.2K? 682K?,POTENTIOMETER.
3. Ammeter (0-5) mA,(0-500)μA,(0-15) mA.
4. Voltmeter (0-1) V ,(0-15)v.
5. Bread Board.
6. Transistor BC108, 2N 3055, CK 100.
7. Power supply (0-30) v.
8. JFET BFW 11.
9. CRO 5MHz
10. Capacitor 100μF, 0.1 μF.
11. Audio Oscillator 10 KHz
12. Signal Generator. 3 MHz
13. Transformer.
14. UJT 2N2646.
15. SCR SN106.

EC2332 DIGITAL SYSTEMS LAB

L	T	P	C
0	0	3	2

Prerequisite EC2201

Goal

To understand the design and analysis of combinational and sequential circuits using logic gates and MSI devices and to implement the same using HDL

Objectives

The course should enable the students to:

1. Understand Boolean theorems and logic gates and to design and implement combinational circuits using basic logic gates.
2. Design Combinational circuits using MSI devices.
3. Design and implement synchronous and asynchronous sequential circuits.

4. Understand Hardware description language and simulate the design of combinational and sequential circuits using Verilog.

Outcome

At the end of the course the student should be able to:

1. Implement combinational circuits using basic logic gates.
2. Understand the design of Combinational circuits such as adders, comparators.. etc. using MSI devices.
3. Understand the design and implementation of Multiplexers, synchronous and asynchronous counters etc.
4. Understand the Hardware Description Language and design and simulate combinational circuits like arithmetic circuits and multiplexers, and sequential circuits like counters using Verilog.

LIST OF EXPERIMENTS

1.	Design and implementation of Adders and Subtractors using logic gates.	3
2.	Design and implementation of code converters using logic gates (i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa	6
3.	Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483	3
4.	Design and implementation of 2Bit Magnitude Comparator using logic gates and 8 Bit Magnitude Comparator using IC 7485	3
5.	Design and implementation of Multiplexer and De-multiplexer using logic gates .	3
6.	Design and implementation of encoder and decoder using logic gates	3
7.	Construction and verification of 4 bit ripple counter and Mod-10 counters	6
8.	Design and implementation of 3-bit synchronous up/down counter	3
9.	Design and Verification of truth table of Master slave JK flip flop.	3
10.	Design of Asynchronous up Counter.(MOD-6)	3
11.	Design of Adder and Subtractor using VHDL.	3
12.	Design of MUX and DeMux using VHDL.	3
13.	Design of 4 bit Ripple Counter and MOD 10 Counter using VHDL.	3
		TOTAL:45

List Of Equipments

1. Digital IC Trainer Kit
2. VLSI Design Software Xilinx 9.1i
3. ICS Used:IC 74150,IC 74154, IC 74138, IC 74148IC 7400,7402,7408,7432,7486IC 7485, 7483 IC 7474,7476

SEMESTER IV

MA2402 RANDOM PROCESSES

L	T	P	C
3	1	0	4

Prerequisite Nil

Goal

This course aims at providing the necessary basic concepts in random processes. A knowledge of fundamentals and applications of phenomena will greatly help in the understanding of topics such a estimation and detection, pattern recognition, voice and image processing networking and queuing.

Objectives

The course should enable the students to:

1. Have a fundamental knowledge of the basic probability concepts.
2. Have a well - founded knowledge of standard distributions which can describe real life phenomena.
3. Acquire skills in handling situations involving more than one random variable and functions of random variables
4. Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
5. Be able to analyze the response of random inputs to linear time invariant systems.

Outcome

At the end of the course the student should be able to:

1. Evaluate the probability using addition and multiplication theorem, apply Baye's for practical problems to find the probability, and verify whether a given function is a probability mass or density function,
2. Apply the discrete and continuous distributions for solving practical problems, and evaluate the moments of the distributions using moment generating function,
3. Evaluate the probability using marginal and conditional distributions. Analyze the correlation between two variables. Find the regression equations for the given set of data and their degree of relationship, and Apply central limit theorem for practical problems and evaluates the probability of an event,
4. Verify whether a process is of first or second order or wide sense or strictly stationary. Classifies the properties of Markov processes,
5. Evaluate the auto and cross correlation of functions. Apply the relationship between cross power and cross correlation in practical problems. Analyze the response of random inputs to linear time invariant systems.

UNIT I PROBABILITY AND RANDOM VARIABLE 12

Axioms of probability - Conditional probability - Total probability - Baye's theorem - Random variable - Probability mass function - Probability density functions- Properties -Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 12

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES AND STATISTICS 12

Joint distributions - Marginal and conditional distributions - Covariance - Measures of Central Tendency - Measures of Dispersion - Skewness - Kurtosis - Correlation and regression.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 12

Definition and examples - first order, second order, strictly stationary, wide - sense stationary and Ergodic processes - Markov process.

UNIT V CORRELATION AND SPECTRAL DENSITIES 12

Auto correlation - Cross correlation - Properties - Power spectral density - Cross spectral density - Properties - Wiener-Khintchine relation - Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function -Linear systems with random inputs - Auto correlation and cross correlation functions of input and output.

L = 45, T = 15, TOTAL: 60

TEXT BOOKS

1. Venkatraman M.K., "Probability Statistics and Random Process", National Publishing Company, 2004.
2. Veerarajan, T. "Probability Statistics and Random Process", Tata McGraw-Hill Publications, second edition, New Delhi, 2002.
3. Ross, S., "A First Course in Probability", Fifth edition, Pearson Education, Delhi, 2002.

REFERENCES

1. Henry Stark and John W. Woods "Probability and Random Processes with Applications to Signal Processing", Pearson Education, Third edition, Delhi, 2002.
2. Ochi, M.K. , "Applied Probability and Stochastic Process", John Wiley & Sons, New York, 1990.

EC2401 ELECTRONIC CIRCUITS-II

L	T	P	C
3	1	0	4

Prerequisite EC2301

Goal

To familiarize the student with the analysis and design of feedback amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

Objectives

The course should enable the students to

1. Study the concept of feedback amplifiers and its topologies,
2. Study the mechanism for oscillation and different types of oscillators,
3. Study the concept of Tuned amplifiers, stabilization and neutralization techniques,
4. Study the concept of multivibrator circuits and its triggering methods,
5. Study the concept of blocking oscillator and saw tooth generators.

Outcome

At the end of the course the student should be able to:

1. Understand the concept of feedback amplifiers, different topologies and its design,
2. Understand the concept for oscillation, types of oscillators and its design,
3. Understand the concept of Tuned amplifiers and various neutralization techniques,
4. Understand the concept of multivibrator circuits and its design,
5. Understand the mechanism of blocking oscillator and its applications.

UNIT I FEEDBACK AMPLIFIERS **9**

Block diagram. Loop gain. Gain with feedback. Desensitivity of gain. Distortion and cut off frequencies with feedback. The four basic feedback topologies and the type of gain stabilized by each type of feedback. Input and Output resistances with feedback. Method of identifying feedback topology, feedback factor and basic amplifier configuration with loading effect of feedback network taken into account. Analysis of feedback amplifiers. Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS **9**

Barkhausen Criterion. Mechanism for start of oscillation and stabilization of amplitude. Analysis of Oscillator using Cascade connection of one RC and one CR filters. RC phase shift Oscillator. Wien bridge Oscillator and twin-T Oscillators. Analysis of LC Oscillators, Colpitts, Hartley, Clapp, Miller and Pierce oscillators. Frequency range of RC and LC Oscillators. Quartz Crystal Construction. Electrical equivalent circuit of Crystal. Crystal Oscillator circuits.

UNIT III TUNED AMPLIFIERS **9**

Coil losses, unloaded and loaded Q of tank circuits. Analysis of single tuned and synchronously

tuned amplifiers. Instability of tuned amplifiers. Stabilization techniques. Narrow band neutralization using coil. Broad banding using Hazeltine neutralization. Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RL & RC Integrator and Differentiator circuits. Diode clippers, clampers and slicers. Collector coupled and Emitter coupled Astable multivibrator. Monostable multivibrator. Bistable multivibrators. Triggering methods. Storage delay and calculation of switching times. Speed up capacitors. Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

Monostable and Astable Blocking Oscillators using Emitter and base timing. Frequency control using core saturation. Pushpull operation of Astable blocking oscillator i.e., inverters. Pulse transformers. UJT sawtooth generators. Linearization using constant current circuit. Bootstrap and Miller saw-tooth generators. Current time base generators.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. Millman and Halkias. C., "Integrated Electronics", Tata McGraw-Hill,Second Edition 1991,(I,II).
2. Schilling and Belove, "Electronic Circuits", TMH, Third Edition, 2002 (Unit - III)
3. Millman J. and Taub H., "Pulse Digital and Switching waveform", McGraw-Hill International (UNIT - IV & V)
4. Robert L. Boylestead and Louis Nasheresky, 8th edn., PHI, 2002.

REFERENCES

1. Sedra / Smith, "Micro Electronic Circuits" Oxford university Press, 2004.
2. David A. Bell, " Solid State Pulse Circuits ", Prentice Hall of India, 1992.

EC2402 LINEAR INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

Prerequisite EC2201, EC2301

Goal

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

Objectives

The course should enable the students to:

1. Learn the IC fabrication technology.
2. Know the Op -amp characteristics and its linear applications.
3. Learn comparator, Schmitt-Trigger circuits, Voltage regulator and some linear and nonlinear oscillators
4. Study how an Op-Amp can act as a filter on an electrical signal
5. Learn the theory and applications of PLL, ADC and DAC.

Outcome

At the end of the course the student should be able to:

1. Enumerate different steps involved in the process of fabrication of integrated circuit.
2. Distinguish clearly between an ideal and actual characteristics of an Op-amp. And to learn different linear applications.
3. Understand different nonlinear applications.
4. Understand the advantages of using active filters in place of passive filters.
5. Understand how an operational amplifier can be helpful in signal processing.

UNIT I INTEGRATED CIRCUIT TECHNOLOGY 9

Monolithic Integrated Circuit Technology - Planar process - Bipolar Junction Transistor fabrication -- Monolithic diodes - Metal -Semiconductor contact - Integrated Circuit Resistors - Integrated Circuit Capacitors - Fabrication of MOSFET - CMOS Technology.

UNIT II OP-AMP CHARACTERISTICS AND APPLICATIONS 9

Characteristics of ideal op-amp. Pin configuration of 741 op-amp. Internal Circuit, Bias, offsets and drift,bandwidth and slew rate.DC and AC characteristics, Frequency compensation. Applications: Instrumentation Amplifier, inverting and non-inverting amplifiers, inverting and non-inverting summers, difference amplifier, differentiator and integrator, Log and antilog amplifiers. Multiplier and divider, analog computers.

UNIT III COMPARATORS AND SIGNAL GENERATORS 9

Comparators, regenerative comparators, astable multivibrator, Monostable multivibrator, Triangular

wave- generators, RC-phaseshift oscillator, Wein's bridge oscillator,Voltage Regulator, Series op amp regulator, IC voltage regulator,723 general purpose regulator, Switching Regulator.

UNIT IV ACTIVE FILTERS, TIMERS AND MULTIPLIERS 9

Low pass, High pass, Band pass and Band Reject filters, Butterworth, Chebychev filters, first and second order filters-switched capacitor filters. 555 Timer functional diagram, monostable and astable operation, multiplier - application.

UNIT V PLL, ADC AND DAC 9

PLL- basic block diagram and operation, Phase Detector/comparator, VCO ,capture range and lock range,IC PLL 565 Block diagram, simple applications of PLL, AM detection, FM detection and FSK demodulation. Weighted resistor DAC, R-2R and inverted R-2R DAC, monolithic DAC.Flash ADC, counter type ADC, successive approximation ADC, dual slope ADC, DAC/ADC specifications.

TOTAL = 45

TEXT BOOKS

1. Ramakant A.Gayakwad, 'OP-AMP and Linear ICs', Prentice Hall / Pearson Education
2. Coughlin & Driscoll, 'OP-AMP and Linear ICs'; PHI
3. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd..

REFERENCES

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International .
2. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill.
3. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers
4. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India.
5. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill.
6. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill.
7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education.

EC2403 SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

Prerequisite MA2201,MA2301

Goal

To study and analyze characteristics of continuous, discrete time signals and systems.

Objectives

The course should enable the students to:

1. Understand the representation of Signals, classification of signals, signal transforms and their properties.
2. Understand the concepts in the analysis of continuous time signals and systems.
3. Understand Sampling Theorem and Z-Transform.
4. Understand the concepts of Discrete Time systems.
5. Understand the finite and infinite Impulse response.

Outcome

At the end of the course the student should be able to:

1. Understand the properties and representation of discrete and continuous signals.
2. Analyze and transform signals to different domains.
3. Perform sampling on the continuous signals along with the analysis of discrete systems using Z-transforms.
4. Perform the analysis and synthesis of discrete time systems
5. Perform the finite and infinite impulse response analysis of discrete time systems.

UNIT I REPRESENTATION OF SIGNALS 9

Continuous and discrete time signals: Classification of Signals - Periodic aperiodic even - odd - energy and power signals - Deterministic and random signals - complex exponential and sinusoidal signals - periodicity - properties of discrete time complex exponential unit impulse - unit step impulse functions - Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals - Explanation of properties of continuous time and discrete time Fourier series.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

Continuous time Fourier Transform and Laplace Transform analysis with examples - properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains. Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Laplace transform: Computation of impulse response and transfer function using Laplace transform.

UNIT III SAMPLING THEOREM AND Z-TRANSFORMS 9

Representation of continuous time signals by its sample - Sampling theorem - Reconstruction of a Signal from its samples, aliasing - discrete time processing of continuous time signals, sampling of band pass signals. Basic principles of Z-transform - Z-transform definition - region of convergence - properties of ROC - Properties of Z-transform - Poles and Zeros - inverse Z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.

UNIT IV DISCRETE TIME SYSTEMS 9

Computation of Impulse response & Transfer function using Z Transform, DFT Properties and examples - LTI-DT systems -Characterization using difference equation - Block diagram representation - Properties of convolution and the interconnection of LTI Systems - Causality and stability of LTI Systems.

UNIT V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

Systems with finite duration and infinite duration impulse response - recursive and nonrecursive discrete time system - realization structures - direct form - I, direct form - II, Transpose , cascade and parallel forms.

L = 45, T = 15, TOTAL = 60

TEXT BOOK

1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

REFERENCES

1. John G.Proakis and Dimitris G.Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 4th Edition, PHI, 2006.
2. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, McGraw Hill, 2003.
3. Simon Haykin and Barry Van Veen, Signals and Systems, 2nd Edition, John Wiley, 2007.
4. K.Lindner, Introduction to signals and systems, McGraw Hill International, 1999.
5. Michael J Roberts, Fundamentals of Signals and systems, McGraw Hill, 2008.

EC2404 ANALOG COMMUNICATION

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation; Angle modulation and demodulation, noise performance of various receivers and information theory with source coding theorem.

Objectives

The course should enable the students to:

1. Study the need of modulation, Amplitude Modulation and demodulation
2. Provide various Angle modulation and demodulation
3. Study depth analysis in noise performance Continuous wave modulations
4. Study some basic information theory with some channel coding theorem.

Outcome

At the end of the course the student should be able to:

1. Understand the need for modulation and amplitude modulation techniques.
2. Understand frequency modulation, demodulation and the comparison of AM and FM.
3. Understand the sources and types of noise in various receivers.
4. Understand the PAM, PPM and PWM techniques.
5. Know the basic information theory and various channel coding theorem.

UNIT I AMPLITUDE MODULATION **9**

Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters - Super heterodyne receiver, AM receiver.

UNIT II ANGLE MODULATION **9**

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal - Direct FM - indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL - Nonlinear model and linear model of PLL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receives, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

UNIT III NOISE **9**

Noise - Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sine wave plus

Narrowband Noise, Receiver model, Noise in DSB-SC receiver, Noise in SSB receiver, Noise in AM receivers, Noise in FM receivers, FM threshold effect, FM threshold reduction.

UNI IV PULSE MODULATION **9**

Time Divison Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM-Generation & demodulation of PWM, PPM- Generation and demodulation of PPM

UNIT V INFORMATION THEORY **9**

Uncertainty, Information and entropy, Source coding theorem, Data compaction, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, Differential entropy, and mutual information for continuous ensembles, information capacity theorem, implication of the information capacity theorem, rate distortion theory, Compression of information.

TOTAL = 45

TEXT BOOK

1. Simon Haykin, Communication Systems, John Wiley & sons, NY, 4th Edition, 2001.

REFERENCES

1. Roddy and Coolen, Electronic communication, PHI, New Delhi, 4th Edition, 2003.
2. Taub and Schilling, Principles of communication systems, TMH, New Delhi, 1995.
3. Bruce Carlson et al, Communication systems, McGraw-Hill Int., 4th Edition, 2002.

EC2431 ELECTRONIC CIRCUITS AND SIMULATION LAB

L	T	P	C
0	0	3	2

Prerequisite EC2201, EC2231, EC2301

Goal

To understand the design and implementation of feedback amplifiers, multivibrators and oscillators.

Objectives

The course should enable the students to:

1. Design and implement of the Series and Shunt feedback amplifiers.
2. Design the various types of oscillators like wein bridge oscillators,LC oscillators,RC phase shift oscillators and Harteley oscillators.
3. Design and simulation of Differential amplifier and different filters Using P-spice.
4. Design the various types of multi vibrators like astable, mono stable and bistable multivibrators.

Outcome

At the end of the course the student should be able to:

1. Understand the design of shunt and series feedback amplifiers, and calculate the bandwidth from the frequency response , input and output impedence.
2. Understand the design of oscillators and calculate the frequency of operation of various oscillators.
3. Understand the design and simulation of Differential amplifier and different filters using P-spice.
4. Understand the design of various types of multi vibrators like astable,mono stable and bistable multivibrators and then to calculate the frequency of operation.

LIST OF EXPERIMENTS

S. No	List of Experiments	Contact Hours
1	Study of series feedback ampliers-Frequency response, input, output Impedance calculation	3
2	Study of shunt feedback amplifiers -Frequency response, input, output Impedance calculation	3
3	Design of RC phase shift oscillator	3
4	Design of Wien bridge oscillator	3
5	Design of Heartly and Colpits oscillator	3
6	Study of class-C tuned amplifier- Frequency response	3
7	Study of integrator and differentiator circuits	3
8	Study of Clipper and clamper circuits	3
9	Study of multivibrator circuits	3
10	Simulation of differential amplifier using PSpice	3
11	Simulation of second order Butterowrth filter using PSpice	3
12	Simulation of multivibrator circuits using PSpice	3
13	Simulation of D/A and A/D convertes using PSpice	3
14	Simulation of analog multiplier cicuit using PSpice	3
15	Simulation of CMOS logic gates using PSpice	3
	Total	**45**

List of Equipments

1. Transistor BC 107,BC 108
2. Resisters 1k ?,2.2k ?,3.3k ?,10k ?,47k ? 330 ?,DRV
3. Capaciors.1µF, .01 µF,.001 µF,10 µF,100 µF
4. Inductors 10mH,22mH,BIV
5. Diode IN 4007
6. Op-amp LM741
7. DC Power Supply (0-30v)
8. Signal Generator (0-3MHZ)
9. CRO 3MHZ
10. Multimeter
11. Breadboard
12. Pspice Simulator Versionb 9.1, PC

EC2432 LINEAR INTEGRATED CIRCUITS LAB

L	T	P	C
0	0	3	2

Prerequisite EC2201, EC2301

Goal

To study, design and test various applications of linear integrated circuits.

Objectives

The course will enable the students to design and test:

1. Inverting, Non-Inverting & Differential Amplifiers using Op-amp
2. Integrator, Differentiator using Op-amp
3. Instrumentation amplifier
4. Filters using Op-amp
5. Astable, Monostable multivibrators and Schmitt Trigger using op-amp
6. Oscillators using Op-amp
7. Precision rectifier & Triangular Wave Generator
8. Astable, Monostable multivibrators using 555 timer
9. Applications of PLL
10. Power supply and SMPS control.

Outcome

At the end of this course the students should be able to design and test:

1. Inverting, Non-Inverting & Differential Amplifiers
2. Integrator, Differentiator
3. Instrumentation amplifier
4. Low pass and High pass filters
5. Astable, Monostable multivibrators using Op-amp
6. Oscillators using Op-amp
7. Precision rectifier & Triangular Wave Generator
8. IC 555 timer
9. Frequency multiplier using Op-amp
10. Power supply and SMPS control.

LIST OF EXPERIMENTS

Design and testing of

1.	Inverting, Non inverting and differential amplifiers.	6
2.	Integrator and Differentiator.	3
3.	Instrumentation amplifier	3
4.	Active lowpass and bandpass filter.	3
5.	Astable, Monostable multivibrators and Schmitt Trigger using op-amp.	6
6.	Phase shift and Wein bridge oscillator using op-amp.	3
7.	Precision Half Wave & Full Wave Rectifiers.	3
8.	Triangular Wave Generator.	3
9.	Astable and monostable using NE555 Timer.	6
10.	PLL characteristics and Frequency Multiplier using PLL.	3
11.	DC power supply using LM317 and LM723.	3
12.	Study of SMPS control IC SG3524 / SG3525.	3
	TOTAL	**45**

List of Equipments

1. Cathode Ray Oscilloscope (0-20) MHz
2. Function Generator (0-30) MHz
3. Dual Power Supply (0-12) V
4. Regulated Power Supply (0-12) V,(0-30)V

5. IC741, IC555, IC565, LM317, LM723
6. Resistors 41 Ω ,120 Ω , 220 Ω , 1K Ω ,1.5 K Ω , 2 K Ω , 2.2 K Ω , 2.7 K Ω , 3 K Ω , 4.7 K Ω , 8 K Ω , 10 K Ω ,15 K Ω ,20 K Ω , 40 K Ω ,70 K Ω ,100 K Ω
7. Capacitors 0.1μF,0.01 μF, 4.7 μF,10 μF,200 μF
8. DRB
9. DiodeIN4007,
10. Voltmeter (0-25) V
11. Ammeter(0-30)mA
12. Bread Board
13. Connecting Wires

EC2433 ANALOG COMMUNICATION LAB

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

To have a fundamental understanding in analog communication and analog modulation types.

Objectives

The course should enable the students to:

1. Study the Amplitude and Frequency modulation and demodulation.
2. Study the characteristics of AM and FM receivers.
3. Study the different pulse modulation techniques.
4. Design and Analysis of AM and FM modulation and demodulation using Matlab and Pspice.

Outcome

At the end of the course the student should be able to:

1. Evaluate amplitude and frequency modulation parameters
2. Characterize AM and FM receivers.
3. Learn about the Pulse modulation techniques.
4. Analyze and Design the AM and FM using Matlab anf Pspice.

LIST OF EXPERIMENTS

1. Analog Modulation and Demodulation 6
2. Frequency Modulation and Demodulation 6

3.	Characteristics of AM receiver (Selectivity & Sensitivity).	3
4.	Characteristics of FM receiver (Selectivity & Sensitivity).	3
5.	Sampling & Reconstruction	3
6.	PAM - Modulation and Demodulation	3
7.	PWM , PPM - Modulation and Demodulation	6
8.	Preemphasis and Deemphasis	3
9.	Analog modulation and demodulation using Matlab	3
10.	Frequency modulation and demodulation using Matlab	3
11.	Analog modulation and demodulation using Pspice	3
12.	Frequency modulation and demodulation using Pspice	3
	TOTAL	**45**

List of Equipments

1. RPS- (0-30) v
2. CRO - (0-20) MHz
3. Function Generator- (0-1)MHz
4. Components
5. Multimeters
6. Spectrum Analyzer

Software

1. Computer system with latest specification
2. PSpice Simulation - Version 9.1

EC2434 PROJECT WORK

L	T	P	C
0	0	6	2

Prerequisite Nil

Goal

To provide practical knowledge on the various components design and manufacturing aspects of a commercially available Electronics & Communication utility.

Objectives

The course should enable the students to:

1. Actual design aspects by providing hands on skills.

Outcome

At the end of the course the student should be able to:

1. Identify various components, materials used, manufacturing process involved and assembly and dismantling of that commercial object.

EXERCISES:

- To Dismantle and identify the various components, material used, manufacturing process involved and to assemble the following components & Processing Techniques.

  (Resistor, Capacitor, Inductor, Integrated Circuits, Electrical Machines)

SEMESTER V

MA 2502 COMPUTATIONAL METHODS

L	T	P	C
3	1	0	4

Prerequisite MA 2101,MA2301

Goal

To provide comprehensive knowledge in numerical solutions.

Objectives

The course should enable the students to:

1. Learn the techniques of solving the algebraic and transcendental equations and the solutions of system of linear algebraic equations. Understand the techniques to find the eigen value iteratively.
2. Learn to interpolate using Newton's forward and backward difference formulae for equal and unequal intervals.
3. Study the use of numerical differentiation and integration to find the value of the derivative at a point and approximate area using numerical integration.
4. Learn to solve numerically the initial value problems for ordinary differential equations using single step and multi step method.
5. Learn the methods of solving second order partial differential equations numerically.

Outcome

At the end of the course the student should be able to:

1. Find out the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations by direct and indirect methods, and evaluate the eigen value of a matrix iteratively and verify it analytically.
2. Solve problems where huge amounts of experimental data are involved, construct approximate polynomial to represent the data and to find the intermediate values.
3. Apply the numerical differentiation and integration when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information. evaluate the angular velocity and acceleration, and the area under the curve and the value of double integral using trapezoidal and simpson's rule.
4. Solve engineering problems which are characterized in the form of nonlinear ordinary differential equations, solve the initial and boundary value problems numerically and verify it analytically.
5. Solve the initial and boundary value problems related heat flow, one and two dimensional and vibration problems. Understand the numerical techniques of solving the partial differential equation in engineering applications.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Linear interpolation methods (method of false position) - Newton's method - Statement of Fixed Point Theorem - Fixed point iteration: x=g(x) method - Solution of linear system by Gaussian elimination and Gauss-Jordon methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods- Inverse of a matrix by Gauss Jordon method - Eigen value of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 12

Lagrangian Polynomials - Divided differences - Interpolating with a cubic spline - Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Derivatives from difference tables - Divided differences and finite differences -Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules - Romberg's method - Two and Three point Gaussian quadrature formulas - Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods: Taylor series method - Euler and modified Euler methods - Fourth order Runge - Kutta method for solving first and second order equations - Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference solution of second order ordinary differential equation - Finite difference solution of one dimensional heat equation by explicit and implicit methods - One dimensional wave equation and two dimensional Laplace and Poisson equations.

L = 45, T = 15, TOTAL : 60

TEXT BOOKS

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.

REFERENCES

1. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.

EI2511 MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To introduce the concept of measurement and the related instrumentation requirement as a vital ingredient of electronics and communication engineering.

Objectives

The course should enable the students to:

1. Acquire the knowledge on basic measurement concepts
2. Acquire the knowledge on basic electronic measurements
3. Acquire the knowledge on signal generators and analyzers
4. Acquire the knowledge on digital instruments
5. Acquire the knowledge on data Acquisition Systems and Fiber Optic Measurements.

Outcome

At the end of the course the student should be able to:

1. Understand Measurement systems, Bridge measurements
2. Know the principles of cathode ray oscilloscopes and other measuring instruments
3. Understand Function generators, Spectrum analyzer and Wave analyzer
4. Compare analog and digital techniques, and measurement errors
5. Understand elements of a digital data acquisition system, Fiber optic measurements.

UNIT I BASIC MEASUREMENT CONCEPTS **9**

Measurement systems - Static and dynamic characteristics - units and standards of measurements - error analysis - moving coil, moving iron meters - multimeters - True RMS meters - Bridge measurements - Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS **9**

Force on charge in electric field - Motion of Charge in uniform and time varying electric fields - Force on a moving charge in a magnetic field - Cathode ray oscilloscopes - block schematic - applications - special oscilloscopes - Q meters - Vector meters - RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS **9**

Function generators - RF signal generators - Sweep generators - Frequency synthesizer - wave analyzer - Harmonic distortion analyzer - spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS **9**

Comparison of analog and digital techniques - digital voltmeter - multimeters - frequency counters - measurement of frequency and time interval - extension of frequency range - measurement errors.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS **9**

Elements of a digital data acquisition system - interfacing of transducers - multiplexing - computer controlled instrumentation - IEEE 488 bus - fiber optic measurements for power and system loss - optical time domains reflectometer.

TOTAL :45

TEXT BOOKS

1. Albert D.Helfrick and William D.Cooper - Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2003.
2. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, Electronic Devices and Circuits, TMH, 1998.

REFERENCES

1. Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice Hall of India, 2nd edn., 2003.
2. Ernest O. Doebelin, Measurement Systems- Application and Design-Tata McGraw-Hill-2004.

EC 2501 DATA COMMUNICATION AND NETWORKS

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To Provide basic knowledge about various Data Communication Techniques and the Networking concepts.

Objectives

The course should enable the students to :

1. Study the different types of Network components
2. Study various communication links
3. Study LAN technologies
4. Study Transport layer protocols
5. Study of WAN technologies.

Outcome

At the end of the course the student should be able to:

1. Identify the different Network components and their respective roles in a communication system.

2. Propose efficient, cost effective, reliable and appropriate technology to establish communication links.
3. Design an enterprise network employing the common LAN technologies and be able to evaluate the advantages and disadvantages.
4. Configure a PC to work as a host in a TCP/IP network and to use the IP based commands to facilitate the trouble shooting process.
5. Describe the technical issues related to the Wide Area Networks and identify the common technologies available in establishing WAN infrastructure.

UNIT I DATA COMMUNICATIONS 9

Components - Direction of Data flow - networks -types of Connections - Topologies -basics of Message switching, Packet switching, Circuit switching and Cell switching. - Transmission Media - Coaxial Cable - Fiber Optics - Line Coding.

UNIT II PROTOCALS AND STANDARDS 9

Standards - ISO / OSI reference model- overview of TCP/IP architecture, TCP/IP model. Structured cabling and specifications: Standards CAT5, 5E - RS232 Interfacing standard.

UNIT III DATA LINK LAYER 9

Error - Detection and Correction - Parity - CRC - Hamming code - Flow Control and Error control: Stop and Wait - Go back N ARQ - Selective Repeat ARQ- HDLC.

LAN: Ethernet IEEE 802.3and IEEE 802.5 - IEEE 802.11-FDDI.

UNIT IV NETWORK& TRANSPORT LAYER 9

IP addressing methods- Sub-netting - Routing - Distance Vector and Link State Routing concepts - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Connection establishment and teardown, Quality of services (QOS).

UNIT V APPLICATION LAYER 9

Domain Name Space (DNS) - Services provided - DNS records and messages - server Simple Mail Transfer Protocol (SMTP) - Architecture and Services - Message format - Pretty good privacy technique, Hyper Text Transfer Protocol (HTTP) - Connections and Architecture - Message format -Web caching, World Wide Web (WWW) - Client Server Architecture-Browser settings.

TOTAL = 45

TEXT BOOKS

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw-Hill, 4th Edition, 2006.
2. Larry L. Peterson & Bruce S. Davie, "Computer Networks, A systems approach", Morgan Kaufmann Publication, 5th Edition, 2011.

REFERENCES

1. James. F. Kurose & Keith W. Ross, "Computer Networking: A Top- down Approach Featuring", Pearson Education, 6th Edition, 2012.
2. William Stallings, "Data And Computer Communications", Pearson Education, Inc. 9th Edition, 2010.
3. Curt M. White, "Data Communications and Computer Networks" 6-th Edition, 2008.

EC2502 MICROPROCESSORS AND MICROCONTROLLER

L	T	P	C
3	1	0	4

Prerequisite EC2301

Goal

To learn the architecture programming and interfacing of microprocessors and Microcontrollers.

Objectives

The course should enable the students to:

1. Study 8085 architecture
2. Study 8086 architecture
3. Learn 8086 programming
4. Study Interfacing concepts
5. Study 8051 Microcontroller.

Outcome

At the end of the course the student should be able to:

1. Understand the architecture, instruction sets and programming of 8085.
2. Understand the architecture, Interrupts and memory interfacing of 8086.
3. Program arithmetic and data manipulation using 8086.
4. Understand interfacing concepts using 8056.
5. Understand the architecture, instruction sets and programming of 8081.

UNIT I 8085 MICROPROCESSOR **9**

8085 Architecture - Instruction set - Addressing modes - Assembly language programming - 8 bit arithmetic - Interrupts.

UNIT II 8086 MICROPROCESSOR **9**

Functional block diagram -signals - Memory interfacing - I/O ports and data transfer concepts Timing Diagram - Interrupt structure.

UNIT III PROGRAMMING OF 8086 PROCESSOR **9**

Instruction format and addressing modes - Assembly language format - Data transfer, data Manipulation, control and string instructions - Programming: Loop structure with counting Indexing - Look up table - Subroutine instructions stack.

UNIT IV PHERIPHERAL INTERFACING **9**

Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8257 PIC, 8251 USART and 8253 Timer/Counter -Inter Integrated Circuits (I2C), Serial Peripheral Interface (SPI)- A/D and D/A converter interfacing.

UNIT V 8051 MICRO CONTROLLER **9**

Functional block diagram - Instruction format and addressing modes - Interrupt structure - Timer - I/O ports - Serial communication- Data Transfer, Manipulation, Control & I/O instructions - Simple programming.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. Ramesh S. Gaonkar, "Microprocessor - Architecture, Programming and Applications with the 8085", Fifth Edition, Prentice Hall.,2002.
2. A K Ray and K M Burchandi "Advanced Microprocessor and Peripherals" Tata McGraw Hill - 2006
3. Muhammad Ali Mazidi& Janice GilliMazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, 5th Indian reprint, 2003.

REFERENCE BOOKS

1. William Kleitz, 'Microprocessor and Micro Controller Fundamental of 8085 and 8051 Hardware and Software', Pearson Education, 1998.
2. Programming and Customizing the 8051 Microcontroller.

EI2512 CONTROL SYSTEMS

L	T	P	C
3	1	0	4

Prerequisite MA 2201,EC2403,

Goal

To familiarize the students with concepts related to the operational analysis and stabilization of control systems

Objectives

The course will enable the students to:

1. Analyze representation of systems and to derive transfer function models.
2. Provide adequate knowledge in the time response of systems and steady state error analysis.
3. Give basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
4. Provide the concept of stability of control system and methods of stability analysis.
5. Study the three ways of designing compensation for a control system, various components of control system.

Outcome

At the end of this course the students should be able to:

1. Describe various input/output models of dynamic system
2. Understand frequency domain descriptions and dynamic analysis
3. Understand the concept of stability and effect of feedback control on sensitivity
4. Apply the basic methods of classical control system design such as root locus and phase lead-lag compensation based on Bode plots.
5. Understand the principles of control theory and the various components and application of Control System.

UNIT I CONTROL SYSTEM MODELLING **9**

System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems. Block diagram representation of systems - Block diagram reduction methods - Closed loop transfer function, determination of signal flow graph. Mason's gain formula - Examples.

UNIT II TIME DOMAIN ANALYSIS **9**

Test signals - time response of first order and second order systems - time domain specifications - types and order of systems - generalized error co-efficients - steady state errors - concepts of stability - Routh-Hurwitz stability - root locus.

UNIT III FREQUENCY DOMAIN ANALYSIS **9**

Introduction - correlation between time and frequency response - stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion - Gain margin - phase margin.

UNIT IV COMPENSATORS **9**

Realization of basic compensators - cascade compensation in time domain and frequency domain and feedback compensation - design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers.

UNIT V CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS **9**

Stepper motors - AC servo motor - DC servo motor - Synchros - sensors and encoders - DC tacho generator - AC tacho generator - Hydraulic controller - Pneumatic controller - Typical application of control system in industry.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. Ogata.K, Modern Control Engineering, Prentice Hall of India, 4th Edition, 2003 (UNIT I - IV)
2. Nagrath & Gopal, Control System Engineering, 3rd Edition, New Age International Edition, 2002. (UNIT V)

REFERENCES

1. Benjamin.C.Kuo, Automatic Control Systems, 7th Edition - Prentice Hall of India, 2002.
2. M.Gopal, Control Systems, Tata McGraw-Hill, 1997.

EC2503 TRANSMISSION LINES AND WAVEGUIDES

L	T	P	C
3	1	0	4

Prerequisite MA2201,EC2303

Goal

To lay a strong foundation on the theory of transmission lines and wave guides by highlighting their applications.

Objectives

The course should enable the students to:

1. Study transmission lines using circuit theory, analysis of line, define reflection factor, return loss and lossless line, Representation of lines in different form.
2. Familiarize students with the Standing waves and standing wave ratio, Study impedance matching techniques, Smith Chart, and Stub matching.
3. Develop field equations for wave propagation through various metallic structures, and define various modes of wave propagation, wave impedance and its importance.

4. Learn rectangular cross sectioned metallic guided structures, different modes of wave propagation, attenuation and obtain impedance.

5. Solve wave equation in cylindrical coordinate system, and understand the various modes of wave propagation in cylindrical waveguide.

Outcome

At the end of the course, the student should be able to:

1. Apply transmission line theory to solve problems, understand the signal propagation through transmission lines, solve problems involving Reflection coefficient to know the line behavior, and model the line in a convenient form using circuit theory.

2. Solve problems using SWR ,return loss equations, achieve impedance matching in a line, Solve problems using Smith Chart, apply Smith Chart for Stub design.

3. Know how the electromagnetic waves are propagating through waveguides , solve problems of practical importance using developed theory of wave propagation.

4. Develop a strong theoretical understanding of wave propagation in rectangular wave guide, solve problems of rectangular guided structures, and solve problems related to small equations derived to understand the wave phenomena.

5. Know how the electromagnetic waves are propagating through circular waveguide, Solve problem using the modal theory of wave propagation, and understand the application of resonators in microwave communication.

UNIT I TRANSMISSION LINE THEORY 9

Different types of transmission lines - Definition of Characteristic impedance - The transmission line as a cascade of T-Sections - Definition of Propagation Constant. General Solution of the transmission line - The two standard forms for voltage and current of a line terminated by an impedance - physical significance of the equation and the infinite line - The two standard forms for the input impedance of a transmission line terminated by an impedance -meaning of reflection coefficient - wavelength and velocity of propagation.Waveform distortion - distortion less transmission line - The telephone cable - Inductance loading of telephone cables Input impedance of lossless lines - reflection on a line not terminated by Zo - Transfer impedance- reflection factor and reflection loss - T and π Section equivalent to lines.

UNIT II THE LINES AT RADIO FREQUENCIES 9

Standing waves and standing wave ratio on a line - One eighth wave line - The quarter waveline and impedance matching - the half wave line.The circle diagram for the dissipation less line - The Smith Chart - Application of the Smith Chart- Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and vice versa - Input impedance of a lossless line terminated by an impedance -single stub matching and double stub matching.

UNIT III GUIDED WAVES 9

Waves between parallel planes of perfect conductors - Transverse electric and transverse magnetic waves - characteristics of TE and TM Waves - Transverse Electromagnetic waves -Velocities of

propagation - component of uniform plane waves between parallel planes - Attenuation of TE and TM waves in parallel plane guides - Wave impedances.

UNIT IV RECTANGULAR WAVEGUIDES 9

Transverse Magnetic Waves in Rectangular Wave guides - Transverse Electric Waves in Rectangular Waveguides - characteristic of TE and TM Waves - Cutoff wavelength and phase velocity - Impossibility of TEM waves in waveguides - Dominant mode in rectangular waveguide -Attenuation of TE and TM modes in rectangular waveguides - Wave impedances - characteristic impedance - Excitation of modes.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS 9

Bessel functions - Solution of field equations in cylindrical co-ordinates - TM and TE waves in circular guides - wave impedances and characteristic impedance - Dominant mode in circular waveguide - excitation of modes - Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semi circular cavity resonator, Q factor of a cavity resonator for TE101 mode.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. J.D.Ryder "Networks, Lines and Fields", PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hallof India 2nd edition 2003. (Unit III, IV, V). McGraw-Hill, 9th reprint

REFERENCES

1. Narayana Rao.N : "Elements of Engineering Electromagnetics" 6th edition, Prentice Hall of India, New Delhi, 2012.
2. David. K. Cheng, "Field and Wave electromagnetics, 2nd edition, Pearson Education, 2004.

EC2531 MATLAB and Simulink Lab

L	T	P	C
0	0	3	2

Prerequisite EC2302,EC2403,EC2404

Goal

Introduce the MATLAB programming environment and the usage of Simulink blocksets for communication engineering

Objectives

The course should enable the students to:

1. Learn & implement MATLAB, MATLAB help system.
2. Arrays, Multidimensional arrays, Operations.
3. Functions of MATLAB.
4. Arithmetic and Logical operators.

5. Conditional statements and loops.
6. Plotting, special plotting: 3D plotting.
7. Generation of various signals and sequences.
8. Simulink Basics.
9. Simulink modeling of basic modulation systems.
10. Editing and Debugging MATLAB Programs.

Outcome

At the end of the course, the student should be able to:

1. Get a clear understanding of the basics of MATLAB , various windows and how to use help system.
2. Learn how to work with matrices, and their operations.
3. Get a Clear understanding of the usage of MATLAB functions relevant to communication engineering.
4. How to perform Arithmetic and Logical operations in MATLAB and beyond.
5. Develop programming skills, usage of loops.
6. Make use of the plotting capabilities of MATLAB to effectively display the outputs.
7. Know signals relevant to communication engineering system design.
8. know the basics of Simulink blocksets for communication engineering.
9. Understand the usage of basic digital modulation schemes using Simulink blocksets.
10. Enable the student to identify programming errors.

LIST OF EXPERIMENTS

1.	Introduction to MATLAB, MATLAB help system	6
2.	Arrays, Multidimensional arrays, Operations	6
3.	Functions	6
4.	Arithmetic and Logical operators	3
5.	Conditional statements and loops	6
6.	Plotting, special plotting: 3D plotting	6
7.	Generation of various signals and sequences	3
8.	Simulink Basics	3
9.	Simulink modeling of basic modulation systems	3
10.	Editing and Debugging MATLAB Programs	3
	TOTAL	**45**

List of Equipments

1. PC,3GB RAM 320GB HD Intel i3 Processor
2. MATLAB and Simulink R-2011a, Ver.7.12
3. Tool Boxes : Communication System

REFERENCES

1. Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, Kevin R. Coombes, John E. Osborn, Garrett J. Stuck. "A guide to MATLAB: For begginers and experienced users" Cambridge University Press, 2006
2. MATLAB Tutorial files, www.mathworks.com

EC 2532 DATA COMMUNICATION AND NETWORKS LAB

L	T	P	C
0	0	3	2

Prerequisite Nil

Goal

To Provide hands on training with OPNET simulator and Networking Hardware equipments.

Objectives

The course should enable the students to :

1. Know the various Networking Hardware equipments and their functions,
2. Study the OPNET / Qualnet simulator in detail to measure Network parameters.
3. Study the various Routing program and Socket Processing techniques.

Outcome

At the end of the course the students should be able to understand and test:

1. Various Networking Hardware equipments to evaluate their performance measurements.
2. The OPNET / Qualnet simulator in detail to create the Network scenario to measure Network parameters.
3. The various Routing program for the given Network size and Socket Processing techniques using TCP & UDP protocols.

The following experiments are conducted using the Hardware.

1. PC to PC Communication. 6

   Parallel Communication using 8 bit parallel cable.

   Serial communication using RS 232C.

2. Ethernet LAN protocol. 6

   To create scenario and study the performance of CSMA/CD protocol through simulation .

3. Token bus and token ring protocols. 3

   To create scenario and study the performance of token bus and token ring protocols through simulation.

4. Wireless LAN protocols 3

   To create scenario and study the performance of network with CSMA / CA protocol and

   Compare with CSMA/CD protocols.

5. Implementation of distance vector and Link state routing algorithm. 3

6. Transfer of files from PC to PC using Windows / Unix socket processing. 3

The following experiments are conducted using either QUALNET/OPNET simulators.

7. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped. 3

8. Simulate a four node point-to-point network, and connect the links as follows: n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/ UDP. 6

9. Simulate the different types of Internet traffic such as FTP a TELNET over a network and analyze the throughput. 6

10. Simulate the transmission of ping messaged over a network topology consisting of 6 Nodes and find the number of packets dropped due to congestion. 3

11. Simulate an Ethernet LAN using N-nodes (6-10), change error rate and data rate and Compare the throughput. 3

TOTAL = 45

List of Equipments

1. A total of 25 computers connected through LAN with NETVIEW or related software installed in it.
2. 8 bit parallel cable - 10 nos.
3. RS232C cable - 10 nos.
4. QUALNET/OPNET simulator software

EC2533 MICROPROCESSORS AND MICROCONTROLLER LAB

L	T	P	C
0	0	3	2

Prerequisite EC2302

Goal

To learn the architecture programming and interfacing of Microprocessors and Microcontrollers.

Objectives

The course should enable the students to:

1. Study 8085 - 8 bit arithmetic
2. Study 8086 - 16 bit arithmetic
3. Study 8086 - serial, parallel
4. Study Interfacing and programming - ADC and DAC, 8279, 8251 and 8253.
5. Study 8051- arithmetic and logical.

Outcome

At the end of the course the student should be able to:

1. Write the program for arithmetic operations.
2. Write the program for arithmetic operations.
3. Write program for serial and parallel communications and also the timer program.
4. Write program for peripheral devices.
5. Write program for arithmetic, logical and interfacing stepper motor.

S. No	List of Experiments	Contact Hours
1	Introduction	3
2	Programs for 8 bit Arithmetic operations (Using 8085).	3
3	Programs for 16 bit Arithmetic operations (Using 8085).	3
4	Programs for Sorting and Searching (Using 8085, 8086).	3
5	Programs for String manipulation operations (Using 8086).	3
6	Programs for Digital clock and Stop watch (Using 8086).	3
7	Interfacing ADC and DAC.	3
8	Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.	3
9	Interfacing and Programming 8253.	3

10	Interfacing and Programming 8259.	3
11	Interfacing and Programming 8279.	3
12	Serial Communication between two MP Kits using 8251.	3
13	Interfacing and Programming of Stepper Motor and DC Motor Speed control.	3
14	Practice Session	3
15	Model Test	3
	Total Contact Hours	**45**

List of Equipment's

1. Microprocessor Kit.
   - ESA-85
   - ESA-86
   - ESA-51
2. Cathode Ray Oscilloscope-30 MHz
3. Power Supply (0-30)V
4. Interfacing Cards
   - DAC
   - ADC
   - Stepper Motor
5. Interface card 8255
6. Interface card 8253/8251
7. Function Generator
8. Digital IC trainer Kit
9. Stepper Motor Kit.
10. ADC & DAC Kit
11. Parallel Communication Kit.

SEMESTER-VI

MG 2001 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

Prerequisites Nil

Goal

To make the students to understand the different managerial functions like planning, organizing, staffing, leading and controlling.

Objectives

The course should enable the students to;

1. Be familiar with the historical development of organizations
2. Understand the various steps involved in planning
3. Understand the Structure and Process involved in formal and informal organization
4. Impart knowledge on the principles of leadership and human factors
5. Impart knowledge on System and process of Controlling.

Outcome

At the end of the course the student should be able to:

1. Visualize the development of various business organizations.
2. Be acquainted with steps involved in planning.
3. Gain knowledge in departmentation by different strategies..
4. Be acquainted with different motivation techniques.
5. Describe the various issues on process control.

UNIT I HISTORICAL DEVELOPMENT **9**

Definition of Management - Science or Art - Management and Administration - Development of Management Thought - Contribution of Taylor and Fayol - Functions of Management - Types of Business Organisation.

UNIT II PLANNING **9**

Nature & Purpose - Steps involved in Planning - Objectives - Setting Objectives - Process of Managing by Objectives - Strategies, Policies & Planning Premises- Forecasting - Decision-making.

UNIT III ORGANISING **9**

Nature and Purpose - Formal and informal organization - Organization Chart - Structure and Process - Departmentation by difference strategies - Line and Staff authority - Benefits and Limitations - De-Centralization and Delegation of Authority - Staffing - Selection Process - Techniques - HRD - Managerial Effectiveness.

UNIT IV DIRECTING **9**

Scope - Human Factors - Creativity and Innovation - Harmonizing Objectives - Leadership - Types of Leadership Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques - Job Enrichment - Communication - Process of Communication - Barriers and Breakdown - Effective Communication - Electronic media in Communication.

UNIT V CONTROLLING **9**

System and process of Controlling - Requirements for effective control - The Budget as Control Technique - Information Technology in Controlling - Use of computers in handling the information - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting - The Global Environment - Globalization and Liberalization - International Management and Global theory of Management.

TOTAL : 45

TEXT BOOKS

1. G.K. Vijaya Raghavan, M.Sivakumar, Principles of Management, Lakshmi Publications, Jan 2010.
2. M. Govindarajan, S. Natarajan, Principles Of Management, Prentice Hall of India Learning Pvt. Ltd2005
3. Harold Kooritz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill, 1998
4. Joseph L Massie "Essentials of Management", Prentice Hall of India,(Pearson) Fourth Edition, 2003.

REFERENCES

1. Tripathy PC And Reddy PN, "Principles of Management", Tata McGraw-Hill, 1999.
2. Decenzo David, Robbin Stephen A, "Personnel and Human Reasons Management", Prentice Hall of India, 1996
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition,2004.
4. Fraidoon Mazda, "Engineering Management", Addison Wesley, 2000.

EC2601 DIGITAL COMMUNICATION

L	T	P	C
3	0	0	3

Prerequisite EC 2302,EC2402,EC2404

Goal

To introduce the basic concepts of digital modulation techniques to baseband pulse, pass band data transmission, to give an exposure to error control coding and finally to discuss about the spread spectrum modulation schemes.

Objectives

The course should enable the students to:

1. Understand different methods of pulse digital modulation and demodulation schemes.
2. Analyze baseband pulse transmission and reception, its noise occurrence and noise reduction in communication channel.
3. Analyze pass band digital modulation and demodulation schemes and compare its bit error probability.
4. Understand error control codes with different coding techniques and decoding techniques in data transmission channel.
5. Understand the spread spectrum modulation techniques which are used in digital communication.

Outcome

At the end of the course the student should be able to:

1. Understand the different methods of PCM, PAM, DPCM, DM, ADM schemes which are used in digital communication.
2. Understand the analysis of matched filter, ISI, nyquiest's criterion, correlative level coding, adaptive equalization and eye pattern in digital communication channel.
3. Understand the analysis of ASK, FSK, PSK, DPSK, DEPSK, QPSK, MSK and GMSK schemes and comparison of bit error probability.
4. Understand the linear block codes, cyclic codes convolution codes and viterbi decoding techniques in data transmission channel.
5. Understand the PN sequence, DSSS-BPSK, FHSS and gold codes in digital communication.

UNIT I PULSE DIGITAL MODULATION **9**

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error. PAM and Other forms of pulse modulations Differential PCM system (DPCM), TDM, Delta modulation, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II BASE BAND PULSE TRANSMISSION AND RECEPTION 9

Base band signal receiver, probability of error, the optimum filter, Matched Filter, probability of error using matched filter, Inter symbol Interference, Nyquist's criterion for Distortion less Base band Binary Transmission, Correlative level coding, Adaptive Equalization, Eye pattern analysis.

UNIT III MODULATION SCHEMES 9

Introduction of digital modulation techniques- Generation, Detection, Signal space diagram, calculation of bit error probability and Power spectra of ASK, FSK, PSK, DPSK, DEPSK, QPSK, MSK and GMSK, similarity of BFSK and BPSK, Comparison of Digital modulation systems using bit error probability.

UNIT IV ERROR CONTROL CODING 9

Introduction to linear block codes, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, Introduction to convolution codes, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram, decoding using Viterbi algorithm.

UNIT V SPREAD SPECTRUM MODULATION 9

Pseudo- noise sequences, a notion of spread spectrum - Direct sequence spread spectrum with coherent binary phase shift keying, Signal space Dimensionality and processing gain, Probability of error, Frequency -hop spread spectrum -Maximum length and Gold codes.

TOTAL : 45

TEXT BOOKS

1. Simon Haykin, "Digital communications", John Wiley, 2005.
2. H. Taub and D. Schilling, "Principles of Communication Systems", TMH, 2003.
3. Bernard Sklar, "Digital Communication",Paerson Education, 2nd Edition , 2006.

REFERENCES

1. Sam Shanmugam, " Digital and Analog Communication Systems", -, John Wiley, 2005.
2. B.P.Lathi, "Modern Analog and Digital Communication", Oxford reprint, 3rd edition, 2004.
3. Amitabha Bhattacharya, "Digital Communications", Tata McGraw Hill, 2006.
4. John.G. Proakis, "Fundamentals of Communication Systems", Pearson Education, 2006.
5. Michael. B. Purrsley, "Introduction to Digital Communication", Pearson Education, 2006.
6. Herbert Taub , Donald L Schilling, " Principles of Communication Systems", 3rd Edition, Tata McGraw Hill, 2008.

EC 2602 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	4

Prerequisite MA 2201,EC2403

Goal

To provide the knowledge about various signal processing techniques and their importance in communication field.

Objectives

The course should enable the students to :

1. Study the DFT and FFT
2. Study the IIR Filters.
3. Study the FIR filter and Finite Word Length Problems.
4. Study the Sampling rate conversion.
5. Study the fundamentals of Digital Signal Processors.

Outcome

At the end of the course the student should be able to:

1. Understand the concept of Discrete Fourier Transform Technique and it's efficient computation.
2. Understand the design techniques of IIR and FIR filter types
3. Understand the limitations of Digital processors and to handle various Quantization noises due to finite word length problems.
4. Understand to Decimate and interpolate the signal to convert the sampling rate of the known signal.
5. Know the various type of Digital Signal Processors and their special hardware descriptions.

UNIT I FFT **12**

Introduction to DFT - Efficient computation of DFT -Properties of DFT - FFT algorithms - Radix-2 FFT algorithms - Decimation in Time - Decimation in Frequency algorithms -Use of FFT algorithms in Linear Filtering and correlation.

UNIT II IIR DIGITAL FILTERS DESIGN **12**

IIR Filters - Magnitude response - Phase response - Design and Implementation of Analog Low Pass Butterworth filter - Bilinear transformation -Prewarping, Impulse invariant transformation.

UNIT III FIR DIGITAL FILTERS AND FINITE WORD LENGTH EFFECTS **12**

Linear phase filters - Windowing techniques - design of linear phase FIR filters - Rectangular, Hamming - Frequency sampling techniques.

Quantization effects - Input, Product and Co-efficient quantization error - Limit cycle oscillations - Signal scaling.

UNIT IV MULTIRATE DIGITAL SIGNAL PROCESSING **12**

Decimation- Interpolation- Sampling rate conversion- Implementation of sampling rate onversion. Polyphase implementation of FIR filters for Interpolator and decimator.

UNIT V DIGITAL SIGNAL PROCESSORS **12**

Introduction to DSP architecture - Harvard architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C54X.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing Principles, Algorithms and Application, PHI, 4th Edition, 2006.
2. Emmanuel C. Ifeachor, Barrie W. Jervis, Digital Signal Processing A Practical Approach, Pearson Education India, 2nd Edition.
3. B.Venkataramani & M. Bhaskar, Digital Signal Processor Architecture, Programming and Application, TMH 2002. (UNIT - V)

REFERENCES

1. Alan V. Oppenheim, Ronald W. Schafer, "Discrete Time Signal Processing", PHI, 3rd Edition, 2009.
2. Sanjit .K. Mitra, "Digital Signal Processing-A Computer based approach", McGraw-Hill, 4th edition, 2010.
3. S.Salivahanan, A.Vallavaraj, Gnanapriya," Digital Signal Processing", Tata McGraw-Hill /TMH, 2000
4. M.H. Hayes, "Schaums Outline of Digital Signal Processing", Schaum's Outline Series, 2nd Edition, 2011.
5. Avtar singh, S.Srinivasan, "DSP Implementation using DSP microprocessor with Examples" from TMS32C54XX -Thamson / Brooks cole Publishers, 2003.

EC2603 ANTENNAS AND WAVE PROPAGATION

L	T	P	C
3	1	0	4

Prerequisite EC2303,EC2503

Goal

To enable the student to study the various types of antennas and wave propagation.

Objectives

The course should enable the students to:

1. Study antenna basics and radiation from a current element.
2. Study antenna arrays and loop antennas.
3. Study the travelling wave antennas.
4. Learn aperture and lens antennas.
5. Study radio wave propagation.

Outcome

At the end of the course the student should be able to:

1. Understand the antenna fundamentals and the radiation of the thin linear wire antennas.
2. Understand the array of point sources and uniform linear arrays and also know about the loop antennas.
3. Understand the radiation mechanism of travelling wave and wideband antennas.
4. Understand the radiation of rectangular aperture, slot, parabolic reflector and lens antennas.
5. Know the basic propagation and its types.

UNIT I ANTENNA FUNDAMENTALS AND RADIATION FIELDS OF WIRE ANTENNAS 9

Radiation intensity. Directive gain. Directivity. Power gain. Beam Width. Band Width. Gain and radiation resistance of current element. Half-wave dipole and folded dipole. Reciprocity principle. Effective length and Effective area. Relation between gain effective length and radiation resistance.Concept of vector potential. Modification for time varying, retarded case.

Fields associated with Hertzian dipole. Power radiated and radiation resistance of current element. Radiation resistance of elementary dipole with linear current distribution. Radiation from half-wave dipole and quarter-wave monopole.

UNIT II ANTENNA ARRAYS AND LOOP ANTENNAS 9

Antenna Arrays: Expression for electric field from two and three element arrays. Uniform linear array. Method of pattern multiplication. Binomial array. Use of method of images for antennas above ground.

Loop Antennas: Radiation from small loop and its radiation resistance. Radiation from a loop with circumference equal to a wavelength and resultant circular polarization on axis. Helical antenna. Normal mode and axial mode operation.

UNIT III TRAVELLING WAVE (WIDEBAND) ANTENNAS 9

Radiation mechanisms of traveling wave on a wire. Analysis and design of Rhombic antenna. Coupled Antennas- Self and mutual impedance of antennas. Two and three element Yagi antennas. Log periodic antenna. Reason for feeding from end with shorter dipoles and need for transposing the lines.

UNIT IV APERTURE AND LENS ANTENNAS 9

Radiation from an elemental area of a plane wave (Huygen's Source). Radiation from the open end of a coaxial line. Equivalence of fields of a slot and complementary dipole. Relation between dipole and slot impedances. Method of feeding slot antennas. Field on the axis of an E-Plane sectoral horn. Radiation from circular aperture- Beam Width and Effective area. Reflector antennas (dish antennas). Dielectric lens and metal plane lens antennas. Biconical antenna.

UNIT V PROPAGATION 9

The three basic types of propagation; ground wave, space wave and sky wave propagation.

Sky wave propagation: Structure of the ionosphere. Effective dielectric constant of ionized region. Mechanism of refraction. Refractive index. Critical frequency. Skip distance. Effect of earth's magnetic field. Energy loss in the ionosphere due to collisions. Maximum usable frequency. Fading and Diversity reception.

Space wave propagation: Reflection from ground for vertically and horizontally polarized waves. Reflection characteristics of earth. Resultant of direct and reflected ray at the receiver. Duct propagation.

Ground wave propagation: Attenuation characteristics for ground wave propagation. Calculation of field strength at a distance.

L = 45, T = 15, TOTAL = 60

TEXTBOOK

1. E.C.Jordan and Balmain, "Electro Magnetic Waves and Radiating Systems", PHI, 1968, Reprint 2005.

REFERENCES

1. John D.Kraus and Ronalatory Marhefka, "Antennas", Tata McGraw-Hill Book Company, 2002.
2. R.E.Collins, 'Antennas and Radio Propagation ", McGraw-Hill, 1987.
3. Ballany, "Antenna Theory " , John Wiley & Sons, second edition , 2003.
4. Prasad, K.D./ Antennas and Wave Propagation/ Khanna Publications

CS2612 CLOUD COMPUTING

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

Understand the architecture of cloud and industry frameworks.

Objectives

The course should enable the student to:

1. Study about migrating into cloud.
2. Study IAS and enterprise cloud.
3. Study security aspects in cloud and integration of cloud.
4. Study of cloud security and security management.
5. Study of intercloud environment.

Outcome

At the end of the course the student should be able to :

1. Understand migration into cloud,
2. Explain issues for enterprise application,
3. Understand cloud security and integration of cloud,
4. Understand cloud security and security management,
5. Understand the concepts of intercloud environment.

UNIT I CLOUD COMPUTING **9**

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS

Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.

UNIT II CLOUD TECHNOLOGY **9**

Introduction to Cloud Technologies, Study of Hypervisors Compare SOAP and REST Webservices, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization.

Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications.

UNIT III DATA IN THE CLOUD **9**

Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo.

Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model.

UNIT IV CLOUD SECURITY **9**

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud.

Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security.

Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT V INTERCLOUD ENVIRONMENTS **9**

Issues in cloud computing, Implementing real time application over cloud platform.

Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment.

Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud.

TOTAL: 45

TEXT BOOKS

1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, "Cloud Computing for Dummies", Wiley, 2009.
2. Gautam Shroff, "Enterprise Cloud Computing", Cambridge, 2010.
3. Ronald Krutz and Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley, 2010.

REFERENCES

1. Scott Granneman, "Google Apps Deciphered: Compute in the Cloud to Streamline Your Desktop", Pearson Education, 2008.
2. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", O'Reilly, 2009.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing : A Practical Approach", McGraw Hill, 2009.
4. Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.

EC2604 MOBILE COMMUNICATION

L	T	P	C
3	0	0	3

Prerequisite EC2404

Goal

To enable the student to understand the real time wireless communication

Objectives

The course should enable the students to:

1. Understand the concept of Existing mobile Communication technology and current Status.
2. Understand different Propagation for Mobile communication.
3. Understand the concept of Different modulation Techniques.
4. Understand the concept of GSM Network.
5. To understand the concept of Types of Coding.

Outcome

At the end of the course the student should be able to:

1. Know the Current issues for Mobile communication..
2. Know the Signal Effect in INDOOR Propagation & OUT DOOR Propagation.
3. Know the concept of Bit error rate in Different modulation Techniques.
4. Know the Real time working Principles of the Mobile communication.
5. Know how to reduce the bit rate.

UNIT I OVERVIEW OF CELLULAR MOBILE COMMUNICATION AND CELLULAR CONCEPT **9**

Overview to wireless communication: Evolution & Generation of mobile communication. Existing mobile communication technology and current Status. Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system Capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems

UNIT II MOBILE RADIO PROPAGATION **9**

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse Model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of Small scale fading, statistical models for multipath fading channels.

UNIT III MODULATION TECHNIQUES AND EQUALIZATION **9**

Modulation Techniques: Minimum Shift Keying, Gauss ion MSK, M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels. Equalization: Survey of qualization

Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive qualization. Diversity Techniques, RAKE receiver.

UNIT IV GSM SYSTEMS **9**

GSM-architecture-Location tracking and call setup- Mobility management- Handover- Security-GSM SMS -International roaming for GSM- call recording functions-subscriber and service data mgt --Mobile Number portability -VoIP service for Mobile Networks - GPRS -Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing.

UNIT V CODING AND MULTIPLE ACCESS TECHNIQUES **9**

Coding: Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD. Multiple Access Techniques: FDMA, TDMA,CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

TOTAL = 45

TEXT BOOK

1. T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.

REFERENCES

1. R. Blake, " Wireless Communication Technology", Thomson Delmar, 2003.
2. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
3. Stephen G. Wilson, " Digital Modulation and Coding", Pearson Education,
4. Jochen Schiller, Mobile Communications, Person Education - 2003, 2nd Edn.

EC2631 DIGITAL COMMUNICATION LAB

L	T	P	C
0	0	3	2

Prerequisite Ec2302,EC2402,EC2404,EC2433

Goal

To carry out experiments on various digital communications modulation schemes using kits. MATLAB software is used to simulate the digital modulation techniquies.

Objectives

The course should enable the students to:

1. Understand different forms of pulse modulation and demodulation schemes and implement using hardware kits.
2. Understand sampling process and implement time division multiplexing using hardware kits.

3. Understand different pass band digital modulation and demodulation schemes and implement using hardware kits.
4. Understand MATLAB and write the program and simulate the digital modulation and demodulation schemes.

Outcome

At the end of the course the student should be able to:

1. Verify the pulse modulation and demodulation schemes and implement using hardware kits.
2. Verify the sampling process , reconstruction of signal and implement time division multiplexing using hardware kits.
3. Verify the digital modulation and demodulation schemes and implement using hardware kits,
4. Understand the MATLAB and simulate the digital modulation and demodulation schemes.

S. No	List of Experiments	Contact Hours
1	Time Division Multiplexing	3
2	Amplitude and Frequency Shift Keying	6
3	Channel Coding and Decoding	3
4	Quadrature Phase Shift Keying	3
5	Delta Modulation,	3
6	Differential Pulse Code Modulation	3
7	Pulse Code Modulation	3
8	Binary Phase Shift Keying	3
9	Direct Sequence Spread Spectrum	3
10	Frequency Hopping Spread Spectrum	3
11	Linear block code -encoder and decoder	3
12	Convolution code - encoder and decoder	3
13	MATLAB (any two experiment)	
	1.ASK	
	2.FSK	
	3.PSK	
	4.QPSK	
	5.DPSK	3

14	(any two experiment)	
	Delta Modulation, Linear predictive Coding Techniques, Differential	
	Pulse Code Modulation	6
	Total Contact Hours	**45**

List of Equipments

1. Linear block code -encoder and decoder Trainer kit RPS , CRO , Patch cord
2. ICXR2206 , Resistor (330 ohm,5.1kilo ohm,4.7 kilo ohm,5 kilo ohm) , Capacitor (10uF,0.1uF),RPS , CRO , Function generator , Breadboard
3. Channel Coding Trainer Kit , CRO, Patch cords, RPS
4. Diode (IN60) , Resistor(33kilo ohms,1kilo ohms), Capacitor(2.2uF,0.047uF), CRO, RPS , Breadboard
5. Convolution code - encoder and decoder Trainer kit RPS, CRO , Patch cord
6. Delta Modulation Trainer kit , RPS, CRO , Patch cord
7. DPCM Trainer kit, RPS, CRO , Patch cords
8. Pulse Cord Modulation Trainer Kit, RPS , CRO , Patch Cord
9. BPSK Trainer Kit , RPS , CRO , Patch cord
10. Direct Sequence Spread Spectrum Trainer kit RPS , CRO , Patch cord
11. QPSK Trainer Kit , CRO , RPS , Patch Cord
12. TDM Trainer Kit , CRO , RPS , Patch Cord
13. Frequency Hopping Spread Spectrum Trainer kit RPS , CRO , Patch cord
14. Linear predictive Coding Techniques Trainer kit RPS , CRO , Patch cord

EC 2632 DIGITAL SIGNAL PROCESSING LAB

L	T	P	C
0	0	3	2

Prerequisite EC2403,EC2531

Goal

To Provide hands on training with Mat Lab simulator and DSP processor about various Signal Processing Techniques

Objectives

The course should enable the students to :

1. Know MatLab simulation software to perform Signal Processing exercises.

2. Know the DSP processor TMS320c54x blocks in detail.
3. Study Code Composer Studio software.

Outcome

At the end of the course the student should be able to understand and test:

1. Mat Lab simulation software to perform various Signal Processing exercises.
2. The DSP processor addressing modes and functional blocks and to use it for signal processing applications.
3. The code composer studio software and be able to convert the high level Language (c) to Machine Language (Assembly) to perform Signal Processing experiments.

LIST OF EXPERIMENTS

USING TMS320C5XX HARDWARE FAMILY

1.	Study of various addressing modes of Digital Signal Processors using simple programming examples.	6
2.	Sampling of input signal and display.	3
3.	Calculation of Linear and circular convolution between two sequences	3
4.	Calculation of FFT.	6

USING MATLAB SIMULATOR

1.	Generation of Signals.	3
2.	Linear and circular convolution of two sequences.	3
3.	Sampling and effect of aliasing.	3
4.	Design of FIR filters.	6
5.	Design of IIR filters.	6
6.	Calculation of FFT of a signal.	6
		TOTAL : 45

LIST OF EQUIPMENTS

Sl.No.	**Description**	**Qty**
1.	Personal Computer (Intel's CORE i3 Processor, 500GB SATA HDD, 2GB RAM, Acer's 18.5" LED monitor, Keyboard & Mouse)	27
2.	Personal Computer (AMD's Dual Core Processor, 80GB IDE HDD, 1GB RAM, 15" TFT Benq Monitor, Microsoft Keyboard & Mouse)	01
3.	Printer(TVS MSP345 Dot Matrix)	01
4.	TMS 320VC 5416 DSK	09

5.	TMS 320VC 6701 DSK	01
6.	TMS 320VC 6713 DSK	04
7.	TMS 320C 5X Kit	01
8.	ADSP 2106X EZLab	03

Software

1.	MATLAB_v7.12	10 Users

EL 2431 COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

L	T	P	C
2	0	2	3

Goal

The goal of the programme is to provide the learners with the methods and materials required for becoming accomplished personalities through the medium of English.

Objectives

The course is expected to enable students to:

1. Be aware of self-knowledge by exposure to soft skills, values, behaviour, attitudes, temperamental changes, and a positive attitude to life.
2. Learn personality traits and undergo personality tests to determine their own personality characteristics and the scope for improvement.
3. Cultivate the art of speaking fluently making use of proper gestures, tone and voice modulation, adding humour to the speech.
4. Figure out the need to work in teams, adorn or accept team leadership, and make use of body language to enhance team spirit.
5. Be familiar with the art of managing self, people, work and time, keeping in mind problems like time-wasters and stress-builders.

Outcome

On completion of the course, the students will be able to:

1. Apply the knowledge gained to improve upon their values, behaviour, attitude, and develop the soft skills required for home, workplace and the society.
2. Employ the concept of personality traits and build up an accomplished personality that would be pleasing to people around so as to influence them positively.
3. Develop a personal style and communicate fearlessly and effectively in a convincing manner so as to impress listeners or the audience.
4. Participate in presentations, group discussions, debates and mock interviews making good use of language skills and interpersonal relationships.

5. Comprehend stress-management tips to overcome stress-prone habits and develop a career plan with personal, familial and societal goals for success.

UNIT I **12**

Values and attitudes - Value-formation - Values & education - Terminal & Instrumental values - Civic responsibilities - The power of Personal/ Cultural/ Social values -- Behaviour and attitudes -- Features of attitudes - Developing positive attitude - Overcoming negative attitude -- People skills - Soft skills as per the Work Force Profile - The four temperaments - Sanguine - Choleric - Melancholic - Phlegmatic -- Tests for Personal Chemistry.

UNIT II **12**

What is personality development? - Types of personalities as per (i) Heredity (ii) Environment (iii) Situation - the 16 personality factors - MBTI Tests - Personality types - Increasing self awareness: Assessing one's locus of control, Machiavellianism, self-esteem, self-monitoring, risk-taking, Type A, Type B personality elements - Intellectual and physical abilities for jobs -- Personality tests.

UNIT III **12**

Developing the art of speaking - How to get rid of stage fright? - Enhancing fluency - Modulating voice - Enunciation - Positive and negative gestures - Preparation - How to begin? - How to convince the listeners? - How to wind up the speech? - Adding humour and illustration - Developing one's own style - Types of style - How to influence the audience? - How to become an effective speaker? -- Tests for effective speaking.

UNIT IV **12**

Team work - Team building - Team leadership -- How to face an interview? -- How to participate in a group discussion? - How to argue for or against in a debate? - Body language - non-verbal communication - personal appearance - facial expression - posture - gestures - eye contact - Etiquette - Voluntary and involuntary body language -Gender implications -- Tests.

UNIT V **12**

Managing self, people, work, situations - Time-management - Secrets of time-management - Time-wasters - Stress -- Kinds of stress - Spotting stress - Stress-builders - Stress -management tips - Stress-prone habits -- Goals - Career planning - Interpersonal interaction - Interpersonal relationships -- Tests.

L = 30, P = 30, TOTAL: 60

Study material will be prepared by the Department of Languages.

Tests suggested will be prepared by a senior faculty of the department.

Movies will be screened to discuss and debate on the topics introduced in each unit.

Laboratory Requirements:

1. Career Lab:1 room
2. 2 Computers as a Server for Labs (with High Configuration)
3. Headphones with Mic (i-ball) - 100 Nos
4. Speakers with Amplifiers, Wireless Mic and Collar Mic - 2 Sets
5. Teacher table, Teacher Chair - 1 + 1
6. Plastic Chairs - 75 Nos.

SEMESTER VII

EC2701 OPTICAL COMMUNICATION

L	T	P	C
3	0	0	3

Prerequisite PH 2001,EC 2303,EC2404

Goal

To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber and to study about various optical sources and optical detectors and their use in the optical communication system. Finally to discuss about digital transmission and its associated parameters on system performance.

Objectives

The course should enable the students to:

1. Learn the basic elements of optical fiber transmission link, fiber modes configurations and structures
2. Understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length,
3. Learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers
4. Learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration
5. Learn digital transmission system, operational principles WDM.

Outcome

At the end of the course the student should be able to:

1. Understand the optical fiber link and fiber modes & configurations.
2. Have knowledge in different types of losses, signal distortion in optical fibers and design optimization for fibers.
3. Know the types of optical sources and fiber networking components.
4. Understand the various optical receivers and their performance.
5. Understand the working of digital transmission system, SONET / SDH.

UNIT I INTRODUCTION TO OPTICAL FIBERS **9**

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations -Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure, Photonic Crystal Fibers(PCF) and characteristics

UNIT II SIGNAL DEGRADATION OPTICAL FIBERS **9**

Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination -Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling -Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III FIBER OPTICAL SOURCES, COUPLING and OPTICAL NETWORKING COMPONENTS **9**

Direct and indirect Band gap materials-LED structures -Light source materials -Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition -Rate equations -External Quantum efficiency -Resonant frequencies -Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fiber -to-Fiber joints, Fiber splicing, couplers, isolators, circulators, switches and wavelength converters, MEMS optical switches, MEMS variable optical attenuators, MEMS continuously tunable lasers.

UNIT IV FIBER OPTICAL RECEIVERS **9**

PIN and APD diodes -Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise -Comparison of Photo detectors -Fundamental Receiver Operation - preamplifiers, Error Sources -Receiver Configuration -Probability of Error - Quantum Limit.

UNIT V DIGITAL TRANSMISSION SYSTEM **9**

Point-to-Point links System considerations -Link Power budget -Rise - time budget -Noise Effects on System Performance-Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network. Passive Optical Networks-FTTH Systems

TOTAL = 45

TEXT BOOKS

1. Gerd Keiser, "Optical Fiber Communication" McGraw -Hill International, 4th ed., 2010
2. J.Senior, "Optical Communication, Principles and Practice", Third Edition, Prentice Hall of India, 2009.
3. Ai-Qun Liu.,"Photonics MEMS Devices".,CRC Press,Tailor and Francis Group,2009

REFERENCES

1. Optical Communication essentials by Keiser
2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

EC2702 MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

Prerequisite EC 2201,EC2301,EC2303

Goal

To introduce the principles of Microwave engineering and its applications.

Objectives

The course should enable the students to:

1. Describe the construction, principle of operation of various microwave tubes,
2. Describe microwave transistor and diodes.
3. Explain the basic working principle and representation of passive microwave components by means of S-parameters.
4. Study Microstrip lines and microwave integrated circuits fabrication methods.
5. Study various measurement setup procedure and techniques for various parameters of microwave devices and circuits.

Outcome

At the end of the course the student should be able to:

1. Understand principle of operation of various microwave tubes as sources and amplifiers and their performance characteristics.
2. Understand limitations of Microwave BJTs and principles of operation of microwave solid state devices and their applications.
3. Demonstrate familiarity with the passive microwave components and their S- Parameters.
4. Describe types of Microstrip lines and Microwave integrated circuits fabrication methods.
5. Enumerate a variety of microwave measuring devices, their applications and the methodology used in making measurements on them.

UNIT I MICROWAVE LINEAR-BEAM TUBES (O TYPE) and MICROWAVE CROSSED FIELDTUBES (M TYPE) 12

Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure, Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process, Output Power and Beam Loading, State of the Art, Multicavity Klystron Amplifiers, Beam-Current Density, Output Current Output Power of Two-Cavity Klystron, Output Power of Four-Cavity Klystron, Reflex Klystrons, Velocity Modulation, Power Output and Efficiency, Electronic Admittance, Helix Traveling-Wave Tubes (TWTs), Slow-Wave structures, Amplification Process, Convection Current, Axial Electric Field, Wave Modes, Gain Consideration, Microwave Crossed-Field Tubes, Magnetron Oscillators, Cylindrical Magnetron, Coaxial Magnetron.

UNIT II MICROWAVE DIODES AND TRANSISTORS 12

Transit time limitations in transistors, Microwave bipolar transistors, power frequency limitations, HEMT, Transferred Electron Devices (TEDs) - Introduction, Gunn-Effect Diodes - GaAs Diode, Background, Gunn Effect, Ridely-Watkins- Hilsum (RWH) Theory, Differential Negative Resistance, Two-Valley Model Theory, High-Field Domain, Modes of Operation, LSA Diodes, InP Diodes, CdTe Diodes, Avalance Transit-Time Devices - Introduction, Read Diode, Physical Description, Avalanche Multiplication, Carrier Current Io(t) and External Current Iet), Output Power and Quality Factor, IMPATT Diodes, Physical Structures, Negative Resistance, Power Output and Efficiency, TRAPATT Diodes, Physical Structures, Principles of Operation, Power Output and Efficiency, BARITT Diodes, Physical Description, Principles of Operation, Microwave Performance. Parametric Devices, Physical Structures, Nonlinear Reactance and Manley - Rowe Power Relations, Parametric Amplifiers, Applications, Tunnel Diodes.

UNIT III MICROWAVE DEVICES AND S - PARAMETERS 9

Microwave Hybrid Circuits, Waveguide Tees, Magic Tees (Hybrid Trees), Hybrid Rings (Rat-Race Circuits), Waveguide Corners, Bends and Twists, Directional Couplers, Two-Hole Directional Couplers, Z & ABCD Parameters- Introduction to S parameters, S Matrix of a Directional Coupler, Hybrid Couplers, Circulators and Isolators, Microwave Circulators, Microwave Isolators.

UNIT IV STRIP LINES and MONOLITHIC MICROWAVE INTEGRATED CIRCUITS 6

Introduction, Microstrip Lines, Characteristic Impedance of Microstrip Lines, Losses in Microstrip Lines, Quality Factor Q of Microstrip Lines, Parallel Strip Lines, Distributed Lines, Characteristic Impedance, Attenuation Losses, Coplanar Strip Lines, Shielded Strip Lines, References, Problems, Monolothic Microwave Intregated Circuits, Introduction, Materials, Substrate Materials, Conductor Materials, Dielectric Materials, Resistive Materials, Monolithic Microwave Integrated-Circuit Growth, MMIC Fabrication Techniques, Fabrication Example.

UNIT V MICROWAVE MEASUREMENTS 6

Slotted line VSWR measurement, VSWR through return loss measurements, power measurement, impedance measurement insertion loss and attenuation measurements, measurement of scattering parameters - Measurement of 1 dB, dielectric constant measurement of a solid using waveguide.

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. Samuel Y.LIAO : Microwave Devices and Circuits - Prentice Hall of India - 3rd Edition (2003)
2. Annapurna Das and Sisir K.Das: Microwave Engineering - Tata McGraw-Hill (2000)

REFERENCES

1. R.E. Collin : Foundations for Microwave Engineering. - IEEE Press Second Edition (2002)
2. David M.POZAR : Microwave Engineering. - John Wiley & Sons - Second Edition (2003)

EC2703 VLSI DESIGN

L	T	P	C
4	0	0	4

Prerequisite EC2201,EC 2302

Goal

To introduce the technology, design concepts and testing of Very Large Scale Integrated Circuits and to learn the concepts of modeling a digital system using Hardware Description Language.

Objectives

The course should enable the students learn about:

1. CMOS Technology
2. MOS Transistor Theory
3. Specification using Verilog HDL
4. CMOS Chip Design
5. CMOS Testing.

Outcome

On completion of this course the student should be able to:

1. Get an overview of Silicon semiconductor technology and CMOS technology.
2. Understand MOS AC characteristics, complementary CMOS inverter DC characteristics.
3. Understand VLSI Design flow, Verilog Hardware Description Language.
4. Know logic design with CMOS, ASIC design flow.
5. Know about need for testing, Chip level and system level test techniques.

UNIT I CMOS TECHNOLOGY **12**

An overview of Silicon semiconductor technology, Basic CMOS technology: n well, P well, Twin tub and SOI Process. Interconnects, circuit elements: Resistors, capacitors, Electrically alterable ROMs, bipolar transistors, Latch up and prevention.

Layout design rules, physical design: basic concepts, CAD tool sets, physical design of logic gates: Inverter, NAND, NOR, Design Hierarchies.

UNIT II MOS TRANSISTOR THEORY **12**

NMOS, PMOS Enhancement transistor, Threshold voltage, Body effect, MOS DC equations, channel length modulation, Mobility variation, MOS models, small signal AC characteristics, complementary CMOS inverter DC characteristics, Noise Margin, Rise time, fall time, power dissipation, transmission gate, tristate inverter.

UNIT III SPECIFICATION USING VERILOG HDL **12**

Basic Concepts: VLSI Design flow, identifiers, gate primitives, value set, ports, gate delays, structural

gate level and switch level modeling, Design hierarchies, Behavioral and RTL modeling: Operators, timing controls, Procedural assignments conditional statements, Data flow modeling and RTL.

Structural gate level description of decoder, equality detector, comparator, priority encoder, D-latch, D-Flip Flop, half adder, Full adder, Ripple Carry adder.

UNIT IV CMOS CHIP DESIGN **12**

Logic design with CMOS: MOSFETS as switches, Basic logic gates in CMOS, Complex logic gates, Transmission gates: Muxes and latches, CMOS chip design options: Full custom ASICs, Std. Cell based ASICs, Gate Array based ASICs Channeled, Channel less and structured GA, Programmable logic structures; 22V10, Programming of PALs, Programmable Interconnect, Reprogrammable GA: Xilinx programmable GA, ASIC design flow.

UNIT V CMOS TESTING **12**

Need for testing, manufacturing test principles, Design strategies for test, Chip level and system level test techniques.

TOTAL: 60

TEXT BOOKS

1. Neil Weste , David Harris : CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition), 2010.
2. Samir Palnitkar; Verilog HDL - Guide to Digital design and synthesis, III edition, Pearson Education, 2003.

REFERENCES

1. Wayne Wolf, Modern VLSI Design, Pearson Education 2003.
2. J . Bhaskar : Verilog HDL Primer, BSP, 2002.
3. C. Roth, Digital Systems Design Using VHDL, Thomson Learning, 2000.

EC2704 EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

Prerequisite CS2101,CS 2311,EC2502

Goal

To provide basic knowledge about embedded systems design and understand the RTOS concepts

Objectives

The course should enable the students to:

1. Understand the embedded systems hardware and software,
2. Understand the devices and buses used for embedded networking,
3. Understand the programming concepts and embedded programming in C and C++,

4. Understand the real time operating system concepts and inter-task communication,

5. Understand the Vx Works RTOS functions.

Outcome

At the end of the course the student should be able to:

1. Know the concepts of embedded processors hardware, software and System on a Chip.

2. Know about the embedded interfacing devices, buses and networking protocols.

3. Know the embedded programming concepts in C and C++.

4. Know the concepts of real time operating system, inter process communication and synchronization.

5. Know the Vx Works RTOS concepts and functions.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition and Classification - Overview of Processors and hardware units in an embedded system - Software embedded into the system - Exemplary Embedded Systems - Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK 9

I/O Devices - Device I/O Types and Examples - Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/ Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ 9

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls - Multiple function calls in a Cyclic Order in the Main Function Pointers - Function Queues and Interrupt Service Routines Queues Pointers - Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming - Embedded Programming in C++, 'C' Program compilers - Cross compiler - Optimization of memory codes.

UNIT IV REAL TIME OPERATING SYSTEMS - PART - 1 9

Definitions of process, tasks and threads - Clear cut distinction between functions - ISRs and tasks by their characteristics - Operating System Services- Goals - Structures- Kernel - Process Management - Memory Management - Device Management - File System Organization and Implementation - I/O Subsystems - Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS : RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics - Co-operative Round Robin Scheduling - Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) - Preemptive Scheduling Model strategy by a Scheduler - Critical Section Service by a Preemptive Scheduler - Fixed (Static) Real time scheduling of tasks - INTER PROCESS COMMUNICATION AND SYNCHRONISATION - Shared data problem - Use of Semaphore(s) - Priority

Inversion Problem and Deadlock Situations - Inter Process Communications using Signals - Semaphore Flag or mutex as Resource key - Message Queues - Mailboxes - Pipes - Virtual (Logical) Sockets - Remote Procedure Calls (RPCs).

UNIT V REAL TIME OPERATING SYSTEMS - PART - 2 **9**

Study of Micro C/OS-II or Vx Works or Any other popular RTOS - RTOS System Level Functions - Task Service Functions - Time Delay Functions - Memory Allocation Related Functions - Semaphore Related Functions - Mailbox Related Functions - Queue Related Functions - Case Studies of Programming with RTOS - Understanding Case Definition - Multiple Tasks and their functions - Creating a list of tasks - Functions and IPCs - Exemplary Coding Steps.

TOTAL = 45

TEXTBOOK

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, Second Edition-2009.

REFERENCES

1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design - Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001
4. Frank Vahid and Tony Givargis, Embedded Systems Design - A unified Hardware /Software Introduction, John Wiley, 2002.

EC 2731 MICROWAVE AND OPTICAL COMMUNICATION LAB

L	T	P	C
0	0	3	2

Prerequisite PH 2001,EC 2201,EC 2303,EC2404

Goal

To familiarize the students with the fundamentals of Microwave systems, measurement techniques and optical devices

Objectives

The course should enable the student to :

1. Study of Reflex Klystron repeller mode characteristics,
2. Measure low and high VSWR of a Primary transmission line,
3. Study GUNN Diode characteristics,
4. Determine the frequency of line and impedance of an unknown load,

5. Study Radiation pattern plotting of Dipole antenna,
6. Study Radiation pattern plotting of Horn antenna,
7. Analyze Transmission line using MATLab and SmithChart,
8. Perform Power coupling using directional coupler,
9. Study the characteristics of MagicTee,
10. Study the radiation pattern of Microstrip patch antennas,
11. Study Numerical Aperture and attenuation losses of optical fiber,
12. Study the characteristics of LED and Photodiode using optical transceiver kit,
13. Simulate Dense Wavelength Division Multiplexing (DWDM) modeling using OptSIM,
14. Simulate ISI measurement and performance analysis of WDM using OptSIM,
15. Simulate and study of EDFA- optical amplifier using OptSIM.

Outcome

At the end of the course the student should be able to:

1. Explain the mode characteristics of reflex Klystron,
2. Have a clear understanding of standing waves in a line due to impedance mismatch and reflection,
3. Understand the operation of GUNN diode as a low frequency oscillator,
4. Obtain the unknown load impedance using Smith Chart,
5. Understand the power distribution of Dipole Antenna,
6. Understand the power distribution of Horn Antenna,
7. To analyze transmission line using Smith Chart,
8. Understand the principle of coupler and determine its directivity, insertion and isolation losses.
9. Understand the characteristics of magic Tee,
10. Understand the power distribution of a Micro strip patch antenna,
11. Have a clear Understanding of NA and attenuation losses of fibers,
12. Understand and observe the performance of LED and Photodiode,
13. Design and analyse DWDM system using Opt SIM,
14. Have a clear understanding of ISI and its effects,
15. Design and analyze EDFS.

S. No	List of Experiments	Contact Hours
1	Study of Reflex Klystron repeller mode characteristics	3
2	Measurement of low and high VSWR	3

3	Study of GUNN Diode characteristics	3
4	Determination of frequency of line and impedance of an unknown load	3
5	Study of Radiation pattern of Dipole antenna	3
6	Study of Radiation pattern plotting of Horn antenna	3
7	Transmission line analysis using MATLab and SmithChart	3
8	Power coupling using directional coupler	3
9	Study of characteristics of Magic Tee	3
10	Study of radiation pattern of Microstrip patch antennas	3
11	Study of Numerical Aperture and attenuation losses of optical fiber	3
12	Study of characteristics of LED and Photodiode using optical transceiver kit	3
13	Dense Wavelength Division Multiplexing (DWDM) modeling using OptSIM	3
14	ISI measurement and performance analysis of WDM using OptSIM	3
15	Study of EDFA- optical amplifier using OptSIM	3

Total : 45

List of Equipments

1. Reflex Klystron Microwave Power Supply and Oscillator
2. Gunn diode Microwave power supply and oscillator
3. PIN diode modulator
4. Isolator
5. Attenuator
6. Frequency Meter
7. Detector Mount
8. Power meter
9. Matched Termination
10. Horn Antenna
11. Digital storage oscilloscope
12. Directional coupler
13. Magic Tee
14. Antenna Trainer Kit with Dipole and Horn Antennas
15. Microstrip Antenna Trainer Kit (ATS Micro-Falcon)

16. MATLAB-version 2011a with RF Toolbox
17. Optsim- Optical Network Simulator software
18. Optical Transceiver Kit
19. NA & attenuation loss measurement kit for different optical fibers

EC2732 VLSI DESIGN LAB

L	T	P	C
0	0	3	2

Prerequisite EC2201,EC2302

Goal

To provide exposure to the students on frontend and backend tools in VLSI and to design and implement various circuits on FPGA board.

Objective

The course will enable the students to acquire practical knowledge on

1. Verilog HDL
2. Frontend and Backend tools in VLSI

Outcome

At the end of the course the student should be able to

1. Design and implement various digital circuits using Xilinx Simulator.
2. Design, simulate and perform layout generation of various CMOS logic circuits using Cadence/ MAGMA/Tanner.

SI. NO.	LIST OF EXPERIMENTS	CONTACT HOURS
	I FPGA BASED EXPERIMENTS	
1	HDL based design entry and simulation of combinational circuits, simple counters, adders (8-bit), multiplier (4bit).	6
2	Synthesis, Place and Route and P&R simulation of components simulated in above experiment.	6
3	Schematic entry of combinational & sequential circuits using Xilinx.	6
4	Design and implementation of simple combinational and sequential circuits on FPGA board.	9
	II IC DESIGN EXPERIMENTS (based on Cadence/MAGMA/Tanner)	
5	Design and simulation of simple CMOS logic circuits.	9
6	Layout generation, parasitic extraction and re-simulation of the circuit designed in the above experiment.	9
	Total	**45**

LIST OF EQUIPMENTS

1. PERSONAL COMPUTER
2. FPGA SPARTAN - III MODULE

LIST OF SOFTWARES

1. ISE XILINX 9.1i
2. Cadence/MAGMA/Tanner.

SEMESTER VIII

GE2001 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

Prerequisites Nil

Goal

To introduce the students to basic concepts of Engineering Ethics and Human Values.

Objectives

The course should enable the students to :

1. Create awareness on human values,
2. Be familiar with the various theories on engineering ethics,
3. Learn about moral social values and loyalty of professional,
4. Study the safety aspects, responsibilities and various rights of professionals.
5. Study about awareness on engineering ethics.

Outcome

At the end of the course the student should be able to:

1. Gain knowledge in human values,
2. Use the principles of engineering ethics and ethical theories,
3. Be acquainted with the Global issues on Environmental Ethics and Computer Ethics,
4. Get awareness on the Ethics and responsibilities of a professional,
5. Get awareness on engineering ethics and human Values.

UNIT I HUMAN VALUES **10**

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 **9**

Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the Challenger case study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS **9**

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies, Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES **8**

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-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.

TOTAL = 45

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

EC2831 PROJECT & VIVA VOCE

L	T	P	C
0	0	24	6

Prerequisite EC2434

Goal

To develop the student's skills and enable innovation in design and fabrication work from the theoretical and practical skill acquired from the previous semesters.

Objectives

The course should enable the students to:

1. Select and work on real life application in the field of Electronics & Communication,
2. Implement their skills acquired in the previous semesters to practical problems,
3. Apply and enhance the knowledge acquired in the related field,
4. Make the students come up with new ideas in his area of interest.

Outcome

At the end of the course the student should be able to:

1. Appreciate various aspects of the curriculum which support students in increasing their mastery,
2. Get an idea and develop confidence in designing, analyzing and executing the project,
3. Develop knowledge of latest trends in fabrication relate their ideas to industrial applications,
4. Have complete understanding of making a product.

NOTE:

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Twenty Four per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

Each student will be assigned any one of the following types of project/thesis work:

(a) Industrial case study

(b) Preparation of a feasibility report

(c) Thesis by experimental research, and

(d) Design and development of equipment.

Each report must contain student's own analysis or design presented in the approved format. Sessional marks will include

(a) Evaluation of the student's progress,

(b) Degree of involvement and participation,

(c) Merit of the project.

A student will have to defend his project/thesis and credit will be given on the merits of presentation and viva-voce examination.

ELECTIVE COURSES-VII SEMESTER

EC 2751 BIOMEDICAL INSTRUMENTATION

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To make students understand the applications of electronics in diagnostic and therapeutic area.

Objectives

The course should enable the students to:

1. Learn Electro-physiology and Bio-Potential recording
2. Understand bio-chemical and non electrical parameter measurement
3. Learn about assist devices and bio-telemetry
4. Study radiological equipments
5. Study recent trends in Medical Instrumentation.

Outcome

At the end of the course the student should be able to:

1. Know the origin of Bio-potentials, recording methods of various bio signals
2. Know about measurement and analysis of various bio signals
3. Know about cardiac pacemakers, DC Defibrillator, Bio-telemetry
4. Know about Diagnostic x-ray equipments, Radiation Therapy
5. Know about Endoscopy unit, Laser in medicine and Electrical safety in medical equipment.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionosing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

TOTAL: 45

TEXTBOOK

1. Leislie Cromwell, "Biomedical instrumentation and measurement", Prentice Hall of India, New Delhi, 2002.

REFERENCES

1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 1997.

EC 2752 ADVANCED MICROPROCESSORS

L	T	P	C
3	0	0	3

Prerequisite EC 2502

Goal

The purpose of this course is to give an in-depth knowledge on Advanced Microprocessors

Objectives

The course should enable the students to :

1. Learn about to 8086, 80286, 80386, 80486 Microprocessor
2. Learn programming of 8086.
3. Study digital interfacing.
4. Learn multiprocessor Configuration and micro-programmable microprocessors.
5. Study about ARM processor and its programming.

Outcome

At the end of the course the student should be able to:

1. Understand the different types of processors.
2. Write an ALP using 8086.
3. Interface I/O devices & other devices with 8086.
4. Understand processor configuration, Pentium & Bit slice processor.
5. Understand Arm7 implementation & to write an ALP.

UNIT I 16/ 32 BIT MICROPROCESSOR 9

Organization of 8086, 80286,80386,80486 microprocessors - Minimum maximum mode of 8086 - Pipeline Architecture - Registers - Addressing modes of 8086 - Memory Segmentation -Bus structure and timing - exception handling.

UNIT II ASSEMBLY LANGUAGE PROGRAMMING OF 8086 9

Instruction set of 8086 - Data transfer instruction - Arithmetic instruction - Branch instructions - Loop instructions - NOP and HALT instructions - Flag manipulation instructions - Logical instructions - Shift and rotate instructions - Assembly language programming of 8086 microprocessor - linking and relocation - stacks procedure - Interrupts and interrupt routines - Macros - Byte and string manipulations.

UNIT III DIGITAL INTERFACING WITH 8086 9

Programming Parallel ports - Handshake input/output - interfacing a microprocessor to a keyboard, interfacing to alphanumeric displays, interfacing a microcomputer to high power devices, Optical motor shaft encoders - interfacing of Sensors and Transducers - D/A converter interfacing with 8086 - A/D converter - types & interfacing, A 8086 based process control system.

UNIT IV MULTIPROCESSOR CONFIGURATIONS, ADVANCED MICROPROCESSOR ARCHITECTURE, INTRODUCTION TO THE MICROPROGRAMMABLE MICROPROCESSORS 9

Queue status and lock facilities - 8086 / 8088 based multiprocessing system, 8087 numeric data processor, 8089 I/O processor. Introduction to Motorola 68HC11 processor, Pentium4 Microprocessor - Architecture, Instruction set and addressing modes, Organization of bit-slice processor, bit-slice processor architecture for micro-programmed machines.

UNIT V HIGH PERFORMANCE RISC ARCHITECTURE 9

ARM: The ARM7 architecture - ARM7 organization and implementation - The ARM7 instruction set - The thumb instruction set - Basic ARM7 Assembly language program - ARM CPU cores.

TOTAL: 45

TEXT BOOKS

1. Barry B.Brey,, "The Intel Microprocessors Architecture, Programming and Interfacing", PHI, 2002 (UNIT I,II,III)

2. Hall.D.V, "Microprocessor and Interfacing : Programming and hardware", McGraw Hill Book Company, New York, (1988) (UNIT III)

3. Liu.Y and Gibson. G. A., "Microcomputer systems : The 8086/ 8088 family : Architecture, Programming and design", Prentice Hall of India Pvt. Ltd, M.D. (1979) (UNIT IV) .

4. John Mick and Jim Brick, "Bit-slice Microprocessor Design",published 1980 by McGraw-Hill in New York (UNIT IV).

5. Steave Furber, "ARM system- on - chip architecture",AddisonWesley,2000. (UNIT V)

REFERENCES

1. Daniel Tabak, "Advanced Microprocessors", McGraw Hill. Inc., 1995

2. James L. Antonakos, "The Pentium Microprocessor", Pearson Education, 1997

3. James L Antonakos, "An Introduction to the Intel family of Microprocessors", Pearson Education, 1999.

EC 2753 ADVANCED DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

Prerequisite EC 2602

Goal

To introduce the students to advanced digital signal processing techniques.

Objectives

The course should enable the students to:

1. Study the parametric methods for power spectrum estimation.
2. Study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
3. Study multi rate signal processing fundamentals.
4. Study the analysis of speech signals.
5. Learn wavelet transforms.

Outcome

At the end of the course the student should be able to:

1. Know the different parametric methods for power spectrum estimation.
2. Know the analysis of adaptive filtering techniques using LMS algorithm and know the applications of adaptive filtering.
3. Know the concepts of multi rate signal processing fundamentals.
4. Know the analysis of speech signals.
5. Know the wavelet transforms.

UNIT I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION 9

Relationship between the auto correlation and the model parameters - The Yule - Walker method for the AR Model Parameters - The Burg Method for the AR Model parameters - unconstrained least-squares method for the AR Model parameters - sequential estimation methods for the AR Model parameters - selection of AR Model order.

UNIT II ADAPTIVE SIGNAL PROCESSING 9

FIR adaptive filters - steepest descent adaptive filter - LMS algorithm - convergence of LMS algorithms - Application: noise cancellation - channel equalization - adaptive recursive filters - recursive least squares.

UNIT III MULTIRATE SIGNAL PROCESSING 9

Decimation by a factor D - Interpolation by a factor I - Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures - Polyphase filter structure.

UNIT IV SPEECH SIGNAL PROCESSING 9

Digital models for speech signal : Mechanism of speech production - model for vocal tract, radiation and excitation - complete model - time domain processing of speech signal:- Pitch period estimation - using autocorrelation function - Linear predictive Coding: Basic Principles - autocorrelation method - Durbin recursive solution.

UNIT V WAVELET TRANSFORMS 9

Fourier Transform : Its power and Limitations - Short Time Fourier Transform - The Gabor Transform - Discrete Time Fourier Transform and filter banks - Continuous Wavelet Transform - Wavelet Transform Ideal Case - Perfect Reconstruction Filter Banks and wavelets - Recursive multi-resolution decomposition - Haar Wavelet - Daubechies Wavelet.

TOTAL: 45

TEXT BOOKS

1. John G.Proakis, Dimitris G.Manobakis, Digital Signal Processing, Principles, Algorithms and Applications, Third edition, (2000) PHI.
2. Monson H.Hayes - Statistical Digital Signal Processing and Modeling, Wiley, 2002.

REFERENCES

1. L.R.Rabiner and R.W.Schaber, Digital Processing of Speech Signals, Pearson Education (1979).
2. Roberto Crist, Modern Digital Signal Processing, Thomson Brooks/Cole (2004)
3. Raghuveer. M. Rao, Ajit S.Bopardikar, Wavelet Transforms, Introduction to Theory and applications, Pearson Education, Asia, 2000.

EC 2754 HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

Prerequisite EC 2501

Goal

To provide the knowledge of features of different technologies involved in high speed networking and their performance.

Objectives

The course should enable the students to:

1. Understand ATM and Frame relay.
2. Understand Congestion and Traffic management.
3. Understand TCP and ATM congestion control.
4. Understand Integrated and differentiated services.
5. Understand Protocols for QoS support.

Outcome

At the end of the course the student should be able to:

1. Know the basics of ATM and Frame relay.
2. Be familiarized with the up-to-date developments in High Speed Networks and know the effects of congestion and Traffic management.
3. Know the techniques involved to support real-time traffic and congestion control in TCP and ATM networks.
4. Know Integrated and differentiated services and the queuing disciplines.
5. Know the different levels of Quality of Service (QoS) in different applications.

UNIT I HIGH SPEED NETWORKS **9**

Frame Relay Networks - Asynchronous Transfer Mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories - AAL. High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel - Wireless LANs:applications, requirements - Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT **9**

Queuing Analysis- Queuing Models - Single Server Queues - Effects of Congestion -Congestion Control - Traffic Management - Congestion Control in Packet Switching Networks- Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL **9**

TCP Flow control - TCP Congestion Control - Retransmission - Timer Management -Exponential RTO backoff - KARN's Algorithm - Window management - Performance of TCP over ATM. Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic

Control - ABR traffic Management - ABR rate control, RM cell formats, ABRCapacity allocations - GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture - Approach, Components, Services- Queuing Discipline, FQ,PS, BRFQ, GPS, WFQ - Random Early Detection, Differentiated Services

UNIT V PROTOCOLS FOR QOS SUPPORT 9

RSVP - Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms -Multiprotocol Label Switching - Operations, Label Stacking, Protocol details - RTP - Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL = 45

TEXT BOOK

1. William Stallings, "High Speed Networks and Internet", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland& PravinVaraiya, "High Performance Communication Networks", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. IrvanPepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press,Volume 1 and 2, 2003.

EC2755 SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

Prerequisite EC 2303,EC2404,EC2601

Goal

To enable the student to become familiar with satellites and satellite services.

Objectives

The course should enable the students to:

1. Study the overview of satellite systems in relation to other terrestrial systems.
2. Study of satellite orbits and launching.
3. Study of earth segment and space segment components
4. Study of satellite access by various users.
5. Study of DTH and compression standards.

Outcome

At the end of the course the student should be able to:

1. Understand the overview of satellite systems in relation to other terrestrial systems.
2. Understand the concepts of satellite orbits and launching.
3. Understand the concepts of earth segment and space segment components
4. Understand the concepts of satellite access by various users.
5. Understand the concepts DTH and compression standards.

UNIT I OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS 9

Introduction - Frequency Allocations for Satellite Services - Intelsat - U.S. Domsats - Polar Orbiting Satellites - Problems - Kepler's First Law - Kepler's Second Law - Kepler's Third Law -Definitions of Terms for Earth-orbiting Satellites - Orbital Elements - Apogee and Perigee Heights - Orbital Perturbations - Effects of a Nonspherical Earth - Atmospheric Drag - Inclined Orbits -Calendars - Universal Time - Julian Dates - Sidereal Time - The Orbital Plane - The Geocentric- Equatorial Coordinate System - Earth Station Referred to the IJK Frame - The Topcentric-Horizon Co-ordinate System - The Sub-satellite Point - Predicting Satellite Position.

UNIT II GEOSTATIONARY ORBIT & SPACE SEGMENT 9

Introduction - Antenna Look Angels - The Polar Mount Antenna - Limits of Visibility - Near Geostationary Orbits - Earth Eclipse of Satellite - Sun Transit Outage - Launching Orbits - Problems - Power Supply - Attitude Control - Spinning Satellite Stabilization - Momentum Wheel Stabilization - Station Keeping - Thermal Control - TT&C Subsystem - Transponders - Wideband Receiver - Input Demultiplexer - Power Amplifier - Antenna Subsystem - Morelos - Anik-E - Advanced Tiros-N Spacecraft.

UNIT III EARTH SEGMENT & SPACE LINK 9

Introduction - Receive-Only Home TV Systems - Outdoor Unit - Indoor Unit for Analog (FM) TV - Master Antenna TV System - Community Antenna TV System - Transmit-Receive Earth Stations - Problems - Equivalent Isotropic Radiated Power - Transmission Losses - Free- Space Transmission - Feeder Losses - Antenna Misalignment Losses - Fixed Atmospheric and Ionospheric Losses - Link Power Budget Equation - System Noise - Antenna Noise - Amplifier Noise Temperature - Amplifiers in Cascade - Noise Factor - Noise Temperature of Absorptive Networks - Overall System Noise Temperature - Carrier-to-Noise Ratio - Uplink - Saturation Flux Density - Input Back Off - The Earth Station HPA - Downlink - Output Back off - Satellite TWTA Output - Effects of Rain - Uplink rain-fade margin - Downlink rain-fade margin - Combined Uplink and Downlink C/N Ratio - Intermodulation Noise.

UNIT IV SATELLITE ACCESS 9

Single Access - Preassigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth limited a Power-limited TWT amplifier operation, FDMA downlink analysis.

TDMA : Reference Burst; Preamble and Postamble, Carrier recovery, Network synchronization, unique word detection, Traffic Date, Frame Efficiency and Channel capacity, preassigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission. Companion of uplink Power requirements for FDMA & TDMA. On-board signal Processing for TDMA / FDMA operation, Satellite switched TDMA. Code-Division Multiple Access - Direct-Sequence spread

spectrum - code signal c(t) - autocorrelation function for c(t) - Acquisition and tracking - Spectrum spreading and dispreading - CDMA throughput - Problems - Network Layers - TCP Link - Satellite Links and TCP - Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) - Requests for comments - Split TCP connections - Asymmetric Channels - Proposed Systems.

UNIT V DIRECT BROADCAST SATELLITE SERVICES 9

Introduction - Orbital Spacing - Power Rating and Number of Transponders - Frequencies and Polarization - Transponder Capacity - Bit Rates for Digital Television - MPEG Compression Standards - Forward Error Correction - Home Receiver Outdoor Unit (ODU) - Home Receiver Indoor Unit (IDU) - Downlink Analysis - Uplink -Problems - Satellite Mobile Services - VSATs - Radarsat - Global Positioning Satellite System - Orbcomm.

TOTAL: 45

TEXT BOOK

1. Dennis Roddy, Satellite Communications, McGraw-Hill Publication Third edition 2001.

REFERENCES

1. Timothy Pratt - Charles Bostian & Jeremy Allmuti, Satellite Communications, John Willy & Sons (Asia) Pvt. Ltd. 2004
2. Wilbur L. Pritchars Henri G.Suyder Hond Robert A.Nelson, Satellite Communication Systems Engineering, Pearson Education Ltd., Second edition 2003.
3. M.Richharia : Satellite Communication Systems (Design Principles Macmillan Press Ltd. Second Edition 2003.

EC 2756 ENGINEERING ACOUSTICS

L	T	P	C
3	0	0	3

Prerequisite PH 2001,EC2303

Goal

To create interest and give basic knowledge in acoustics

Objectives

The course should enable the students to :

1. Gain Mathematical basis for Acoustic Waves.
2. Explain wave propagation-parameters associated with wave propagation.
3. Gain knowledge about resonators and filters.
4. Explain wave absorption in enclosures and design of enclosures for proper audibility.
5. Impact knowledge about transduction.

Outcome

At the end of the course the student should be able to:

1. Distinguish various acoustic waves, one dimensional, plane and spherical wave.
2. Understand acoustic radiation, absorption and alternation of plane waves.
3. Understand the implication of resonance and filtering in acoustic domain.
4. Understand reverberation time of enclosures, estimation and control for proper audibility.
5. Understand and specify transducers such as microphones loud speakers and condensers.

UNIT I THE ACOUSTICS WAVES EQUATION AND SIMPLE SOLUTION 9

Acoustics waves - Linear wave equation - sound in fluids - Harmonic plane waves - Energy density - Acoustics intensity - Specific acoustic impedance - spherical waves - Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence - method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from a pulsating sphere - Acoustic reciprocity - continuous line source - radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound Absorption from viscosity - complex sound speed and absorption - classical absorption coefficient.

UNIT III PIPES, RESONATORS AND FILTERS 9

Resonance in pipes - standing wave pattern absorption of sound in pipes - long wavelength limit - Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters - low pass, high pass and band pass. Noise, Signal detection, Hearing and speech: Noise, spectrum level and band level - combing band levels and tones - detecting signals in noise - detection threshold - the ear - fundamental properties of hearing - loudness level and loudness - pitch and frequency - voice.

UNIT IV ARCHITECTURAL ACOUSTICS: 9

Sound in endosure - A simple model for the growth of sound in a room - reverberation time - Sabine, sound absorption materials - measurement of the acoustic output of sound sources in live rooms - acoustics factor in architectural design.

Environmental Acoustics:

Weighted sound levels speech interference - highway noise - noise induced hearing loss - noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION 9

Transducer as an electives network - canonical equation for the two simple transducers transmitters - moving coil loud speaker - loudspeaker cabinets - horn loud speaker, receivers - condenser - microphone - moving coil electrodynamics microphone piezoelectric microphone - calibration of receivers.

TOTAL: 45

TEXT BOOK

1. Lawerence E.Kinsler, Austin, R.Frey, Alan B.Coppens, James V.Sanders, Fundamentals of Acoustics, 4ht edition, Wiley, 2000.

REFERENCE

1. L.Berarek , "Acoustics" - McGraw-Hill

EC2757 CONSUMER ELECTRONICS

L	T	P	C
3	0	0	3

Prerequisite EC 2301

Goal

Enable the students to understand the various electronic audio and video devices and home office systems.

Objectives

The course should enable the students to:

1. Understand the working principles of an audio systems.
2. Understand the working principles of video and display systems.
3. Understand the working principles and operation of domestic appliances.
4. Understand the working principles and operation of recording and reproduction systems.
5. Understand the working principles and operation of power supplies and other consumer using systems.

Outcome

At the end of the course the student should be able to:

1. Know the working principles of various audio systems.
2. Know the working principles of video and display systems
3. Know the working principles of video and display systems
4. Know the working principles of video and display systems
5. Know the working principles & operation of power supplies and other systems.

UNIT I AUDIO SYSTEMS **9**

Microphones, their types; Carbon, velocity, crystal, condenser, cordless etc. Loud Speaker: Direct radiating, horn loaded woofer, tweeter, mid range, multi-speaker system, baffles and enclosures. Sound recording on magnetic tape, its principles, block diagram and tape transport mechanism, Digital sound recording on tape and disc, CD system, Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers , public address systems, Graphics Equalizer, speed Synthesizer, Electronic tuning.

UNIT II VIDEO SYSTEMS AND DISPLAYS **9**

Video Systems: B& W TV, color TV and HD TV systems, LCD, LED, PLASMA Systems, Electronic cameras, VCR, VCP, CD systems, Memory diskettes, Discs and drums. Dolby noise reduction digital and analog recording. Digital projection systems (LCD, DLP, SVGA to UXGA system) Block diagram and principles of working of cable TV and DTH, cable TV using internet. Video Telephone and Video Conferencing.

UNIT III DOMESTIC APPLIANCES **9**

Washing machines, Microwave ovens, Air- conditioners and Refrigerators, In car computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System.

UNIT IV RECORDING AND REPRODUCTION SYSTEMS **9**

Disc recording and reproduction, Magnetic recording and reproduction, Video tape recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System.

UNIT V POWER SUPPLIES AND OTHER SYSTEMS **9**

SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM

TOTAL: 45

TEXT BOOK

1. Consumer Electronics S P Bali Pearson ed 2007.

REFERECES

1. K. Blair, Benson "Audio Engineering Hand book", 2001
2. R.R Gulati, "Colour Television-principles & practice",Wiley Eastern Limited,New Delhi, 2008
3. R.R Gulati, "Complete Satellite & Cable Television", New age International Publisher, 2008
4. RC Vijay, "Colour Television Servicing", BPB Publication, New Delhi, 2007.

EC2758 DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

Prerequisite EC 2602

Goal

To introduce the students to various image processing techniques.

Objectives

The course should enable the students to:

1. Study the image fundamentals and mathematical transforms necessary for image processing.
2. Study the image enhancement techniques
3. Study image restoration procedures
4. Study the image compression Procedures
5. Study the image segmentation and representation techniques.

Outcome

At the end of the course the student should be able to:

1. Understand the image fundamentals and the two dimensional image transforms
2. Understand how to improve the image quality by using enhancement techniques.
3. Restore the image by the use of various filtering techniques.
4. Understand the various image compression techniques and standards.
5. Understand the descriptors used to describe an image, segmentation and edge detection in images.

UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS 9

Elements of visual perception - Image sampling and quantization, Basic relationship between pixels - Basic geometric transformations-Introduction to Fourier Transform and DFT - Properties of 2D Fourier Transform - FFT - Separable Image Transforms -Walsh - Hadamard - Discrete Cosine Transform, Haar, Slant - Karhunen - Loeve transforms.

UNIT II IMAGE ENHANCEMENT TECHNIQUES 9

Spatial Domain methods: Basic grey level transformation - Histogram equalization - Image subtraction - Image averaging -Spatial filtering: Smoothing, sharpening filters - Laplacian filters -Frequency domain filters : Smoothing - Sharpening filters - Homomorphic filtering.

UNIT III IMAGE RESTORATION 9

Model of Image Degradation/restoration process - Noise models - Inverse filtering -Least mean square filtering - Constrained least mean square filtering - Blind image restoration - Pseudo inverse - Singular value decomposition.

UNIT IV IMAGE COMPRESSION **9**

Lossless compression: Variable length coding - LZW coding - Bit plane coding- predictive coding-DPCM. Lossy Compression: Transform coding - Wavelet coding - Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION **9**

Edge detection - Thresholding - Region Based segmentation - Boundary representation: chaincodes-Polygonal approximation - Boundary segments - boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors -Simple descriptors- Texture.

TOTAL = 45

TEXT BOOK

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing - PearsonEducation 2007.

REFERENCES

1. William K Pratt, Digital Image Processing John Willey (2001)
2. Image Processing Analysis and Machine Vision - Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy (1999).
3. A.K. Jain, PHI, New Delhi (1995).
4. Fundamentals of Digital Image Processing. Chanda Dutta Magundar - Digital Image Processing and Applications, Prentice Hall of India, 2000.

EC2759 TELECOMMUNICATION SWITCHING AND NETWORKS

L	T	P	C
3	0	0	3

Prerequisite EC 2501,EC2601

Goal

To introduce fundamental functions of a telecom switching office and mathematical model for the analysis of telecommunication traffic.

Objectives

The course should enable the students to:

1. Learn the concept of frequency multiplexing ,TDM and digital multiplexing with digital hierarchy namely SONET / SDH.
2. Learn the concept of switching.
3. Study the need for network synchronization and synchronization issues..
4. Study the enhanced local loop systems in digital environment.
5. Learn statistical modeling of telephone traffic and queuing system characteristics.

Outcome

At the end of the course the student should be able to:

1. Understand the concepts of Frequency and Time division multiplexing. digital multiplexing and digital hierarchy namely SONET / SDH.
2. Understand the concepts of space switching, time switching and combination switching.
3. Understand the need for network synchronization, study synchronization issues , outline network control and management issues.
4. Understand enhanced local loop systems in digital environment, ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
5. Understand the concepts of statistical modeling of telephone traffic, blocking system characteristics and queuing system characteristics.

UNIT I MULTIPLEXING **9**

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings.

SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT II DIGITAL SWITCHING **9**

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SSN07 signaling.

UNIT III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT **9**

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements,Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT IV DIGITAL SUBSCRIBER ACCESS **9**

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT V TRAFFIC ANALYSIS **9**

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network

Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TOTAL: 45

TEXTBOOK

1. Bellamy John, "Digital Telephony", John Wily & Sons, Inc. 3rd edn. 2000.

REFERENCE

1. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

EC2760 NANOELECTRONICS AND DEVICES

L	T	P	C
3	0	0	3

Prerequisite PH 2001,EC2201

Goal

To introduce the student to various Nanoelectronic Devices and Technology.

Objectives

The course should enable the students to:

1. Study the types of Nanotechnology and nanomachines,
2. Study the fundamentals of logic devices and classifications,
3. Study Silicon MOSFET devices and Quantum transport tunneling devices,
4. Study Quantum carbon tubes and its applications for memory devices,
5. Study the function of molecular electronic devices and MEMs.

Outcome

At the end of the course the student should be able to:

1. Understand the molecular Nanotechnology and Nanomaterials.
2. Understand the dynamic properties, physical limits and classifications.
3. Enumerate the concepts of Silicon MOSFET devices and Quantum transport devices.
4. Explain the types, formation and synthesis of carbon nano tubes.
5. Understand fabrication, simulation and testing of molecular electronic devices and MEMS.

UNIT I INTRODUCTION TO NANOTECHNOLOGY **9**

Background to nanotechnology: Types of nanotechnology and nanomachines - periodic table - atomic structure - molecules and phases - energy - molecular and atomic size - surface and dimensional space - top down and bottom up; Molecular Nanotechnology: Electron microscope - scanning electron microscope - atomic force microscope - scanning tunnelling microscope - nanomanipulator -

nanotweezers - atom manipulation - nanodots - self assembly - dip pen nanolithography. Nanomaterials: preparation - plasma arcing - chemical vapor deposition - sol-gels - electrodeposition - ball milling - applications of nanomaterials.

UNIT II FUNDAMENTALS OF NANOELECTRONICS 9

Fundamentals of logic devices:- Requirements - dynamic properties - threshold gates;physical limits to computations; concepts of logic devices:- classifications - two terminaldevices - field effect devices - coulomb blockade devices - spintronics - quantumcellular automata - quantum computing - DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons - performance estimation for the human brain. Ultimate computation:- power dissipation limit - dissipation in reversible computation - the ultimate computer.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES 9

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices-scaling rules - silicon-dioxide based gate dielectrics - metal gates - junctions & contacts - advanced MOSFET concepts.

Quantum transport devices based on resonant tunneling:- Electron tunneling - resonant tunneling diodes - resonant tunneling devices; Single electron devices for logic applications:- Single electron devices - applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES 9

Carbon Nanotube: Fullerenes - types of nanotubes - formation of nanotubes -assemblies - purification of carbon nanotubes - electronic propertics - synthesis of carbon nanotubes - carbon nanotube interconnects - carbon nanotube FETs -Nanotube for memory applications - prospects of an all carbon nanotube nanoelectronics.

UNIT V MOLECULAR ELECTRONICS 9

Electrodes & contacts - functions - molecular electronic devices - first test systems -simulation and circuit design - fabrication; Future applications: MEMS - robots - randomaccess memory - mass storage devices.

TOTAL= 45

TEXTBOOKS

1. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003
2. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002
3. T. Pradeep, NANO: The Essentials - Understanding Nanoscience and Nanotechnology, TMH, 2007.

MG 2002 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

Prerequisites MG 2001

Goal

To understand the Total Quality Management concepts and principles and the various tools available to achieve total quality management and also to understand the statistical approach for quality control.

Objectives

The course should enable the students to :

1. Understand the basic concepts of Total Quality Management.
2. Be familiar with the total quality management principles..
3. Know about the various process control tools available to achieve Total Quality Management.
4. Study about quality function deployment and total productive maintenance.
5. Get awareness about the ISO certification process and their need in various industries.

Outcome

The students will be able to :

1. Apply the concepts of quality planning, quality control etc., in the appropriate places.
2. Apply the total quality management principles in issues like customer complaints, customer retention, relationship development etc.,
3. Describe the tools of quality, management tools, process capability etc.,
4. Describe quality function deployment and total productive maintenance.
5. Implement the quality systems for various industries.

UNIT I INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership - Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II TQM PRINCIPLES **9**

Customer satisfaction - Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement - Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement - Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership - Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures - Basic Concepts, Strategy, Performance Measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality, Statistical Fundamentals - Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS **9**

Benchmarking - Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) - House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) - Concept, Improvement Needs, FMEA - Stages of FMEA.

UNIT V QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System - Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 - Concept, Requirements and Benefits.

TOTAL: 45

TEXT BOOK:

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES:

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth - Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management - Concepts and Tasks, New Age International 1996.

EC2771 FUNDAMENTALS OF AVIONICS

L	T	P	C
3	0	0	3

GOAL

To introduce the basic concepts of aviation electronics in terms of system architecture design and integration.

OBJECTIVES

The course should enable the student :

1. To understand the needs for avionics for both Civil and military aircraft.
2. To introduce avionics system architecture, system verification and validations of various military standard data buses and its power system.

3) To integrate the equipments, evaluate and validate under guidance of FAR.

4) To understand the various principles in flight disk and cockpit panels.

5) To study the Remote diagnostics and maintenance support, life cycle costs for military and civil Avionics.

OUTCOMES

The students should be able to:

1. Use this general awareness for design and fabrication of modern aircraft cockpit. Appreciate the need for avionics and Role of avionics
2. Identify various data bus in real time
3. Awareness of failure mode and effective analysis, criticality and damaging modes analysis by FAR.
4. Apply basic concepts to a/c instruments for efficient output.
5. Awareness onmaintenance of equipment using BIT and CFDS.

UNIT I INTRODUCTION TO AVIONICS 9

Need for Avionics in Civil and Military aircraft and Space systems, integrated avionics and Weapon systems, Typical Avionics sub-systems, design, technologies. Defining avionics system requirements.

UNIT II AVIONICS SYSTEM ARCHITECTURE DESIGN AND INTEGRATION 9

Avionics system architecture, Databuses, MIL-STD-1553B, ARINC-429, ARINC-629, Fault tolerant systems and hardware, fault tolerant software, Evaluating Page 5 of 23 system design and Future architecture. Avionics system design, Development and integration-use of simulation tools, stand alone and integrated Verification and Validation.

MATCHING AVIONICS TO AIRCRAFT

Packaging, ARINC and DOD types, system cooling, EMI/EMC requirements. Aircraft powers systems: Electrical power generation & distribution systems.

UNIT III SYSTEM ASSESSMENT AND VALIDATION 9

Hardware assessment-FARs guide certification requirements-Fault Tree analysis -Failure mode and effective analysis, Criticality and damaging modes and effects analysis, Computer based reliability modeling and prediction. Software Technology, Assessment and Validation -Civil and Military standards.

UNIT IV AVIONICS SYSTEM ESSENTIALS: COCKPIT DISPLAYS, I/O DEVICES AND POWER 9

Trends in display technology, Alphanumeric displays, character displays etc., Basic components of Displays, CRT displays, LCDs etc., and their characteristics. Civil and Military aircraft cockpits, MFDs, MFK, HUD, DVI, HOTAS, Helmet mounted display, Synthetic and enhanced vision, situation awareness, Panoramic/big picture display, virtual cockpit-Civil and Military Electrical Power requirement standards, comparing the Military and Civil Requirements and Tips for Power System Design

UNIT V MAINTENANCE AND COSTS OF AVIONIC **9**

BIT and CFDS, Automatic Test Equipment, Speeds maintenance, ATLAS, Remote diagnostics and maintenance support-Life Cycle Costs for Military and Civil Avionics, Cash flow analysis, Software costs, Establishing spares level.

L = 45, TOTAL=45

TEXT BOOKS

1. Spitzer, C.R. ?Digital Avionics Systems', Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.
2. Collinson R.P.G. ?Introduction to Avionics', Chapman and Hall, 1996

REFERENCES:

1. Middleton, D.H. ?Avionics Systems', Longman Scientific and Technical, Longman Group UK Ltd., England, 1989.
2. Jim Curren, Trend in Advanced Avionics, IOWA State University, 1992.
3. Cary R. Spitzer, The Avionics Handbook, Crc Press, 2000.

EC2772 NAVIGATION SYSTEMS

L	T	P	C
3	0	0	3

Goal

To introduce the basic concepts of Navigation systems used in aircraft.

OBJECTIVES

The course should enable the student :

1. To understand the basic concept of Radar and its operation in both Civil and military aircraft.
2. To introduce different types of Radar and detailed about its application
3. To integrate the equipment with guidance system which is used in missiles
4. To understand the various principles in aircraft navigation systems and its classifications.
5. To study the control systems and frequency Domain characteristics for aerospace systems.

OUTCOMES

The students should be able to:

1. Use this general awareness they can design and fabricate a modern radar for aircraft.
2. Identify various types of radar in real time
3. Awareness of kinematic equations of guidance laws
4. Apply basic concepts to aircraft navigation systems for efficient output.

5. Awareness onRoot locus, Nyquist and Bode Plots and their application to controller design for aerospace systems.

UNIT - I INTRODUCTION TO RADARS **9**

Radar Equation, Block Diagram and Operation, Radar Frequencies, Application of Radars, Range performance of Radars, Minimum detectable signal, Noise effects

UNIT - II. CONTINUOUS WAVE AND FREQUENCY MODULATED RADARS **9**

DOPPLER EFFECT, CW-RADAR, ISOLATIon between transmitter and received, Radial velocity, CW Radar applications, Frequency modulated CW Radars.

UNIT - III GUIDED MISSILES AND LAWS **9**

Classifications, Description of tactical missiles, Guidance phases during flight, Categories of Homing and command guidance, The Kinematic equations, Classification of guidance laws, Classical guidance laws, Modern guidance laws

UNIT - IV AIRCRAFT NAVIGATION **9**

Kinds of Navigation - Position Fixing and Dead-Reckoning Systems, LORAN, DECCA, OMEGA, Very High Frequency Omni-Directional Range (VOR), Celestial navigation and GPS based navigation, Inertial Navigation Systems, Integrated Navigation Systems

UNIT -V CONTROL SYSTEMS AND FREQUENCY DOMAIN CHARACTERISTICS **9**

Classical Linear Time Invariant Control Systems, Transfer function representations, stability, time domain characteristics, PID controller design for aerospace systems,Root Locus, Nyquist and Bode plots and their application to controller design for aerospace systems.

L = 45, TOTAL=45

TEXT BOOKS

1. M. I. Skolnik: Introduction to Radar Systems, Tata McGraw-Hill, 2007 (UNIT I & II)
2. P. Zarchan: Tactical and Strategic Missile Guidance, AIAA, 2007.(UNIT III)
3. M. Kayton and W. Fried: Avionics Navigation System, Wiley Inter science, 1997 (UNIT IV)

REFERENCES

1. N.S. Nise: Control Systems Engineering, Wiley-India, 2004
2. B. Friedland: Control Systems Design, Dover, 2005.

ELECTIVE COURSES-VIII SEMESTER

EC2851 TELEVISION AND VIDEO ENGINEERING

L	T	P	C
3	0	0	3

Prerequisite EC 2303,EC 2403,EC2404,EC 2601

Goal

To study the analysis and synthesis of TV pictures, composite video signal, receiver picture tubes and television camera tubes and advanced topics in television systems and video engineering.

Objectives

The course should enable the students to:

1. Learn the Image orthicon , vidicon, plumbicon, silicon diode array vidicon and solid state image scanners.
2. Learn about the TV transmitter, Monochrome TV receiver,RF tuner , UHF, VHF tuner and AGC.
3. Study the color theory- luminance, hue and saturation, Trinitron color picture tubes.
4. Learn about the NTSC color TV system, NTSC color receiver, limitations of NTSC system, PAL color TV system, cancellation of phase errors, PAL and D color system.
5. Study the Satellite TV technology- Cable TV, Stereo sound in TV and digital equipments for TV studios.

Outcome

At the end of the course the student should be able to:

1. Know about different camera tubes and Scanners,and basic communication theory knowledge.
2. Know about TV Transmitter and TV Receiver and different Tuners.
3. Solve the problem of different receivers calculation.Calculation of bandwidth and transmission of signal.
4. Know the color television systems and solve the problems of cancellation of phase errors
5. Have a clear idea about television and applications of TV System.

UNIT I FUNDAMENTALS OF TELEVISION **9**

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension-horizontal sync. Composition- vertical sync. Details - functions of vertical pulse train - scanning sequence details. Picture signal transmission - positive and negative modulation - VSB transmission sound signal transmission - standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

TV transmitter - TV signal propagation - Interference - TV transmission Antennas - Monochrome TV receiver - RF tuner - UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC - Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation - typical sync processing circuits- Deflection current waveform - Deflection Oscillators - Frame deflection circuits - requirements- Line Deflection circuits - EHT generation - Receiver Antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION 9

Compatibility - colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta - gun-precision - in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking - colour signal transmission- bandwidth- modulation of colour difference signals - weighting factors- Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS 9

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system - PAL colour TV system - cancellation of phase errors- PAL -D colour system- PAL coder - Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation - Burst phase Discriminator - ACC amplifier- Reference Oscillator- Ident and colour killer circuits- U and V demodulators- Colour signal matrixing - merits and demerits of the PAL system - SECAM system - merits and demerits of SECAM system.

UNIT V ADVANCED TELEVISION SYSTEMS 9

Satellite TV technology- Cable TV - VCR- Video Disc recording and playback- Tele Text broadcast receiver - digital television - Transmission and reception- projection Television - Flat panel display TV receiver -Display devices: LCD, TFT,LED, Plasma, and HDTV. Stereo sound in TV - 3D TV - EDTV - Digital equipments for TV studios.

TOTAL: 45

TEXT BOOKS

1. R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servicing , Second edition, New age International Publishes, 2004 (Unit I,II,IV and V)
2. R.R.Gulati "Monochrome and colour television ", New age International Publisher, 2003 (Unit I,III and IV)
3. R.G. Gupta, _Audio Video Systems_, Technical Education.

REFERENCES

1. A.M Dhake, "Television and Video Engineering", Second edition, TMH, 2003.
2. S.P.Bali, " Colour Television, Theory and Practice", TMH, 1994

EC2852 SPEECH PROCESSING

L	T	P	C
3	0	0	3

Prerequisite EC2403

Goal

To introduce the characteristics of speech signals and the related time and frequency domain methods for speech analysis and speech compression

Objectives

The course should enable the students to :

1. Introduce the models for speech production time and frequency domain techniques for estimating speech parameters.
2. Introduce the time domain methods for speech processing.
3. Introduce Frequency domain methods for Speech Processing.
4. Introduce linear predictive coding.
5. Introduce applications of speech processing.

Outcome

At the end of the course the student should be able to:

1. Understand the speech production time and frequency domain techniques for estimating speech parameters.
2. Use time domain methods for speech processing.
3. Apply Frequency domain methods for speech processing.
4. Understand linear predictive coding.
5. Utilize applications of speech processing.

UNIT I NATURE OF SPEECH SIGNAL **9**

Speech production mechanism, Classification of speech, sounds, nature of speech signal, models of speech production.

Speech signal processing: purpose of speech processing, digital models for speech signal, Digital processing of speech signals, Significance, short time analysis.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING **9**

Time domain parameters of speech, methods for extracting the parameters, Zero crossings, Auto correlation function, pitch estimation.

UNIT III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING **9**

Short time Fourier analysis, filter bank analysis, spectrographic analysis, Format extraction, pitch extraction, Analysis - synthesis systems.

UNIT IV LINEAR PREDICTIVE CODING OF SPEECH **9**

Formulation of linear prediction problem in time domain, solution of normal equations, Interpretation of linear prediction in auto correlation and spectral domains.

UNIT V HOMOMORPHIC SPEECH ANALYSIS **9**

Central analysis of speech, format and pitch estimation, Applications of speech processing - Speech recognition, Speech synthesis and speaker verification.

TOTAL: 45

TEXT BOOK

1. L.R. Rabiner and R.E Schafer : Digital processing of speech signals, Prentice Hall, 1978.

REFERENCES

1. J.L Flanagan : Speech Analysis Synthesis and Perception - 2nd Edition - Sprenger Vertag, 1972.
2. I.H.Witten :Principles of Computer Speech , Academic press, 1983.

EC2853 COMMUNICATION NETWORK SECURITY

L	T	P	C
3	0	0	3

Prerequisite EC2501

Goal

To introduce the student to the various techniques and standards for communication network security

Objectives

The course should enable the students :

1. To make the students learn the principles and practices of Cryptography and Network Security,
2. To understand the various methods of public key cryptography,
3. To learn the principles and mechanisms of Authentication,
4. To familiarize the students with key distribution methods,
5. To help students identify the application of cryptographic techniques for providing Network and System Security.

Outcome

At the end of the course the student should be able to:

1. Understand the principles and practices of Cryptography and Network Security and explain concepts related to applied cryptography, including plaintext, ciphertext and symmetric cryptography.
2. Identify and explain the concepts, protocols and technologies associated with public key cryptography.

3. Outline the requirements and mechanisms for identification and authentication.

4. Understand the methods and need for key management and distribution.

5. Explain the requirements of real-time communication security and issues related to the security of web services. Explain the requirements of non-real time security (email security) .

UNIT I BASIC CONCEPTS OF SECURITY & CLASSICAL ENCRYPTION TECHNIQUES 9

Introduction - The need for security, Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, A Model for Network Security. Symmetric Cipher Models - Substitution techniques, Transposition techniques, Steganography, Block Cipher and stream cipher- Encrypting large messages (ECB, CBC, OFB, CFB, CTR) , Secret Key Cryptography : Data Encryption Standard (DES), Multiple Encryption DES, The Strength of DES.

UNIT II PUBLIC KEY CRYPTOGRAPHY AND CRYPTOGRAPHIC HASH FUNCTIONS 9

Introduction - Number Theory, Modular Arithmetic, Prime Numbers, Euler's Totient Function, multiplicative and additive inverse, selection of public and private keys, Principles of Public Key Cryptosystems, The RSA Algorithm, Other Public key cryptosystems, Diffie Hellman Key Exchange.Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Hash Functions Based on Cipher Block Chaining, MD5 Message Digest Algorithm, Secure Hash Algorithm SHA 512.

UNIT III MESSAGE AUTHENTICATION CODES AND DIGITAL SIGNATURES 9

Message Authentication Requirements - Message Authentication Functions, Requirements for Security of MACs, MACs Based on Hash Functions, HMAC, MACs, Based on Block Ciphers, Data Authentication Algorithm. Digital Signatures, Digital Signature Standard.

UNIT IV KEY MANAGEMENT & DISTRIBUTION AND USER AUTHENTICATION 9

Symmetric Key Distribution Using Symmetric Encryption and Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public Key Infrastructure, kerberos.

UNIT V NETWORK & INTERNET SECURITY TRANSPORT- LEVEL SECURITY 9

Web security Considerations, Secure Socket Layer and Transport layer Security; E-Mail Security - Pretty Good Privacy, S/MIME; IP Security - IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations.

TOTAL:45

TEXT BOOK:

1. William Stallings, Cryptography and Network Security, Prentice Hall, 5th edition 2010.

REFERENCES:

1. Atul Kahate, Cryptography and Network Security, Tata McGraw-Hills, 8th reprit 2006.

2. Eric Maiwald, Information Security Series, Fundamental of Network security, Dreamtech press, 2004.

EC2854 WIRELESS NETWORKS

L	T	P	C
3	0	0	3

Prerequisite EC2501,EC2604

Goal

To familiarize the student with the analysis and design of different types of Wireless Networks.

Objectives

The course should enable the students to:

1. Understand physical and wireless MAC layer alternatives techniques.
2. Learn operation of wireless networks & WAN
3. Study wireless Transport Layer concept
4. Understand the concept of Different types of Wireless LAN
5. Understand WPAN and Geo-location systems.

Outcome

At the end of the course the student should be able to:

1. Analyze & design issues of different types of Wireless Modems
2. Understand the basic operation of different Wireless Networks
3. Understand the Issues of Transport Layer
4. Understand the concept of current issues of the Wireless LAN
5. Understand the real time operation of WPAN.

UNIT I PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES 9

Wired transmission techniques:Consideration in the design of wireless modems. Applied wireless transmission techniques, short distance base band transmission,UWB pulse transmission, broad Modems for higher speeds, random access for data oriented networks, integration of voice and data traffic.

UNIT II WIRELESS NETWORK OPERATION AND WAN 9

Wireless networks topologies, cellular topology, cell fundamentals, signal to interference ratio calculation, mobility management, radio resources and power management, securities in wireless networks. Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS - 95 CDMA reverse channel, pilot and frame formats in IS - 95, IMT - 2000; CDMA 2000.

UNIT III MOBILE TRANSPORT LAYERS 9

Mobile IP - Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols- Multicast routing-TCP over Wireless Networks - Indirect TCP - Snooping TCP - Mobile TCP - Fast Retransmit

/ Fast Recovery - Transmission/Timeout Freezing-Selective Retransmission - Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks.

UNIT IV OVERVIEW OF WIRELESS LAN 9

IEEE 802.11 Standards- Architecture,Services (Physical Layer, MAC Layer) Wi-Fi and WiMAX - Wireless Local Loop-wireless ATM-HIPER LAN 1,2.

UNIT V WPAN AND GEOLOCATION SYSTEMS 9

IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geolocation, technologies for wireless geolocation, geolocation standards for E-911 services.

TOTAL: 45

TEXT BOOKS

1. Kaveh Pahlavan, Prashant Krishnamoorthy, Principles of Wireless Networks, - A united approach Pearson Education, 2002.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

REFERENCES

1. Jochen Schiller, Mobile Communications, Pearson Education - 2003, 2nd Edition
2. X.Wang and H.V.Poor, Wireless Communication Systems, Pearson education, 2004.
3. M.Mallick, Mobile and Wireless design essentials, Wiley Publishing Inc. 2003.
4. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, Wireless Networks, John Wiley & Sons, 2003.

EC2855 OPTOELECTRONIC DEVICES

L	T	P	C
3	0	0	3

Prerequisite EC 2201,EC 2404,EC2601,EC2701

Goal

To provide basic knowledge of optical signals, electromagnetic theory and IC fabrication techniques

Objectives

The course should enable the students to:

1. Know the basics of solid state physics and understand the nature and characteristics of light,
2. Understand different methods of luminescence, display devices and laser types and their applications,
3. Learn the principle of optical detection mechanism in different detection devices,
4. Understand different light modulation techniques and the concepts and applications of optical switching,

5. Study the integration process and application of optoelectronic integrated circuits in transmitters and receivers.

Outcome

At the end of the course the student should be able to:

1. Understand the wave nature of light, and the quantum mechanical treatment of light.
2. Know Electro Luminescence, Injection Luminescence, Investigate Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback and threshold condition.
3. Analyze mechanism of operation of Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes and study their performance.
4. Know Analog and Digital Modulation, Electro-optic modulators and solve problems related to Optical Switching and Logic Devices.
5. Understand Optical Integrated Circuits (OIC), Integrated transmitters and receivers.

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS 9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES 9

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR 9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acousto-Optic devices, Optical, Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TOTAL: 45

TEXT BOOK

1. J. Wilson and J.Haukes, "Opto Electronics - An Introduction", Prentice Hall of India Pvt. Ltd.,New Delhi, 1995.

REFERENCES:

1. Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi,1995.
2. Jasprit Singh, "Opto Electronics - An Introduction to materials and devices", McGraw-Hill International Edition, 1998.

EC2856 REMOTE SENSING

L	T	P	C
3	0	0	3

Prerequisite Nil

Goal

To enable the student to explore the fundamental principles of remote sensing as they relate to engineering and environmental problems

Objectives

The course should enable the students to:

1. Understand the principles of remote sensing techniques by outlining a sensor design according to spectral responses of Earth's surfaces and the atmosphere .
2. Understand the processing and enhancement of satellite images for identifying geological structures.
3. Recognize coastal morphology from space.
4. Recognize global changes and environmental monitoring with data from special sensors.
5. Understand the spectral characteristics of earth.

Outcome

At the end of the course the student should be able to:

1. Understand the principles of remote sensing techniques and spectral responses,
2. Identify Geological Structures and satellite Images,
3. Recognize Coastal morphology,
4. Know optical and microwave remote sensing,
5. To Interpret Satellite Images.

UNIT I REMOTE SENSING **9**

Definition - Components of Remote Sensing - Energy, Sensor, Interacting Body - Active and Passive Remote Sensing - Platforms - Aerial and Space Platforms - Balloons, Helicopters, Aircraft and Satellites - Synoptivity and Repetivity - Electro Magnetic Radiation (EMR) - EMR spectrum - Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave - Black Body Radiation - Planck's law - Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics - Scattering of EMR - Rayleigh, Mie, Non-selective and Raman Scattering - EMR Interaction with Water vapour and ozone - Atmospheric Windows - Significance of Atmospheric windows - EMR interaction with Earth Surface Materials - Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy - Reflectance - Specular and Diffuse Reflection Surfaces- Spectral Signature - Spectral Signature curves - EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites - Classification - Based on Orbits and Purpose - Satellite Sensors - Resolution - Description of Multi Spectral Scanning - Along and Across Track Scanners - Description of Sensors in Landsat, SPOT, IRS series - Current Satellites - Radar - Speckle - Back Scattering - Side Looking Airborne Radar - Synthetic Aperture Radar - Radiometer - Geometrical characteristics ; Sonar remote sensing systems.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS - Components of GIS - Hardware, Software and Organizational Context - Data - Spatial and Non-Spatial - Maps - Types of Maps - Projection - Types of Projection - Data Input - Digitizer, Scanner - Editing - Raster and Vector data structures - Comparison of Raster and Vector data structure - Analysis using Raster and Vector data - Retrieval, Reclassification, Overlaying, Buffering - Data Output - Printers and Plotters.

UNIT V MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images - Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image - Image enhancement - Filtering - Classification - Integration of GIS and Remote Sensing - Application of Remote Sensing and GIS - Urban Applications- Integration of GIS and Remote Sensing - Application of Remote Sensing and GIS - Water resources - Urban Analysis - Watershed Management - Resources Information Systems. Global positioning system - an introduction.

TOTAL: 45

TEXT BOOKS

1. M.G. Srinivas (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang," Introduction to Geographic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.

4. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A, 1975.

5. Burrough P A, "Principle of GIS for land resource assessment", Oxford

6. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.

7. Singal, "Remote Sening", Tata McGraw-Hill, New Delhi, 1990.

8. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman and Company 1996.

EC 2857 TELECOMMUNICATION SYSTEM MODELING AND SIMULATION

L	T	P	C
3	0	0	3

Prerequisite MA 2402,EC2601

Goal

To enable the students to model the random variables and random process applied to telecommunication system and to learn the methods of system simulation and performance evaluation.

Objectives

The course should enable the students to:

1. Learn simulation of random variables and random process
2. Learn modeling of radio communication channels
3. Learn various simulation techniques
4. Learn simulation methodologies and performance evaluation
5. Analyze some digital communication and optical communication techniques.

Outcome

At the end of the course the student should be able to:

1. Understand the process of simulation of random variables and random process
2. Understand the concepts of modeling of radio communication channels
3. Know the various simulation techniques such as sampling method and Monte Carlo method
4. Understand the process of simulation methodologies and performance evaluation
5. Analyze some digital communication,optical communication and satellite communication techniques.

UNIT I SIMULATION OF RANDOM VARIABLES RANDOM PROCESS 9

Generation of random numbers and sequence, Guassian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

UNIT II MODELING OF COMMUNICATION SYSTEMS **9**

Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT III ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION **9**

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT IV SIMULATION AND MODELING METHODOLOGY **9**

Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

UNIT V CASE STUDIES **9**

Simulations of QAM digital radio link in environment Light wave communication link and satellite system.

TOTAL: 45

TEXT BOOK

1. MC.Jeruchim, P.Balaban and Sam K Shanmugam, "Simulation of communication Systems: Modeling, Methodology and Techniques ", Plenum press , New York, 2001.

REFERENCES

1. Averill.M.Law and W.David Kelton,"Simulation Modeling and Analysis", McGraw-Hill Inc., 2000.
2. Geoffrey Gorden, "System Simulation", Prentice Hall of India, 2nd Edition, 1992.
3. W.Turin, "Performance Analysis of Digital Communication Systems", Computer Science Press, New York, 1990.
4. Jerry banks and John S.Carson, "Discrete Event System Simulation", Prentice Hall of India, 1984.

MG 2003 ENTREPRENEURSHIP DEVELOPMENT

L	T	P	C
3	0	0	3

Prerequisite MG2001

Goal

To provide an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, and methods of taxation and tax benefits, etc.

Objectives

The course should enable the students to:

1. Learn the Scope of an Entrepreneur.
2. Understand the Major motives influencing an Entrepreneur.
3. Know about Steps involved in Business Development.

Outcome

The students should be able to:

1. Know the Techno Economic Feasibility Assessment procedure.
2. Write a Project Proposal.
3. Utilise the various forms of Finance and support available.

UNIT I ENTREPRENEURSHIP **9**

Entrepreneur - Types of Entrepreneurs - Difference between Entrepreneur and Intrapreneur - Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION **9**

Major Motives Influencing an Entrepreneur - Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test - Stress management, Entrepreneurship Development Programs - Need, Objectives.

UNIT III BUSINESS **9**

Small Enterprises - Definition, Classification - Characteristics, Ownership Structures - Project Formulation - Steps involved in setting up a Business - identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment - Preparation of Preliminary Project Reports - Project Appraisal - Sources of Information - Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING **9**

Need - Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM - Taxation - Income Tax, Excise Duty - Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS **9**

Sickness in small Business - Concept, Magnitude, causes and consequences, Corrective measures - Government Policy for Small Scale Enterprises - Growth Strategies in small industry - Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL : 45

TEXT BOOKS

1. S.S.Khanka Entrepreneurial Development S.Chand & Co. Ltd. Ram Nagar New Delhi,3rd edition 2010..
2. Hisrich R D and Peters M P, Entrepreneurship 6th Edition Tata McGraw-Hill, 2010.

REFERENCES

1. Rabindra N. Kanungo Entrepreneurship and innovation, Sage Publications, New Delhi,1998.
2. E DII Faulty and External Experts - A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development Institute of India, Ahmadabad, 1986.

EC2858 WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

Prerequisite EC 2501

Goal

Introduce the students to the diverse literature on sensor networks, and expose them to the fundamental issues in designing and analyzing sensor network

Objectives

The course should enable the students to:

1. Describe the current technology trends and unique issues for the implementation in sensor networks.
2. Learn the knowledge of hardware components and various parameters for the sensor networks.
3. Learn Physical layer concept and MAC layer Protocol design issues and its function.
4. Understand design issues in the topology formation and localization of the sensor networks.
5. Understand the various tools and programming challenges for simulating a environment for sensor systems using Motes.

Outcome

At the end of the course the student should be able to:

1. Know the characteristics and challenges in the sensor networks.
2. Understand various blocks and its functions in the sensor networks.
3. Discuss the challenges in designing MAC and routing protocols for wireless sensor networks.
4. Know how the sensor networks is self configured and the formation of topology.
5. Program and communicate with embedded operating system such as TinyOS, a prominent application development environment for sensor systems using Motes.

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS 9

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II ARCHITECTURES 9

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 III NETWORKING SENSORS 9

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 IV INFRASTRUCTURE ESTABLISHMENT **9**

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

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS **9**

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

TOTAL=45

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.

EC 2859 SOLID STATE ELECTRONIC DEVICES

L	T	P	C
3	0	0	3

Prerequisite PH 2001,EC2201,EC2701

Goal

To introduce the students to various structures and V/I characteristics of devices

Objectives

The course should enable the students to:

1. Study crystal structures of elements of semiconductor devices,
2. Study energy band structure and charge carriers of semiconductor devices,
3. Study junction formation in various semiconductor devices,
4. Study the VI Characteristics of FET and BJT and their limitations,
5. Study about opto electronic devices and integrated circuits.

Outcome

At the end of the course the student should be able to:

1. Understand the crystal properties of elements used in fabrication of semiconductors.
2. Understand the energy band structure, charge carriers and currents in semiconductor devices.

3. Understand the behavior and fabrication of various junctions in semiconductor devices.
4. Understand the VI characteristics of devices and their limitations in factors like current, power and frequency.
5. Understand the photoelectric effect , fabrication of opto electronic devices and integrated circuits.

UNIT I CRYSTAL PROPERTIES, GROWTH OF SEMICONDUCTORS, ATOMS AND ELECRONS 9

Semiconductor materials:Periodic Structures- Crystal Lattices:Cubic lattices -Planes and Directions-The Diamond lattice.Bulk Crystal Growth:Starting Materials-Growth of Single Crystal Ingots-Wafers-Doping.Epitaxial Growth :Lattice Matching in Epitaxial Growth -Vapor -Phase Epitaxy.Atoms and Electrons:Introduction to Physical Models.Experimental Observations:The Photoelectric Effect-Atomic spectra.The Bohr model. Quantum Mechanics :Probability and the Uncertainty Principle-The Schrodinger Wave Equation -Potential Well Equation -Potential well Problem-Tunneling.

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS 9

Bonding Forces and Energy bands in Solids:Bonding Forces in Solids-Energy Bands-Metals, Semiconductors, and Insulators -Direct and Indirect Semiconductors -Variation of Energy Bands with Alloy Composition.Charge Carriers in Semiconductors:Electrons and Holes-Effective Mass-Intrinsic Material-Extrinsic Material - Electrons and Holes in Quantum Wells.Carrier Concentrations-The Fermi Level-Electron and Hole Concentrations at Equilibrium-Temperature Dependence of Carrier Concentrations-Compensation and Space Charge Neutrality.Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility-Drift and Resistance -Effects of Temperature and Doping on Mobility-High -Field effects-The Hall Effect Invariance of the Fermi level at equilibrium.

UNIT III JUNCTIONS 9

Fabrication of P-N Junctions:Thermal Oxidation-Diffusion -Rapid Thermal Processing-Ion Implantation-Chemical Vapor Deposition Photolithography-Etching -Metallization.Equilibrium Conditions:The Contact Potential-Equilibrium Fermi Levels -Space Charge at a Junction.Forward -and Reverse -Biased Junctions; -Steady state conditions:Qualitative Description Of current flow at a junction-Carrier Injection-Reverse Bias.Reverse -Bias Breakdown:Zener Breakdown -Avalanche Breakdown-Rectifiers-The Breakdown Diode.Transient and AC Conditions -Time variation of stored charge-Reverse Recovery Transient -Switching Diodes -Capacitance of P-N Junctions-The Varactor Diode.Deviations from the Simple Theory:Effects of contact Potential on carrier injection-Recombination and Generation in the Transition Region-Ohmic Losses -Graded Junctions.Metal -Semiconductor Junctions:Schottky Barriers-Rectifying contacts-Ohmic Contacts-Typical Schottky Barriers-Heterojunctions.

UNIT IV FET AND BJT 9

The GaAS MESFET-The High Electron Mobility Transistor -Short channel Effects.The Metal Insulator Semiconductor FET:Basic Operation and Fabrication -The ideal MOS Capacitor-Effects of Real Surfaces-Threshold Voltage -MOS capacitance Measurements- current -Voltage Characteristics of MOS Gate Oxides .The MOSFET :Output characteristics-Transfer characteristics- Mobility Models-Short channel MOSFET I-V characteristics -Control of Threshold Voltage -Substrate Bias Effects-

Sub threshold characteristics -Equivalent Circuit for the MOSFET-MOSFET Scaling and Hot Electron Effects-Drain -Induced Barrier Lowering -short channel and Narrow Width Effect-Gate -Induced Drain Leakage:BJT Fabrication .Minority carrier distribution and Terminal currents:Solution of the Diffusion Equation in the Base Region-Evaluation of the Terminal currents -Current Transfer Ratio.Generalized Biasing :The coupled -Diode Model-Charge control analysis.Switching :cut off -saturation-The switching cycle-Specifications for switching Transistors.other Important Effects:Drift in the base Narrowing -Avalanche Breakdown -Injection level; Thermal Effects-Base Resistance and Emitter Crowding -Gummel -Poon Model-Kirk Effect:Frequency Limitations of Transistors:Capacitance and Charging Times-Transit Time Effects-Webster Effect-High -Frequency Transistors .Heterojunction Bipolar Transistors.

UNIT V OPTOELCTRONIC DEVICES AND INTEGRATED CIRCUIT 9

Photodiodes:Current and Voltage in illuminated Junction-Solar Cells-Photo detectors-Noise and Bandwidth of Photo detectors.Light-Emitting Diodes:Light Emitting Materials-Fiber Optic Communications Multilayer Heterojunctions for LEDs.Lasers.Semiconductor lasers:Population Inversion at a Junction Emission Spectra for p-n junction-The Basic Semiconductor lasers-Materials for Semiconductor lasers.Integrated Circuits -Background :Advantages of Integration -Types of Integrated circuits-Monolithic and Hybrid Circuits.Evolution of Integrated Circuits.Monolithic Device :Elements CMOS Process Integration -Silicon -on - Insulator (SOI)-Integration of other Circuit Elements .Charge Transfer Devices :Dynamic Effects in MOS capacitors -The basic CCD-Improvements on the Basic Structure -Applications of CCDs.Ultra Large -Scale Integration (ULSI) :Logic devices -Semiconductor Memories.Testing, bonding , and Packaging:Testing -Wire Bonding -Flip-flop Techniques-Packaging.

TOTAL: 45

TEXT BOOK

1. Ben.G.Streetman & Sanjan Banerjee, Solid State Electronic Devices (6th Edition) PHI Private Ltd, 2005.

REFERENCES

1. Deepa, S. R & Nair, B. Somanathan:Solid State Devices, PHI Private Ltd, 2010
2. Nandita Das Gupta &Aamitava Das Gupta- Semiconductor Devices Modeling a Technology, PHI, 2004.
3. Yannis Tsividis: Operation & Mode line of The MOS Transistor (2nd Edition) Oxford University Press, 1999.

EC2860 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

L	T	P	C
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Prerequisite EC 2303

Goal

To learn the electromagnetic interference concepts and standards of measurement to design the systems with electromagnetic compatibility for applications

Objectives

The course should enable the students to:

1. Study the EMI /EMC Environment.
2. Study the EMI coupling principles and its types.
3. Study the EMI / EMC standards and measurements for the test procedures.
4. Study various EMI control techniques.
5. Design PCBs with EMC compliance.

Outcome

At the end of the course the student should be able to:

1. Understand the fundamentals and the parameters of EMI/EMC environment.
2. Understand the EMI coupling principles and the types of EMI coupling.
3. Understand various standards and testing procedures for EMI/EMC.
4. Know the different techniques for controlling EMI.
5. Know and design PCBs with EMC compliance.

UNIT I EMI ENVIRONMENT **9**

EMI/EMC concepts and definitions, Sources of EMI, conducted and radiated EMI, Transient EMI, Time domain Vs Frequency domain EMI, Units of measurement parameters, Emission and immunity concepts, ESD.

UNIT II EMI COUPLING PRINCIPLES **9**

Conducted, Radiated and Transient Coupling, Common Impedance Ground Coupling, Radiated Common Mode and Ground Loop Coupling, Radiated Differential Mode Coupling, Near Field Cable to Cable Coupling, Power Mains and Power Supply coupling.

UNIT III EMI/EMC STANDARDS AND MEASUREMENTS **9**

Civilian standards - FCC,CISPR, IEC, EN, Military standards - MIL STD 461D/462, EMI Test Instruments /Systems, EMI Shielded Chamber, Open Area Test Site, TEM Cell, Sensors/Injectors/ Couplers, Test beds for ESD and EFT, Military Test Method and Procedures (462).

UNIT IV EMI CONTROL TECHNIQUES **9**

Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting.

UNIT V EMC DESIGN OF PCBs **9**

PCB Traces Cross Talk, Impedance Control, Power Distribution Decoupling, Zoning, Motherboard Designs and Propagation Delay Performance Models.

TOTAL: 45

TEXT BOOKS

1. Henry W.Ott, "Noise Reduction Techniques in Electronic Systems", John Wiley and Sons, NewYork.
2. C.R.Paul, "Introduction to Electromagnetic Compatibility" , John Wiley and Sons, Inc, 1992
3. V.P.Kodali, "Engineering EMC Principles, Measurements and Technologies", IEEE Press, 1996.
4. Bernhard Keiser, "Principles of Electromagnetic Compatibility", Artech house, 3rd Ed, 1986.

EC2871 EMBEDDED AUTOMOTIVE SYSTEMS

L T P C
3 0 0 3

Prerequisite: Nil

Goal

To provide basic knowledge about the embedded automotive systems and their real time development.

Objectives

The course should enable the students to:

1. Understand the trends in automobiles, security and warning systems.
2. Understand the Electronic management of chassis systems and different sensors.
3. Understand the Electronic ignition systems.
4. Understand the recent advances in embedded automotive systems.
5. Understand the real time design methodology of embedded automotive systems.

Outcome

At the end of the course the student should be able to:

1. Know about the trends in automobiles, electromagnetic principles , security and warning systems.
2. Know about the Electronic management of chassis systems and operation of different sensors.
3. Know about the Electronic ignition systems principles, types and operation.

4. Know about the recent advances in embedded automotive systems and multiprocessor communication.

5. Know about the real time development of embedded automotive systems.

UNIT I INTRODUCTION TO AUTOMOBILES 9

Current trends in Automobiles, open loop and closed loop systems - components for electronic engine management system. Electro magnetic interference suppression. Electromagnetic Compatibility, Electronic dashboard instruments, onboard diagnostic system, security and warming system.

UNIT II ELECTRO CHASSIS SYSTEMS 9

Electronic management of chassis systems; Vehicle motion control, Sensors and actuators and their interfacing. Basic sensor arrangement, types of sensors such as- oxygen sensors, crank angle position sensors- Fuel metering/ vehicle speed sensors and destination sensors, Attitude sensor, Flow sensor, exhaust temperature, air mass flow sensors, throttle position sensor, solenoids, stepper motors and relays.

UNIT III ELECTRONIC IGNITION SYSTEMS 9

Electronic ignition systems; Types of solid state ignition systems and their principle of operation; Digital engine control system, Open loop and closed loop control system, Engine Cranking and warm up control, Acceleration enrichment, Deceleration learning and ideal speed Control, Distributor less ignition - Integrated engine control system, Exhaust emission control Engineering.

UNIT IV EMBEDDED AUTOMOTIVE SYSTEMS 9

Automotive Embedded systems. PIC, free scale microcontroller based system. Recent advances like GLS, GPSS and GMS; Multiprocessor communication using CAN bus.

UNIT V REAL TIME STUDY OF AUTOMOTIVE SYSTEMS 9

Case study- cruise control of car, Artificial Intelligence and engine management.

L = 45, TOTAL=45

TEXT BOOKS:

1. William B. Riddens, "Understanding Automotive Electronics", 5th Edition, Butterworth Hennimann Woburn, 1998.

2. Young A.P. & Griffiths, "Automotive Electrical Equipment" , ELBS & New Press-1999.

3. Tom Weather Jr. & Cland c. Ilunter, "Automotive computers and control system" Prentice Hall Inc., New Jersey.

4. Crouse W.H., "Automobile Electrical Equipment" , Mc Graw Hill Co. Inc., New York, 1995.

REFERENCES:

1. Bechhold, "Understanding Automotive Electronic", SAE, 1998.

2. Robert Bosch," Automotive Hand Book", SAE (5th Edition), 2000.