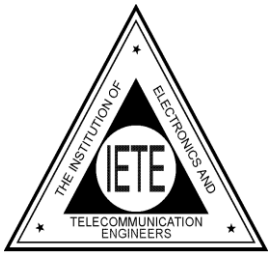
Regulations & Syllabi
For
AMIETE Examination
(Electronics & Telecommunication)



सह वीर्यं करवावहै

Published under the authority of the Governing Council of
The Institution of Electronics and Telecommunication Engineers
2, Institutional Area, Lodi Road, New Delhi – 110 003 (India)
(2013 Edition)

Website : http://www.iete.org
Toll Free No : 18001025488
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Prospectus
Containing
Regulations & Syllabi
For
AMIETE Examination
(Electronics & Telecommunication)

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THE INSTITUTION

INTRODUCTION

The Institution of Electronics and Telecommunication Engineers (IETE), formerly the Institution of Telecommunication Engineers (ITE) was founded in 1953 by a small group of professionals for the advancement of Telecommunication and Electronics in India. Today the Institution has grown in its status to international levels with its manifold activities for furthering the cause of development in the key sectors of Electronics, Telecommunications, Computer Science Engineering, Information Technology and allied disciplines. The emphasis of the current activities is on creation of a concrete base of trained manpower in these fields at various levels of competence and also to contribute gainfully towards the continued professional development needs of existing technical personnel. The IETE also provides a platform for meaningful interaction among professionals from the Industry, R&D Organisations, Educational Institutions and Government Departments.

MEMBERSHIP

1. The IETE is a professional society devoted to the advancement of Electronics and Telecommunication, Computers and Information Technology. The Institution is headed by a Council, elected from its large base of corporate members in India and abroad. It confers professional status by way of admitting such persons, as may be qualified to various classes of membership such as Honorary Fellow, Distinguished Fellow, Fellow, Member, Associate Member, Diploma Member Student Member and Associate. Organizational Membership is also open to Public/Private Sector Companies, Institutions, R&D Laboratories and Government Organisations.

OBJECTIVES

2. The IETE focuses on advancing the science and technology of electronics, telecommunications, computers, information technology and related areas. The objectives of the Institution include;

- Organise conferences, symposia, workshops and brainstorming sessions involving all concerned professionals, students and industry associations for the advancement of the Disciplines.
- Provide a forum for discussion on national policies and to provide suitable inputs to policy makers.
- Promote and conduct basic engineering and continuing technical education programmes for human resource development.
- Bring out quality publications for all levels of readership.
- Honour outstanding professionals.

EXAMINATIONS

3. The IETE conducts the AMIETE (Graduateship) Examination, in order that a student qualifies and becomes an Associate Member of the Institution. The AMIETE examination is recognized by Government of India, Ministry of Human Resource & Development (MHRD) for the

purposes of recruitment to superior posts and services under the Central Government. A similar recognition has been given by UPSC & several State Governments. A large number of Universities and Institutions have recognized AMIETE for admission to postgraduate courses. Extract/Detail of recognition from Govt of India/State Governments/ Universities/Institutions are appended at **Annexure I, II, III, & IV**

4. This qualification further enables a candidate to appear for GATE for postgraduate studies in India. AMIETE (ET) standard in a particular case has been evaluated by the World Education Service, a New York based Educational Credential Evaluators, who have declared that it is equivalent to a Bachelors Degree in Electronics and Telecommunication Engineering.

5. The IETE also conducts ALCCS course (Advanced Level Course in Computer Science) which is also recognised by the Ministry of HRD, Government of India, for the purpose of appointment to superior posts and services under the Central Government, where M. Tech in Computer Science is a prescribed qualification for recruitment.

FACILITIES FOR STUDENTS

6. The IETE helps the students by extending library facilities, laboratory assistance, and coordination of IETE Students Forum and by providing necessary guidance at its IETE Centres. To spread its many fold technical activities in all the regions of the country, IETE has established so far 65 Centres spread all over the country including a centre at Kathmandu and examination centre at Abhu Dhabi. IETE also has mutual arrangements with similar professional bodies like the Institution of Engineers (India), CSI, IEEE (USA), IEEE Com Soc and IET (UK) for availing each other's facilities for the benefit of its members.

LECTURES THROUGH EDUSAT SATELLITE

7. IETE has embarked on an ambitious project of " Reaching The Unreached "through its Satellite Education Programme. In this programme, live, interactive lectures are broadcast from its Teaching End Studio at IETE, Noida centre and is received at classrooms terminals (SITs) at Ahmedabad, Bangalore, Bhopal , Chandigarh ,Delhi, Pune ,Hyderabad, Mankapur and Imphal. More SITs are being established at other centres shortly.

SOLUTIONS TO QUESTION PAPERS

8. To help the students , IETE has printed solutions to Questions papers for both AMIETE and DipIETE streams. List of subjects for which solutions are printed is available on the website www.iete.org

LABORATORY MANUAL

9. All students of AMIETE and DipIETE are required to procure lab-manuals and conduct their experiments and record the same in the concerned lab-manuals. The manuals of all the lab examination have been printed. Students can obtain these manuals as under:

(a) From Reception counter at IETE HQ on payment of Rs.225/- per manual without CD and Rs.300/- for manual with CD.

(b) Through post by sending a DD in favour of Secretary General, IETE payable at New Delhi towards cost of Manuals plus postal charges. The postal charge is Rs.50/- per manual.

(c) These manuals are also available at all IETE Centres. Students are advised to approach the nearby Centre for the same.

ASSISTANCE IN PLACEMENT

10. IETE makes effort to assist in the placement of students with the help of a Placement Cell established at IETE HQ, New Delhi.

RECOGNITION

11. The IETE is recognised by the Government of India as an EDUCATIONAL INSTITUTION OF NATIONAL EMINENCE. The IETE has also been recognised by the Government of India, Ministry of Science and Technology, Dept. of Scientific and Industrial Research as a SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION (SIRO).

STUDENT INTERACTION CELL

12. With a view to quickly resolve student queries, a single window to address all types of queries, problems and to help students, a Student Interaction Cell has been established at IETE HQ, New Delhi. This Cell is at the ground floor of the IETE HQ building. Student can approach SIC by:-

- Tel No 011-43538853
- Fax : 011-24649429
- SMS : 53131 (By typing **IETEFB** followed by < **query** >)
- Email: sic@iete.org

13. If the students queries are not answered or resolved within a reasonable time, students may contact Secretary General, IETE through personal meeting or phone (011-43538821/22) or email (sec.gen@iete.org). **Students are not to approach any other section of the HQ as their queries/problems shall not be entertained by them.**

IMPORTANT INFORMATION

Students are advised to give their Mobile No. & Email ID for better and faster communication

AMIETE EXAMINATIONS
REGULATIONS & SYLLABI

INTRODUCTION

14. IETE conducts AMIETE (Graduateship) Examinations in the following three streams: -

(a) Computer Science & Engineering (CS)
(b) Information Technology (IT)
(c) Electronics & Telecommunication Engineering (ET)

15. The course curriculum and outline syllabi of these streams are given in this booklet. In addition, detailed syllabi of Electronics & Telecommunication Engineering stream is given. (**Please see Appendix 'A', 'B', 'C','D','E','F', and 'G').**

TRANSITION FROM OLD SYLLABUS TO REVISED SYLLABUS

16. Details can also be obtained from the web site www.iete.org.

ELIGIBILITY

17. A candidate desirous of taking up the AMIETE Examination should first be enrolled either as a DipIETE as per **Bye law 15**, or as Student (SG) as per **Bye law 16**, which are reproduced below:

Bye law 15-Student (DipIETE)Member

Every candidate for election to the class of Diploma member shall be not less than 18 years of age and shall satisfy the Council that he has passed the Diploma Examination of the Institution (DipIETE) as per the examination regulations prescribed by the Council from time to time or has passed any other Examination, which in the opinion of the Council, is equivalent to or warrants exemption from the Diploma Examination of the Institution.

Bye law 16-Student (SG) Member

Every candidate for election to the class of Student (SG) shall satisfy the Council that he/she is not less than 16 years of age and has passed the 12^{th} standard examination of 10+2 system, conducted by a recognised Board of Education with physics and mathematics, or its equivalent as prescribed by the Council from time to time; and

(a) is sponsored by a Corporate Member of the Institution; and either

(b) that he/she is or has been a student of electronics engineering/ telecommunication engineering/electrical engineering/computers/information technology/physics in a university/college/ institution approved by the Council;

OR

(c) that he/she is or has been an engineering pupil/apprentice/assistant in a recognized firm, society or organization engaged in engineering or allied activities.

ENROLMENT

18. A candidate is required to apply for enrolment on the prescribed form **(Form IETE-2)**, which is appended in the last. The form also includes the conditions for eligibility. Every application form for student member must be attached with the copies of certificates (age, educational/experience) duly attested by a Corporate member/Gazetted Officer, failing which the application shall not be entertained. For this purpose, the candidate may contact the office of the IETE centre/sub-centres of IETE. In case of any difficulty in getting the form proposed, the form may be submitted directly to the IETE HQ for further action.

ENROLMENT FEE

19. Fees to be paid for enrolment are as given in Form IETE-2 contained in this syllabus. The enrolment fees payable by student members are as under: -

	Member in India (Rs)	**Member Abroad** (US $)
(a) Application Fee	200.00	40.00
(b) Admission Fee	200.00	40.00
(c) Building-cum-Lib. Fund	1300.00	260.00
(d) Composite Subscription	2500.00	360.00
(e) Lab Infrastructure Fee	600.00	100.00
(f) Development Fee	500.00	100.00
(g) Establishment Fee	700.00	100.00
	6000.00	1000.00

20. Enrolment fee is to be paid in one installment at the time of enrolment. The student membership will be valid for 10 consecutive examinations from the date of enrolment. Thereafter, the student members not completing their AMIETE Examination are to seek re-enrolment for further 10 examinations by remitting applicable amount before or immediately after the expiry of their membership period to enable them to appear in the remaining papers and complete AMIETE. Any examination chance not availed by a student due to whatsoever reason will be counted within 10 examinations.

MINIMUM PERIOD OF MEMBERSHIP

21. A Student member shall be allowed to appear in the AMIETE Examination only after he /she has enrolled as a Student member with the Institution. Only those Student members who get enrolled on or before 28/29th February and 31st August will be allowed to appear in the next AMIETE Examination, held in June and December respectively. Membership should be alive at the time of submitting the examination application form.

DUPLICATE IDENTITY CARD

22. In case duplicate I-Card is required due to loss of original Card, application must be submitted alongwith a fee of Rs.500/-.

TIME LIMIT TO COMPLETE AMIETE

23. A student is required to complete AMIETE Examination within two enrolment periods of 10 consecutive examinations each from the date of initial enrolment. The student will, therefore, be permitted to seek only one renewal of membership. Renewal is to be applied for before or immediately after the expiry of initial enrolment with continuity of enrolment maintained by the student. Any delayed re-enrolment entailing missed chances will be counted towards total number of examinations and no relaxation in this regard will be permissible. If the request for renewal is made after the stipulated period of two enrolments, admission will be treated as a fresh enrolment and no benefit in terms of exemptions in respect of subject(s) passed or exempted during the earlier enrolment will be granted. Students must renew their membership in time. Otherwise they will not be allowed to appear in the AMIETE examination. No notice will be sent to the students for renewal of membership.

24. **The course curriculum and outline Syllabi for all the streams are given as follows:**

(a)	**Course Curriculum (CS)**	**(Appendix-'A')**
(b)	**Outline Syllabus (CS)**	**(Appendix-'B)**
(c)	**Course Curriculum (IT)**	**(Appendix-'C')**
(d)	**Outline Syllabus (IT)**	**(Appendix-'D')**
(e)	**Course Curriculum (ET)**	**(Appendix-'E')**
(f)	**Outline Syllabus (ET)**	**(Appendix-'F')**

25. The detailed syllabus of Computer Science & Engineering Stream is appended at **Appendix 'G'**.

AMIETE EXAMINATION

26. AMIETE examination is divided in two Sections viz Section A and Section B with a total of 23 theory papers (12 in Section A and 11 in Section B) and 4 Labs (2 Labs in Section A and 2 Labs in Section B). Each Section is divided in two parts viz. Part-I and Part-II. In addition a student has to undergo a project work, seminar and a Course in Communication Skills & Technical Writing. The course on Communication Skills & Technical Writing is mandatory but would not count towards overall CGPA.

27. Distribution of subjects is as under:

(a) **SECTION A**

(i) PART-I	Six subjects & 1 Lab
(ii) PART-II	Six subjects & 1 Lab

(b) **SECTION B**

(i) PART-I	Six subjects & 1 Lab
(ii) PART-II	Five subjects & 1 Lab

(Three compulsory & two from Elective Subjects)

(c) **PROJECT WORK**

(d) **SEMINAR**

(e) **COURSE IN COMMUNICATION SKILLS & TECHNICAL WRITING**
(Any time during the course)

28. Not withstanding above, a student will not be allowed to complete the curriculum in less than four years unless he has been exempted in some subjects.

29. **Eligibility for appearing in various subjects:** The **eligibility** criteria can be checked on the website **www.iete.org.**

COMMUNICATION SKILL & TECHNICAL WRITING

30. **The course on Communication Skills & Technical Writing** is compulsory for all students. However, the course does not contribute to the overall CGPA. A minimum of 35% marks in theory and oral test has to be obtained by the student at any time before the completion of his/her AMIETE. This course consists of theory and oral exam. Accordingly, "PASS" or "FAIL" will be reflected in the Grade Sheet.

(a) **Theory :**: This consists of written examination for 80 marks.

(b) **Oral Test :** Consists of an Oral Test to test the Communication Skills which include an oral presentation on any subject of the choice of students (e.g. About IETE, General knowledge topics etc). This presentation need not be on technical subject. This test carries 20 marks.

EXEMPTIONS

31. Exemption may be granted in various papers to the students who have passed similar subjects from elsewhere or other courses. Such exemptions are granted to a candidate passing the subject and successfully completing the course/curriculum from a recognized Institution/ Colleges/Universities and approved by the IETE Council.

32 Candidates seeking exemption are required to submit the following documents along with the requisite fee:

(a) Application form for exemption.
(b) Certificate of the course/curriculum completed by the student duly attested.
(c) Mark sheet duly attested.
(d) Certified copy of syllabus from which the candidate has passed the course.
(e) Fee @ Rs. 800/- per subject for which exemption is sought.

33. Candidates are advised to apply for exemption, if required, at the earliest opportunity. All cases of exemptions are considered by the Academic Committee of the Institution. For all subjects where exemption are granted will be communicated to the students in the Mark sheet of the first examination after the exemption is sought as it generally takes three months to process an application for exemption. Exemption will generally be granted if the major portion of the syllabi matches with IETE syllabus. **THE DECISION OF THE ACADEMIC COMMITTEE WILL BE FINAL AND BINDING TO ALL CONCERNED. NO REPRESENTATION IN THIS RESPECT WILL BE ENTERTAINED.**

AWARD OF AMIETE

34. Every Student member successfully completing Sections A and Section B subjects including lab examinations with project work, seminar and a course in Communication Skills & Technical Writing of AMIETE Examination as per regulations prescribed by the Council from time to time shall be eligible to become a Associate Member (AMIETE). On payment of requisite fee for membership, he/she will be awarded a certificate of having passed the AMIETE examination of the Institution and shall then be eligible for transfer to the class of AMIETE. To pass AMIETE Examination, a student is required to score a minimum grade of 'D' having a grade point of 4 for each subject and having an aggregate of 5 CGPA. However for Project, Seminar and lab examination he/she should get a minimum grade of C having a grade point of 5.

CGPA SYSTEM

35 CGPA System which is followed by IETE is given below :

(a) Subject wise grade and grade points are as given below:-

Grade	Grade Point
A+	10
A	9
B+	8
B	7
C+	6
C	5
D	4

(b) CGPA will be calculated as under only for the subjects where a student has passed :-

$$CGPA = \frac{C_1 G_1 + C_2 G_2 \text{ ------ } + C_n G_n}{C_1+C_2+C_3 \text{ ------ } C_n}$$

where G_1 G_2 ------denote the grade point scored.
C_1 C_2 ------denote the credits of subjects.

All theory Subjects & Lab Carry 4 Credits.
Project work Carries 8 Credits.
Seminar Carries 4 Credits.

(c) The award of division/classification will be as under :-

(i)	CGPA of 9 or more	-	Distinction
(ii)	CGPA 6.5 or more but less than 9	-	First Division
(iii)	CGPA 5 or more but less than 6.5	-	Second Division
(iv)	Less than 5	-	FAIL (No award will be given)

(d) CGPA is converted into percentage with a multiplier of 9.5.

EXAMINATION APPLICATION

36. Applications for appearing in any of the subjects of the AMIETE Examination must be made on the prescribed OMR Examination Form (enclosed) and accompanied by the requisite examination fee. The prescribed application form is given initially free of cost along with the prospectus and later on with the Admit card. OMR Examination application form can also be obtained by the students by payment of Rs. 20/- from any IETE Centre or HQ IETE. No action will be taken on an incomplete application. Students are advised to ensure that they have filled all the columns and have enclosed relevant documents. Separate form is to be used for exemption. Generally, after the acceptance of examination form of the students, change of examination centre is not encouraged. However in exceptional cases, change of exam Centre will be allowed with an additional charge of Rs. 500/-. For any correction in the examination form after processing and additional amount of Rs 500/- will be charged as reprocessing fee.

Note : Change of streams will be allowed with an additional charge of Rs. 600/-.

EXAMINATION FEE

37. Students are required to submit their Examination Application form along with the fee as given below. The fee may get revised from time to time and the students are required to submit their application form along with the latest fee structure in force. The present fee structure is given below:

		In India (Rs)	Abroad (US $)	Remarks
(a)	Theory papers/per subject	800.00	100.00	To be deposited alongwith exam application form
(b)	Exemption/per subject	800.00	100.00	
(c)	Written test of Communication Skills & Technical Writing	800.00	100.00	
(d)	Project	1500.00	280.00	
(e)	Each Lab Examination	600.00	100.00	To be deposited at respective IETE centres
(f)	Oral Test on communication skills & technical Writing	600.00	100.00	
(g)	Seminar	600.00	100.00	

Note: (a) Fees will be charged per subject irrespective of whether it is for improvement or re-appearance OR remaining paper or additional paper or exemption.

(b) Examination/Exemption fee once paid are neither refundable nor transferable to a subsequent examination.

(c) Enrolment Form, Examination Form and Exemption Form are to be sent separately with requisite fee along with each form.

LAST DATE FOR RECEIPT OF EXAMINATION APPLICATION

38. The last date for receipt of examination form duly filled in at the IETE HQ office for June/Dec examination respectively are as under:-

- Without late fee — 25 Apr/25 Oct
- With late fee (of Rs.1500/-) — 10 May/10 Nov.

Note: Application received after these dates will not be considered.

DATE SHEET

39. The examinations are held twice a year from 15th June and 15th December and are conducted on all days including holidays and Sundays. These dates are fixed and for the latest Date sheet students can refer to the website and will be notified along with admit cards and through our website **www.iete.org** and at the IETE centre.

ADMIT CARD

40. Admit Cards will be sent to all the students to reach them by about 05th of June/December. Admit Cards of eligible students will also be available on our Websites **www.iete.org** and can be downloaded. Students will be allowed to appear for examination with these downloaded admit card along with their identity card. In the case of non-receipt of Admit-Card by above dates or the admit card not available on the website, the student must approach the concerned Examination Centre or IETE HQ and obtain permission to appear in the examination. No complaint in respect of non-receipt of Admit Card will be entertained once the Examination is over. **A student is required to carry his IETE Identity Card and Admit Card issued by IETE for appearing in examination.**

EXAMINATION CENTRES

41. At present the Examination are conducted at the following Centres : -

In India:

Centre	Code	Centre	Code	Centre	Code
AHMEDABAD	01	KANPUR	10	RAJKOT	44
ALLAHABAD	25	KOCHI	32	RANCHI	48
AMARAVATI	53	KOLKATA	04	SHIMLA	45
BANGALORE	02	KOZIKODE	52	TRIVANDRUM	16
BHOPAL	36	LUCKNOW	11	VADODARA	42
BHUBANESWAR	27	MANKAPUR	28	VARANASI	13
CHANDIGARH	05	MHOW	40	VIJAYAWADA	15
CHENNAI	12	MUMBAI	03	VISAKHAPATNAM	34
DEHRADUN	26	MYSORE	33	**Abroad:**	
DELHI	06	NAGPUR	37	ABU DHABI	17
DHARWAD	49	NASHIK	39	KATHMANDU	19
GUWAHATI	07	NOIDA	38		
HYDERABAD	08	PALAKKAD	41		
IMPHAL	31	PATNA	46		
JABALPUR	23	PILANI	30		
JAIPUR	09	PUNE	14		

USE OF UNFAIR MEANS

42. If a student is found to have resorted to or made attempt to use **Unfair Means**, the Examination Superintendent/Invigilator has absolute powers to expel the candidate from the examination hall, if in his/her opinion the student has adopted unfair means. The Council/Board of Examination may take necessary disciplinary action against the candidate which may consist of punishment(s) extending from cancellation of the paper(s) to debarring from future examinations as well as expulsion from IETE.

RESULTS

43. Results of the examinations will be announced not later than 25th March and 25th September for December & June examinations respectively and communicated to the candidates

through Result Sheets separately. Results will be also available on IETE Websites **(www.iete.org)**

RECOUNTING

44. It may be noted that there is **no provision of re-evaluation** of answer books. Therefore request for re-evaluation are out rightly rejected

45. Recounting of scores, if requested, can be done by paying Rs.200/- (US$40) for students from abroad per subject. Requests for recounting of scores must be received at IETE HQ within 30 days from the date of announcement of results on **a separate application**.

IMPROVEMENT OF GRADES

46. A student who has passed in a subject may appear for improvement. He may take any number of chances irrespective of Grades previously obtained. If the student secures lower Grade than already secured, the original grade will hold good. Fee for improvement is Rs 600/- (US$100) per paper. However, no improvement is permitted in AMIETE Lab examination and project work. Improvement is also allowed after completion of the examinations. After completion, students are required to give an Undertaking that they want/do not want to appear in any subject for improvement. Provisional Certificate/Certificate/final Grade Sheet will be issued only after receipt of undertaking that no improvements are required and fee towards Associate Membership is paid.

IETE MEANS-CUM-MERIT SCHOLARSHIP SCHEME FOR AMIETE AND DipIETE STUDENTS:

47. IETE has instituted IETE Means-Cum-Merit Scholarship scheme for AMIETE and DipIETE students from the year 2010. The scheme envisages award of 100 annual scholarships, 50 each to AMIETE and DipIETE economical weaker and meritorious students. The amount of scholarship will be Rs.5000/- per student in a year. The details of the scheme are available on IETE website http://www.iete.org freely accessible and application form freely downloadable.

AWARDS FOR ACADEMIC EXCELLENCE

48. Seven awards have been instituted to give incentive to student members for high level of performance in the AMIETE Examinations.

LEGAL MATTERS

49. Adjudication in respect of legal cases concerning IETE HQ will be as per **Bye-law 95** of the Institution which is reproduced below: -

"All Legal cases concerning IETE HQ shall lie within the jurisdiction of Delhi courts only"

For more information kindly visit http://www.iete.org

AFFILIATION/ACCREDITATION

50. **The Institution of Electronics & Telecommunication Engineers (IETE) neither recognizes nor accepts affiliations of any private coaching Institute. Students in the past have reported that some private institution claim that they run classes/coaching on behalf of IETE. It is reiterated that IETE does not authorize any private institution to run classes on behalf of IETE. Therefore IETE is not responsible for such Private Coaching Institutes.**

CORRESPONDENCE WITH IETE HQ

51. Important announcements concerning students and examinations will be available on the website www.iete.org and are also published in IETE Journal of Education which is issued four monthly (January-April, May-August and September-December) to the AMIETE Student members who have paid their subscriptions to date. For other facilities like participation in technical lectures, symposia etc. nearest IETE Centre/Sub-Centre may be contacted. All correspondence must be addressed to the Secretary General of the Institution (by designation and not by name). Remittances shall be made by way of crossed Bank Draft only. Facilities for making payments on-line will also be available shortly. Bank drafts should be drawn in favor of Secretary General, IETE, New Delhi payable at New Delhi .Cash is accepted by hand at Accounts Section at IETE HQ only .Whenever depositing fee by cash, students must obtain receipt and attach photocopy of the same along with application. MONEY ORDER WILL NOT BE ACCEPTED.

CHANGE OF ADDRESS

52. **Students are advised to intimate their change of address to IETE HQ immediately, quoting their Membership Number, complete address with Pin Code.**

53. Students are advised to provide their e-mail ID, telephone no and mobile no with their latest address in all correspondence.

MISCELLANEOUS INFORMATION

54. Miscellaneous information is given in **Appendix 'I'**.

- Acknowledgement for receipt of enrollment forms and declaration of exam results are given through SMS and Web.
- All student related information is displayed on web site **www.iete.org**. and http://iete-elan.ac.in
- Students are advised to visit our web site regularly.
- **All payment of fees can also be made on-line. For details refer our website www.iete.org.**

Scheme and Structure for the Programme of AMIETE in Computer Science & Engineering

Appendix 'A'

SECTION A

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC 101	Engineering Mathematics – I *	4	-
2	AC 102	Computer Concepts & C Programming *	4	-
3	AC 103	Analog & Digital Electronics **	4	-
4	AC 104	Data Structures with C & C++ **	4	-
5	AC 105	Object Oriented Programming with C++ **	4	-
6	AC106	Computer Organization **	4	-
7	AC 141	Data Structures with C & C++lab **	-	4
		Total Credits	24	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC 107	Engineering Mathematics – II *	4	-
2	AC 108	Microprocessors & Microcontrollers *	4	-
3	AC 109	Unix & Shell Programming**	4	-
4	AC 110	Operating Systems & Systems Software **	4	-
5	AC 111	Computer Graphics & Visualization**	4	-
6	AC 112	Database Management Systems **	4	-
7	AC 142	DBMS Lab **	-	4
		Total Credits	24	4
	AC 137	Communication Skills & Technical Writing(Oral)*	20	Marks
	AC 138	Communication Skills & Technical Writing(Written)*	80	Marks

All the students have to pass a course in "Communication Skills & Technical Writing" which will not be counted for the overall percentage

**** Few more electives will be added***

1. Electronics for Nuclear Instrumentation

2. Foundation Course on EMI - EMC

3. Quality Assurance

SECTION B									
Part - I					**Part - II**				
Sl No	**Sub Code**	**Title**	**Examination Credits**		**Sl No**	**Sub Code**	**Title**	**Examination Credits**	
			Theory	**Practicals**				**Theory**	**Practicals**
1	AC 113	Operations Research & Engineering Management *	4	-	1	AC 118	Software Architecture **	4	-
2	AC 114	Software Engineering **	4	-	2	AC 119	Data Communication & Computer Networks *	4	-
3	AC 115	Design & Analysis of Algorithms **	4	-	3	AC 120	Finite Automata & Formal Languages	4	-
4	AC 116	Discrete Structures	4	-	4		Elective – II (from Group B)	4	-
5	AC 117	Linux Internals **	4	-	5		Elective – III (from Group C)	4	-
6		Elective - I (from Group A)	4	-	6	AC 144	µP & µC Lab	-	4
7	AC 143	Analysis & Design of Algorithms Lab **	-	4	7	AC 135	Project Work	-	8
					8	AC 136	Seminar	-	4
		Total Credits	24	4			**Total Credits**	20	16

GROUP A Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective I subject		
Sl No	**Sub Code**	**Title**
1	AC 121	C # and .Net **
2	AC 122	VLSI Design †
3	AC 123	Artificial Intelligence & Neural Networks **
4	AC 124	Unix Systems Programs **

GROUP B Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective II subject		
Sl No	**Sub Code**	**Title**
1	AC 125	Software Testing **
2	AC 126	Mobile Applications Development **
3	AC 127	Wireless & Mobile Systems †
4	AC 128	Internet Applications ***
5	AC 129	Cyber Crimes & IPR ***

Note :

*	Common to ET / CS / IT Streams
**	Common to CS / IT Streams
***	Elective common to AMIETE - ET / CS / IT Streams
†	Elective common to ET / CS Streams

GROUP C Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective III subject		
Sl No	**Sub Code**	**Title**
1	AC 130	Compiler Design**
2	AC 131	Cloud Computing **
3	AC 132	Cryptography & Network Security **
4	AC 133	Advanced Microprocessors

Appendix 'B'
OUTLINE SYLLABUS
AMIETE (COMPUTER SCIENCE & ENGINEERING)

AC 101 ENGINEERING MATHEMATICS – I

- Partial differentiation and its application
- Multiple integrals
- Linear algebra
- Numerical Methods
- Linear differential equation of higher order
- Series Solution of differential equations and Special functions
- Fourier Series
- Fourier Transforms and Z-Transform

AC 102 COMPUTER CONCEPTS & C PROGRAMMING

- Introduction to Computer System
- Storage Device Concepts, Operating Systems and Networks
- Fundamentals of Problem Solving and Introduction to C
- Constants, Variables, and Data Types
- Managing Input and Output Operations
- Structure of a C Program
- Functions
- Selection – Making Decisions and Repetitions
- Arrays and Strings
-

AC 103 ANALOG AND DIGITAL ELECTRONICS

- Analog Electronics: Basic Semiconductor and PN Junction Theory
- Semiconductor Diodes
- Diode Applications
- Bipolar Junction Transistors
- BJT Biasing
- Amplifiers and Oscillators
- Digital Electronics: Introductory Concepts
- Number Systems and Codes
- Describing Logic Circuits
- Combinational Logic Circuits
- Digital Arithmetic Operation and Circuits
- MSI Logic Circuits
- Flip-Flop and Their Applications
- Counters and Registers

AC 104 DATA STRUCTURES WITH C & C++

- Introduction to Data Structures
- Pointers and Dynamic Memory Management
- Stacks ad Queues
- Linked List
- Tree
- Graph
- Searching
- Sorting Algorithms
- Files

AC 105 OBJECT ORIENTED PROGRAMMING WITH C++

- Overview
- Declarations and Expressions
- Statements
- Array, Pointer and Structure
- Functions
- Data Abstraction through Classes and User-Defined Data Types
- Operator Overloading
- Class Relationships
- Template
- The Standard Library in C++

AC 106 COMPUTER ORGANIZATION

- Basic Structure of Computers
- Machine Instructions and Programs
- Input/Output Organization
- Memory System
- Arithmetic
- Basic Processing Unit

AC 141 DATA STRUCTURES WITH C & C++ LAB

AC 107 ENGINEERING MATHEMATICS – II

- Complex Differentiation and Transformation
- Complex Integration
- Vector Differentiation
- Vector Integration
- Numerical Methods
- Partial Differential Equations
- Theory of Probability
- Random Variables

AC 108 MICROPROCESSORS & MICROCONTROLLERS

- Introduction to Microprocessors
- Assembly Language Programs
- Interrupts in 8085
- Programs Using Interface Module
- Intel 8259A- Programmable Interrupt Controller
- Intel 8253 – Programmable Interval Timer
- 8051 Microcontroller

AC 109 UNIX & SHELL PROGRAMMING

- Introduction
- The Unix Architecture and Command Usage
- The File System
- Handling Ordinary Files
- Basic File Attributes
- The vi Editor
- The Shell
- The Process
- Customizing The Environment
- More File Attributes
- Simple Filters
- Filters Using Regular Expressions – grep And sed
- Essential Shell Programming
- awk – An Advanced Filter
- perl – The Master Manipulator

AC 110 OPERATING SYSTEMS & SYSTEMS SOFTWARE

- Evolution of OS Functions
- Processes
- Scheduling
- Deadlocks
- Process Synchronization
- File Systems
- Memory Management
- Language Processors
- Data Structures for Language Processing
- Scanning and Parsing
- Macros and Macro Processors
- Linkers
- Assemblers
- Compilers and Interpreters

AC 111 COMPUTER GRAPHICS & VISUALIZATION

- A Survey of Computer Graphics
- Overview of Graphics Systems
- Graphics Output Primitives
- Attributes of Graphics Primitives
- Geometric Transformations
- Viewing
- Visible-Surface Detection Methods
- Illumination Models and Surface-Rendering Methods
- Interactive Input Methods and

- Graphical User Interfaces
- Computer Animation
- Hierarchical Modeling

AC 112 DATABASE MANAGEMENT SYSTEMS

- Databases and Database Users
- Database System - Concepts and Architecture
- Data Modeling Using the Entity-Relationship Model
- The Enhanced Entity-Relationship (EER) Model
- The Relational Data Model and
- Relational Database Constraints
- The Relational Algebra and Relational Calculus
- Relational Database Design by ER - to - Relational Mapping
- SQL-99: Schema Definition, Constraints, Queries and Views
- Relational Database Design
- Distributed Databases and
- Client-Server Architectures
- Transaction Processing Concepts
- Database Recovery Techniques
- Security, Advanced Modeling, and Distribution

AC 142 DBMS LAB

AC 113 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

- What is Operations Research?
- Modeling with Linear Programming
- The Simplex Method and Sensitivity Analysis
- Duality and Post-Optimal Analysis
- Transportation Model and its Variants
- Network Models
- Decision Analysis and Games
- Queuing Systems
- Introduction to Engineering Management
- Engineering and Management
- Historical Development of Engineering Management
- Functions of Technology Management
- Planning and Forecasting
- Decision Making
- Organizing
- Some Human Aspects of Organizing
- Leading Technical People Controlling

AC 114 SOFTWARE ENGINEERING

- Socio-Technical Systems
- Software Processes
- Project Management
- Software Requirements
- Requirements Engineering Processes
- System Models
- Rapid Software Development
- Formal Specification
- Architectural Design
- Distributed Systems Architectures
- Objected-Oriented Design
- Software Reuse
- Component-Based Software Engineering
- User Interface Design
- Critical Systems Development
- Verification and Validation
- Software Testing
- Software Cost Estimation
- Quality Management
- Process Improvement
- Configuration Management

AC 115 DESIGN & ANALYSIS OF ALGORITHMS

- Introduction

- Fundamentals of the Analysis of Algorithm Efficiency
- Brute Force
- Divide and Conquer
- Decrease and Conquer
- Transform and Conquer
- Dynamic Programming Greedy Technique
- Space and Time Tradeoffs
- Limitations of Algorithmic Power
- Coping with Limitations of Algorithmic Power

AC 116 DISCRETE STRUCTURES

- Set Theory
- Mathematical Logic
- Mathematical Induction and Recursive Definitions
- Relations
- Functions
- Groups
- Coding Theory
- Rings

AC 117 LINUX INTERNALS

- Linux-The Operating System
- Compiling the Kernel
- Introduction to the Kernel
- Memory Management
- Inter-Process Communication
- The Linux File System
- Device Drivers Under Linux
- Network Implementation
- Modules and Debugging
- Multi-Processing

ELECTIVE - I

AC 143 ANALYSIS & DESIGN OF ALGORITHMS LAB

AC 118 SOFTWARE ARCHITECTURE

- Envisioning Architecture
- Understanding Quality Attributes
- Achieving Qualities
- Architectural Patterns
- Design Patterns
- Designing the Architecture
- Documenting Software Architectures
- Building Systems from off-the-Shelf Components
- Software Architecture in the Future

AC 119 DATA COMMUNICATION AND COMPUTER NETWORKS

- Data Communications, Data Networking, and the Internet
- Protocol Architecture, TCP/IP, and Internet-Based Applications
- Data Transmission
- Transmission Media
- Signal Encoding Techniques
- Digital Data Communication Techniques
- Data Link Control Protocols
- Multiplexing
- Circuit Switching and Packet Switching
- Routing in Switched Networks
- Congestion Control in Data Networks
- Local Area Network Overview
- High-Speed LANs
- Wireless LANs
- Internetwork Protocols
- Internetwork Operation
- Transport Protocols
- Internet Applications

AC 120 FINITE AUTOMATA & FORMAL LANGUAGES

- Introduction to Automata
- Regular Expressions and Languages
- Properties of Regular Languages

- Context-Free Grammars and Languages
- Properties of Context-Free Languages
- Introduction to Turing Machines
- Undecidability

ELECTIVE - II

ELECTIVE – III

AC 144 µP & µC LAB

AC 135 PROJECT WORK

AC 136 SEMINAR

AC 121 C# & .NET

- Introducing C# and the .Net Platform
- The Philosophy of .Net
- Building C# Applications
- Core C# Programming Constructs
- Defining Encapsulated Class Types
- Understanding Inheritance and Polymorphism
- Understanding Structured Exception Handling
- Understanding Object Lifetime
- Working with Interfaces
- Understanding Generics
- Delegates, Events, and Lambdas

AC 122 VLSI DESIGN

- A review of microelectronics and an introduction to MOS technology
- Basic electrical properties of MOS and BiCMOS circuits
- MOS and BiCMOS circuit design processes
- Basic circuit concepts
- Scaling of MOS circuits
- Subsystem design and layout
- Subsystem design processes
- Illustration of the design process-computational elements
- Memory, registers and aspects of system timing
- Practical aspects and testability

AC 123 ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

- Overview of Artificial Intelligence
- Symbolic Logic
- Knowledge Acquisition and Representation
- Reasoning and KRR Systems
- Uncertainty
- Search Techniques
- Expert Systems
- Neural Networks
- Applications of Artificial Intelligence

AC 124 UNIX SYSTEMS PROGRAMS

- Introduction
- File I/O
- Files and Directories
- Standard I/O Library
- System Data Files and Information
- Process Control
- Process Relationships
- The Environment of a Unix Process
- Signals
- Terminal I/O
- Daemon Processes
- Inter Process Communication

AC 125 SOFTWARE TESTING

- Basics of Software Testing
- Test Generation from Requirements

- Test Adequacy: Assessment Using Control Flow
- Test Adequacy: Assessment Using Data Flow
- Test Adequacy assessment Using Program Mutation
- Testing of Object-Oriented Systems

AC 126 MOBILE APPLICATION DEVELOPMENT

- Introduction to Android
- Activities and Intents
- Introducing Android User Interface
- Designing User Interface Using Views
- Displaying Pictures and Menus with Views
- Data Persistence
- Content Providers
- Messaging and Networking
- Location Based Services
- Android Services
- Hardware Sensors
- Invading the Home Screen
- Audio, Video, and Using Camera
- Bluetooth, NFC, Networks, and Wi-Fi
- Advanced Android Development
- Monetizing, Promoting, and Distributing Applications

AC 127 WIRELESS & MOBILE SYSTEMS

- Introduction
- Probability, Statistics, and Traffic Theories
- Mobile Radio Propagation
- Channel Coding and Error Control
- Cellular Concept
- Multiple Radio Access for Traffic Channels
- Multiple Division Techniques
- Traffic Channel Allocation
- Satellite Systems
- Mobile Communication Systems
- Existing Wireless Systems
- Ad Hoc and Sensor Networks
- Wireless LANs, MANs and PANs
- Recent Advances

AC 128 INTERNET APPLICATIONS

- Hypertext Markup Language
- More HTML
- Cascading Stylesheets
- Cascading Stylesheets 2
- An Introduction to Javascript
- Objects in Javascript
- Dynamic HTML with Javascript
- Programming in Perl 5
- CGI Scripting
- Building Web Applications with Perl
- An Introduction to PHP
- Building Web Applications with PHP
- XML: Defining Data for Web Applications

AC 129 CYBER CRIMES & IPR

- Introduction
- Cyber Crimes – Their Kinds and Classification
- Modes & Techniques of Cyber Crime
- Cyber Crime and IPR Violation
- International Prospective of Cyber Crimes
- Prevention of Cyber Crimes
- Introductory
- Copyright
- Trademarks
- Patents – Historical Overview of Patent Law, Concept of Patent
- Patents - Patentable Inventions
- Patents - Procedure for Obtaining Patent
- Patents – Special Category

- Patents – Infringement and Remedies
- Patents – Offences and Penalties
- Industrial Designs
- Geographical Indications
- The Information Technology Act, 2000

AC 130 COMPILER DESIGN

- Introduction
- Lexical Analysis
- Syntax Analysis
- Syntax-Directed Translation
- Intermediate Code Generation
- Run-Time Environments
- Code Generation

AC 131 CLOUD COMPUTING

- Cloud Computing Basics
- Your Organization and Cloud Computing
- The Business Case for Going to the Cloud
- Cloud Computing Technology
- Cloud Computing at Work
- Migrating to the Cloud
- Best Practices and the Future of Cloud Computing
- Using the Mobile Cloud

AC 132 CRYPTOGRAPHY & NETWORK SECURITY

- Introduction
- Mathematics of Cryptography
- Traditional Symmetric-Key Ciphers
- Introduction to Modern Symmetric-Key Ciphers
- Data Encryption Standard (DES)
- Encipherment Using Modern Symmetric-Key Ciphers
- Asymmetric-Key Cryptography
- Message Integrity and Message Authentication
- Cryptographic Hash Functions
- Digital Signature
- Key Management
- Security at the Application Layer
- Security at the Transport Layer

AC 133 ADVANCED MICROPROCESSORS

- 8086 Architecture and Programming Model
- 8086 Addressing Modes
- Instruction Templates
- Data Transfer Instructions
- Data Conversion Instructions
- Arithmetic Instructions
- Logical Instructions
- Process Control Instructions
- String Instructions
- Branch Instructions
- Interrupts and Related Instructions
- 8087 Numeric Co-Processor
- 8087 Instruction Set
- Your First Assembly Language Program
- Simple Assembly Language Programs
- BIOS and DOS Services
- Assembly Language Programs Using Recursion
- Assembly Language Programs Using BIOS Services
- Assembly Language Programs Using DOS Services
- Assembly Language Programs Using Co-Processor
- C Language Programs Using BIOS and DOS Services
- 80286 - with Memory Management and Protection
- 808386 and 80486 – The 32 Bit Processors
- Pentium Processor

AC 137 (ORAL) AC 138 (WRITTEN)
COMMUNICATION SKILLS AND TECHNICAL WRITING

- Communication: Its Types and Significance
- Grammar
- Syntax
- Reading Skills
- Writing Skills
- Listening Skills
- Speaking Skills
- Technical Report and Scientific Report
- Campus Recruitment, Interview and Group Discussion
- Meeting Negotiations, Phone and

Scheme and Structure for the Programme of AMIETE in Information Technology

Appendix "C"

SECTION A

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AT 101	Engineering Mathematics – I *	4	-
2	AT 102	Computer Concepts & C Programming *	4	-
3	AT 103	Analog & Digital Electronics **	4	-
4	AT 104	Data Structures with C & C++ **	4	-
5	AT 105	Object Oriented Programming with C++ **	4	-
6	AT 106	Computer Organization**	4	-
7	AT 141	Data Structures with C & C++lab **	-	4
		Total Credits	24	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AT 107	Engineering Mathematics – II *	4	-
2	AT 108	Microprocessors & Microcontrollers *	4	-
3	AT 109	Unix & Shell Programming**	4	-
4	AT 110	Operating Systems & Systems Software **	4	-
5	AT 111	Computer Graphics & Visualization**	4	-
6	AT 112	Database Management Systems **	4	-
7	AT 142	DBMS Lab **	-	4
		Total Credits	24	4
	AT 137	Communication Skills & Technical Writing(Oral)*	20	Marks
	AT 138	Communication Skills & Technical Writing(Written)*	80	Marks

All the students have to pass a course in "Communication Skills & Technical Writing" which will not be counted for the overall percentage

**** Few more electives will be added***

1. Electronics for Nuclear Instrumentation

2. Foundation Course on EMI – EMC

3.Quality Assurance

SECTION B

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AT 113	Operations Research & Engineering Management *	4	-
2	AT 114	Software Engineering **	4	-
3	AT 115	Design & Analysis of Algorithms **	4	-
4	AT 116	Multimedia Systems	4	-
5	AT 117	Linux Internals **	4	-
6		Elective - I (from Group A)	4	-
7	AT 143	Analysis & Design of Algorithms Lab **	-	4
		Total Credits	24	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AT 118	Software Architecture**	4	-
2	AT 119	Data Communication & Computer Networks *	4	-
3	AT 120	Java & Web Programming	4	-
4		Elective – II (from Group B)	4	-
		Elective – III (from Group C)	4	-
5	AT 144	Java & Web Programming Lab	-	4
6	AT 135	Project Work	-	8
7	AT 136	Seminar	-	4
		Total Credits	20	16

GROUP A Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective I subject		
Sl No	**Sub Code**	**Title**
1	AT 121	C # and .Net **
2	AT 122	Data Mining & Warehousing
3	AT 123	Artificial Intelligence & Neural Networks **
4	AT 124	Unix Systems Programs **

Note :

*	Common to ET / CS / IT Streams
**	Common to CS / IT Streams
***	Elective common to AMIETE - ET/CS/IT

GROUP B Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective II subject		
Sl No	**Sub Code**	**Title**
1	AT 125	Software Testing **
2	AT 126	Mobile Applications Development **
3	AT 127	E-Commerce
4	AT 128	Internet Applications ***
5	AT 129	Cyber Crimes & IPR ***

GROUP C Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective III subject		
Sl No	**Sub Code**	**Title**
1	AT 130	Compiler Design**
2	AT 131	Cloud Computing **
3	AT 132	Cryptography & Network Security **
4	AT 133	System Modeling & Simulation

Appendix – 'D'

OUTLINE SYLLABUS
AMIETE (INFORMATION TECHNOLOGY)

AT 101 ENGINEERING MATHEMATICS – I

- Partial differentiation and its application
- Multiple integrals
- Linear algebra
- Numerical Methods
- Linear differential equation of higher order
- Series Solution of differential equations and Special functions
- Fourier Series
- Fourier Transforms and Z-Transform

AT 102 COMPUTER CONCEPTS & C PROGRAMMING

- Introduction to Computer System
- Storage Device Concepts, Operating Systems and Networks
- Fundamentals of Problem Solving and Introduction to C
- Constants, Variables, and Data Types
- Managing Input and Output Operations
- Structure of a C Program
- Functions
- Selection – Making Decisions and Repetitions
- Arrays and Strings

AT 103 ANALOG AND DIGITAL ELECTRONICS

- Analog Electronics: Basic Semiconductor and PN Junction Theory
- Semiconductor Diodes
- Diode Applications
- Bipolar Junction Transistors
- BJT Biasing
- Amplifiers and Oscillators
- Digital Electronics: Introductory Concepts
- Number Systems and Codes
- Describing Logic Circuits
- Combinational Logic Circuits
- Digital Arithmetic Operation and Circuits
- MSI Logic Circuits
- Flip-Flop and Their Applications
- Counters and Registers

AT 104 DATA STRUCTURES WITH C & C++

- Introduction to Data Structures
- Pointers and Dynamic Memory Management
- Stacks ad Queues
- Linked List
- Tree
- Graph
- Searching
- Sorting Algorithms
- Files

AT 105 OBJECT ORIENTED PROGRAMMING WITH C++

- Overview
- Declarations and Expressions
- Statements
- Array, Pointer and Structure
- Functions
- Data Abstraction through Classes and User-Defined Data Types
- Operator Overloading
- Class Relationships
- Template
- The Standard Library in C++

AT 106 COMPUTER ORGANIZATION

- Basic Structure of Computers
- Machine Instructions and Programs
- Input/Output Organization
- Memory System
- Arithmetic
- Basic Processing Unit

AT 141 DATA STRUCTURES WITH C & C++ LAB

AT 107 ENGINEERING MATHEMATICS – II

- Complex Differentiation and Transformation
- Complex Integration
- Vector Differentiation
- Vector Integration
- Numerical Methods
- Partial Differential Equations
- Theory of Probability
- Random Variables

AT 108 MICROPROCESSORS & MICROCONTROLLERS

- Introduction to Microprocessors
- Assembly Language Programs
- Interrupts in 8085
- Programs Using Interface Module
- Intel 8259A- Programmable Interrupt Controller
- Intel 8253 – Programmable Interval Timer
- 8051 Microcontroller

AT 109 UNIX & SHELL PROGRAMMING

- Introduction
- The Unix Architecture and Command Usage
- The File System
- Handling Ordinary Files
- Basic File Attributes
- The vi Editor
- The Shell
- The Process
- Customizing the Environment
- More File Attributes
- Simple Filters
- Filters Using Regular Expressions – grep And sed
- Essential Shell Programming
- awk – An Advanced Filter
- perl – The Master Manipulator

AT 110 OPERATING SYSTEMS & SYSTEMS SOFTWARE

- Evolution of OS Functions
- Processes
- Scheduling
- Deadlocks
- Process Synchronization
- File Systems
- Memory Management
- Language Processors
- Data Structures for Language Processing
- Scanning and Parsing
- Macros and Macro Processors
- Linkers
- Assemblers
- Compilers and Interpreters

AT 111 COMPUTER GRAPHICS & VISUALIZATION

- A Survey of Computer Graphics
- Overview of Graphics Systems
- Graphics Output Primitives
- Attributes of Graphics Primitives
- Geometric Transformations
- Viewing
- Visible-Surface Detection Methods
- Illumination Models and Surface-Rendering Methods
- Interactive Input Methods and
- Graphical User Interfaces

- Computer Animation
- Hierarchical Modeling

AT 112 DATABASE MANAGEMENT SYSTEMS

- Databases and Database Users
- Database System - Concepts and Architecture
- Data Modeling Using the Entity-Relationship Model
- The Enhanced Entity-Relationship (EER) Model
- The Relational Data Model and
- Relational Database Constraints
- The Relational Algebra and Relational Calculus
- Relational Database Design by ER - to - Relational Mapping
- SQL-99: Schema Definition, Constraints, Queries and Views
- Relational Database Design
- Distributed Databases and
- Client-Server Architectures
- Transaction Processing Concepts
- Database Recovery Techniques
- Security, Advanced Modeling, and Distribution

AT 142 DBMS LAB

AT 113 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

- What is Operations Research?
- Modeling with Linear Programming
- The Simplex Method and Sensitivity Analysis
- Duality and Post-Optimal Analysis
- Transportation Model and its Variants
- Network Models
- Decision Analysis and Games
- Queuing Systems
- Introduction to Engineering Management
- Engineering and Management
- Historical Development of Engineering Management
- Functions of Technology Management
- Planning and Forecasting
- Decision Making
- Organizing
- Some Human Aspects of Organizing
- Leading Technical People Controlling

AT 114 SOFTWARE ENGINEERING

- Socio-Technical Systems
- Software Processes
- Project Management
- Software Requirements
- Requirements Engineering Processes
- System Models
- Rapid Software Development
- Formal Specification
- Architectural Design
- Distributed Systems Architectures
- Objected-Oriented Design
- Software Reuse
- Component-Based Software Engineering
- User Interface Design
- Critical Systems Development
- Verification and Validation
- Software Testing
- Software Cost Estimation
- Quality Management
- Process Improvement
- Configuration Management

AT 115 DESIGN & ANALYSIS OF ALGORITHMS

- Introduction

- Fundamentals of the Analysis of Algorithm Efficiency
- Brute Force
- Divide and Conquer
- Decrease and Conquer
- Transform and Conquer
- Dynamic Programming
  Greedy Technique
- Space and Time Tradeoffs
- Limitations of Algorithmic Power
- Coping with Limitations of Algorithmic Power

AT 116 MULTIMEDIA SYSTEMS

- Introduction to Multimedia
- Multimedia Authoring and Tools
- Graphics and Image Data Representation
- Color in Image and Video
- Fundamental Concepts in Video
- Basics of Digital Audio
- Lossless Compression Algorithms
- Lossy Compression Algorithms
- Image Compression Standards
- Basic Video Compression Techniques
- MPEG Video Coding I – MPEG-1 and 2
- MPEG Video II – MPEG-4, 7, and Beyond
- Basic Audio Compression Techniques
  MPEG Audio Compression
- Multimedia Network Communication and Applications

AT 117 LINUX INTERNALS

- Linux-The Operating System
- Compiling the Kernel
- Introduction to the Kernel
- Memory Management
- Inter-Process Communication
- The Linux File System
- Device Drivers Under Linux
- Network Implementation
- Modules and Debugging
- Multi-Processing

ELECTIVE - I

AT 143 ANALYSIS & DESIGN OF ALGORITHMS LAB

AT 118 SOFTWARE ARCHITECTURE

- Envisioning Architecture
- Understanding Quality Attributes
- Achieving Qualities
- Architectural Patterns
- Design Patterns
- Designing the Architecture
- Documenting Software Architectures
- Building Systems from off-the-Shelf Components
- Software Architecture in the Future

AT 119 DATA COMMUNICATION AND COMPUTER NETWORKS

- Data Communications, Data Networking, and the Internet
- Protocol Architecture, TCP/IP, and Internet-Based Applications
- Data Transmission
- Transmission Media
- Signal Encoding Techniques
- Digital Data Communication Techniques
- Data Link Control Protocols
- Multiplexing
- Circuit Switching and Packet Switching
- Routing in Switched Networks
- Congestion Control in Data Networks
- Local Area Network Overview
- High-Speed LANs

- Wireless LANs
- Internetwork Protocols
- Internetwork Operation
- Transport Protocols
- Internet Applications

AT 144 JAVA & WEB PROGRAMMING

- The History, Evolution and Overview of Java
- Data Types, Variables and Arrays
- Operators
- Control Statements
- Introducing Classes
- Inheritance
- Packages & Interfaces
- Exception Handling
- Multithreaded Programming
- I/O, Applets
- String Handling
- The Collections Framework
- Introducing the AWT
- Introducing Swing
- Web Basics and Overview
- Creating Web Pages: XHTML
- Advanced XHTML
- Design Basics
- Information Architecture and Page Layout
- CSS, Forms and Form Processing
- Client-Side Scripting: Javascript

ELECTIVE - II

ELECTIVE – III

AT 144 JAVA & WEB PROGRAMMING LAB

AT 135 PROJECT WORK

AT 136 SEMINAR

AT 121 C# & .NET

- Introducing C# and the .Net Platform
- The Philosophy of .Net
- Building C# Applications
- Core C# Programming Constructs
- Defining Encapsulated Class Types
- Understanding Inheritance and Polymorphism
- Understanding Structured Exception Handling
- Understanding Object Lifetime
- Working with Interfaces
- Understanding Generics
- Delegates, Events, and Lambdas

AT 122 DATA MINING & WAREHOUSING

- Introduction
- Getting to Know Your Data
- Data Preprocessing
- Data Warehouse and OLAP Technology – An Overview
- Data Cube Computation and Data Generalization
- Mining Frequent Patterns and Associations
- Classification: Basic Concepts
- Cluster Analysis
- Data Mining Trends and Research Frontiers

AT 123 ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

- Overview of Artificial Intelligence
- Symbolic Logic
- Knowledge Acquisition and Representation
- Reasoning and KRR Systems
- Uncertainty
- Search Techniques
- Expert Systems
- Neural Networks

- Applications of Artificial Intelligence

AT 124 UNIX SYSTEMS PROGRAMS

- Introduction
- File I/O
- Files and Directories
- Standard I/O Library
- System Data Files and Information
- Process Control
- Process Relationships
- The Environment of a Unix Process
- Signals
- Terminal I/O
- Daemon Processes
- Inter Process Communication

AT 125 SOFTWARE TESTING

- Basics of Software Testing
- Test Generation from Requirements
- Test Adequacy: Assessment Using Control Flow
- Test Adequacy: Assessment Using Data Flow
- Test Adequacy assessment Using Program Mutation
- Testing of Object-Oriented Systems

AT 126 MOBILE APPLICATION DEVELOPMENT

- Introduction to Android
- Activities and Intents
- Introducing Android User Interface
- Designing User Interface Using Views
- Displaying Pictures and Menus with Views
- Data Persistence
- Content Providers
- Messaging and Networking
- Location Based Services
- Android Services
- Hardware Sensors
- Invading the Home Screen
- Audio, Video, and Using Camera
- Bluetooth, NFC, Networks, and Wi-Fi
- Advanced Android Development
- Monetizing, Promoting, and Distributing Applications

AT 127 E-COMMERCE

- History of E-Commerce
- Business Models for E-Commerce
- Enabling Technologies of the World Wide Web
- E-Marketing
- E-Security
- E-Payment Systems
- E-Customer Relationship Management
- E-Supply Chain Management
- E-Strategy
- Mobile Commerce
- Customer-Effective Web Design
- Legal and Ethical Issues

AT 128 INTERNET APPLICATIONS

- Hypertext Markup Language
- More HTMLl
- Cascading Stylesheets
- Cascading Stylesheets 2
- An Introduction to Javascript
- Objects in Javascript
- Dynamic HTML with Javascript
- Programming in Perl 5
- CGI Scripting
- Building Web Applications with Perl
- An Introduction to PHP

- Building Web Applications with PHP
- XML: Defining Data for Web Applications

AT 129 CYBER CRIMES & IPR

- Introduction
- Cyber Crimes – Their Kinds and Classification
- Modes & Techniques of Cyber Crime
- Cyber Crime and IPR Violation
- International Prospective of Cyber Crimes
- Prevention of Cyber Crimes
- Introductory
- Copyright
- Trademarks
- Patents – Historical Overview of Patent Law, Concept of Patent
- Patents - Patentable Inventions
- Patents - Procedure for Obtaining Patent
- Patents – Special Category
- Patents – Infringement and Remedies
- Patents – Offences and Penalties
- Industrial Designs
- Geograhical Indications
- The Information Technology Act, 2000

AT 130 COMPILER DESIGN

- Introduction
- Lexical Analysis
- Syntax Analysis
- Syntax-Directed Translation
- Intermediate Code Generation
- Run-Time Environments
- Code Generation

AT 131 CLOUD COMPUTING

- Cloud Computing Basics
- Your Organization and Cloud Computing
- The Business Case for Going to the Cloud
- Cloud Computing Technology
- Cloud Computing at Work
- Migrating to the Cloud
- Best Practices and the Future of Cloud Computing
- Using the Mobile Cloud

AT 132 CRYPTOGRAPHY & NETWORK SECURITY

- Introduction
- Mathematics of Cryptography
- Traditional Symmetric-Key Ciphers
- Introduction to Modern Symmetric-Key Ciphers
- Data Encryption Standard (DES)
- Encipherment Using Modern Symmetric-Key Ciphers
- Asymmetric-Key Cryptography
- Message Integrity and Message Authentication
- Cryptographic Hash Functions
- Digital Signature
- Key Management
- Security at the Application Layer
- Security at the Transport Layer

AT 133 SYSTEM MODELING & SIMULATION

- Introduction to Discrete-Event System Simulation
- General Principles
- Simulation Software
- Statistical Models in Simulation
- Queueing Models
- Random-Number Generation
- Random-Variate Generation
- Input Modeling
- Verification and Validation of Simulation Models

- Output Analysis for a Single Model
- Comparison and Evaluation of Alternative System Designs

AT 137 (ORAL) AT 138 (WRITTEN) COMMUNICATION SKILLS AND TECHNICAL WRITING

- Communication: Its Types and Significance
- Grammar
- Syntax
- Reading Skills
- Writing Skills
- Listening Skills
- Speaking Skills
- Technical Report and Scientific Report
- Campus Recruitment, Interview and Group Discussion
- Meeting Negotiations, Phone and Mobile Phone Skils

Scheme and Structure for the Programme of AMIETE in Electronics & Telecommunication Engineering
Appendix 'E'

SECTION A

Part – I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE 101	Engineering Mathematics – I *	4	-
2	AE 102	Computer Concepts & C Programming*	4	-
3	AE 103	Electronic Devices & Circuits	4	-
4	AE 104	Linear ICs & Digital Electronics	4	-
5	AE 105	Principles of Electrical Engineering	4	-
6	AE 106	Materials & Processes	4	-
7	AE 141	Analog Electronics Lab	-	4
		Total Credits	24	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE 107	Engineering Mathematics – II *	4	-
2	AE 108	Microprocessors & Microcontrollers *	4	-
3	AE 109	Control Engineering	4	-
4	AE 110	Circuit Theory & Design	4	-
5	AE 111	Instrumentation & Measurements	4	-
6	AE 112	Signals & Systems	4	-
7	AE 142	Digital Electronics Lab	-	4
		Total Credits	24	4
	AE 137	Communication Skills & Technical Writing(Oral)*	20	Marks
	AE 138	Communication Skills & Technical Writing(Written)*	80	Marks

All the students have to pass a course in "Communication Skills & Technical Writing" which will not be counted for the overall percentage

**** Few more electives will be added***

1. Electronics for Nuclear Instrumentation

2. Foundation Course on EMI - EMC

3. Quality Assurance

SECTION B

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE 113	Operations Research & Engineering Management *	4	-
2	AE 114	Electromagnetics & Radiation Systems	4	-
3	AE 115	Telecommunication Switching Systems	4	-
4	AE 116	Analog Communications	4	-
5	AE 117	Embedded Systems Design	4	-
6		Elective – I (from Group A)	4	-
7	AE 143	µP & C Programming Lab	-	4
		Total Credits	24	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE 118	Digital Communications	4	-
2	AE 119	Data Communication & Computer Networks *	4	-
3	AE 120	Microwave Theory & Techniques	4	-
4		Elective – II (from Group B)	4	-
5		Elective – III (from Group C)	4	-
6	AE 144	Analog & Digital Communications Lab	-	4
7	AE 135	Project Work	-	8
8	AE 136	Seminar	-	4
		Total Credits	20	16

GROUP A Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective I subject		
Sl No	**Sub Code**	**Title**
1	AE 121	Digital Signal Processing
2	AE 122	VLSI Design †
3	AE 123	Power Electronics
4	AE 124	Operating Systems

GROUP B Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective II subject		
Sl No	**Sub Code**	**Title**
1	AE 125	Information Theory & Coding
2	AE 126	Radar & Navigational Aids
3	AE 127	Wireless & Mobile Systems †
4	AE 128	Internet Applications ***
5	AE 129	Cyber Crimes & IPR ***

GROUP C Students can chose any one of the following elective subjects		
Students can choose any one of the following as an Elective III subject		
Sl No	**Sub Code**	**Title**
1	AE 130	Optoelectronics & Communication
2	AE 131	Advanced Communication Systems
3	AE 132	Multimedia Systems ††
4	AE 133	DSP Algorithms and Architecture

Note:

*	Common to ET / CS / IT Streams
**	Common to CS / IT Streams
***	Elective common to AMIETE - ET/CS / IT
†	Elective common to AMIETE - ET/CS
††	Syllabus is same as that of the core subject for AMIETE - IT

Appendix - 'F'

OUTLINE SYLLABUS
AMIETE (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

AE 101 ENGINEERING MATHEMATICS – I

- Partial differentiation and its application
- Multiple integrals
- Linear algebra
- Numerical Methods
- Linear differential equation of higher order
- Series Solution of differential equations and Special functions
- Fourier Series
- Fourier Transforms and Z-Transform

AE 102 COMPUTER CONCEPTS & C PROGRAMMING

- Introduction to Computer System
- Storage Device Concepts, Operating Systems and Networks
- Fundamentals of Problem Solving and Introduction to C
- Constants, Variables, and Data Types
- Managing Input and Output Operations
- Structure of a C Program
- Functions
- Selection – Making Decisions and Repetitions
- Arrays and Strings

AE 103 ELECTRONIC DEVICES AND CIRCUITS

- Circuit Theory
- Semiconductors, Diodes and Diode Circuits
- Transistors and Other Devices
- Small-Signal Models, Amplification and Biasing
- Small-Signal Amplifiers-Frequency Response
- Large-Signal Amplifiers
- Feedback Amplifiers and Oscillators
- Integrated Circuits Fabrication

AE 104 LINEAR ICs AND DIGITAL ELECTRONICS

- Introduction
- Operational Amplifier
- Operational Amplifier Characteristics
- Operational Amplifier Applications
- Comparator and Waveform Generator
- 555 Timer applications
- Voltage Regulator
- D-A and A-D Converters
- Introductory Concepts
- Number Systems and Codes
- Describing Logic Circuits
- Combinational Logic Circuits
- Digital Arithmetic
- MSI Logic Circuits
- Flip-Flops and their Applications
- Counters and Registers

AE 105 PRINCIPLES OF ELECTRICAL ENGINEERING

- Magnetic Circuits
- Transformers
- D.C. Machines
- Synchronous Machines
- Induction Machines
- Fractional kW Motors
- Power systems
- Domestic wiring and measuring techniques of electrical and electronics instruments

AE 106 MATERIALS & PROCESSES

- Crystal Geometry, Atomic Structure & Bonding
- Structure of Solids & Crystal Imperfections
- Diffusion in Solids & Conducting Materials
- Dielectric Materials in Static & Alternating Fields
- Magnetic Materials
- Semi conducting Materials
- Semi conducting Devices & Electronic Component Materials
- Fabrication Processes of Semi conductors

AE 141 ANALOG ELECTRONICS LAB

AE 107 ENGINEERING MATHEMATICS – II

- Complex Differentiation and Transformation
- Complex Integration
- Vector Differentiation
- Vector Integration
- Numerical Methods
- Partial Differential Equations
- Theory of Probability
- Random Variables

AE 108 MICROPROCESSORS & MICROCONTROLLERS

- Introduction to Microprocessors
- Assembly Language Programs
- Interrupts in 8085
- Programs Using Interface Module
- Intel 8259A- Programmable Interrupt Controller
- Intel 8253 – Programmable Interval Timer
- 8051 Microcontroller

AE 109 CONTROL ENGINEERING

- Modeling of Systems
- Block Diagrams
- Signal Flow Graphs
- Feedback Characteristics of Control Systems
- Control Systems and Components
- Time Response Analysis
- Concepts of Stability
- Root Locus Technique
- Frequency Domain Analysis
- Compensation
- State Variable Analysis

AE 110 CIRCUIT THEORY AND DESIGN

- Conventions for Describing Networks
- Network Equations
- Initial Conditions in Networks
- Differential Equations Applications
- Signals, Amplitude, Phase and Delay
- The Laplace Transformation
- Transforms of other Signal Waveforms
- Impedance Functions and Network Theorems
- Network Functions; Poles and Zeros
- Elements of Realisability Theory
- Two-Port Parameters
- Synthesis of One-Port Networks
- Elements of Transfer Function synthesis
- Topics in filter Design

AE 111 INSTRUMENTATION AND MEASUREMENTS

- Measurement Fundamentals
- Measurement of Resistance, Inductance and capacitance

- Instruments to measure Current and Voltages
- Digital measuring Instruments
- Signal Generators and Oscilloscope
- Signal Analysis Instruments and R.F Power measurement Techniques
- Recorders
- Transducers and Data Acquisition System

AE 112 SIGNALS AND SYSTEMS

- Signals
- Linear-Time Invariant Systems
- Fourier Series Representation of Periodic Signals
- The Continuous-Time Fourier Transform
- The Discrete-Time Fourier Transform
- Time and Frequency Characterization of Signals and Systems
- Sampling
- The Laplace Transform
- The Z-Transform
- Random Processes

AE 142 DIGITAL ELECTRONICS LAB

AE 113 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

- What is Operations Research?
- Modeling with Linear Programming
- The Simplex Method and Sensitivity Analysis
- Duality and Post-Optimal Analysis
- Transportation Model and its Variants
- Network Models
- Decision Analysis and Games
- Queuing Systems
- Introduction to Engineering Management
- Engineering and Management
- Historical Development of Engineering Management
- Functions of Technology Management
- Planning and Forecasting
- Decision Making
- Organizing
- Some Human Aspects of Organizing
- Leading Technical People Controlling

AE 114 ELECTROMAGNETICS AND RADIATION SYSTEMS

- Coulomb's Law and Electric Field Intensity
- Electric Flux Density, Gauss's Law and Divergence
- Energy and Potential
- Current and Conductors , Dielectrics and Capacitance
- Poisson's and Laplace's Equations
- The Steady Magnetic Field
- Magnetic Forces, Materials and Inductance
- Time-Varying Fields and Maxwell's Equations
- Radiation and Propagation of Waves
- Antennas

AE 115 TELECOMMUNICATION SWITCHING SYSTEMS

- Switching Systems
- Telecommunications Traffic
- Switching Networks
- Time Division Switching
- Control of Switching Systems
- Signaling
- Packet Switching
- Networks

AE 116 ANALOG COMMUNICATIONS

- Introduction to Communication Systems
- Noise
- Amplitude Modulation
- Single-Sideband Techniques
- Frequency Modulation
- Radio Receivers
- Transmission Lines
- Waveguides, Resonators and Components
- Pulse Communications
- Broadband Communications Systems

AE 117 EMBEDDED SYSTEMS DESIGN

- Introduction to embedded systems
- Custom single purpose processors: Hardware
- General purpose processors: Software
- Standard single-purpose processors: Peripherals
- Memory
- Interfacing
- Introduction to Real Time Operating Systems
- More operating system services
- Basic design using Real Time Operating System

ELECTIVE – I

AE 143 µP & C PROGRAMMING LAB

AE118 DIGITAL COMMUNICATIONS

- Introduction
- Fundamental Limits on Performance
- Sampling Process
- Waveform Coding Techniques
- Base-band Shaping for Data Transmission
- Digital Modulation Techniques
- Detection and Estimation
- Spread Spectrum Modulation
- Applications

AE 119 DATA COMMUNICATION AND COMPUTER NETWORKS

- Data Communications, Data Networking, and the Internet
- Protocol Architecture, TCP/IP, and Internet-Based Applications
- Data Transmission
- Transmission Media
- Signal Encoding Techniques
- Digital Data Communication Techniques
- Data Link Control Protocols
- Multiplexing
- Circuit Switching and Packet Switching
- Routing in Switched Networks
- Congestion Control in Data Networks
- Local Area Network Overview
- High-Speed LANs
- Wireless LANs
- Internetwork Protocols
- Internetwork Operation
- Transport Protocols
- Internet Applications

AE 120 MICROWAVE THEORY & TECHNIQUES

- Introduction to Microwaves and Microwave Transmission Lines
- Microwave Waveguides
- Microwave Components
- Microwave Solid-state Devices
- Microwave Linear-Beam Tubes (O-Type)

- Microwave Cross-field Tubes (M-type)
- Strip Lines and Microstrip Lines
- Monolithic MICs

ELECTIVE – II

ELECTIVE – III

AE 144 ANALOG & DIGITAL COMMUNICATIONS LAB

AE 135 PROJECT WORK

AE 136 SEMINAR

AE 121 DIGITAL SIGNAL PROCESSING

- Sampling of Continuous-Time Signals
- Transform Analysis of Linear Time-Invariant Systems
- Structures for Discrete-Time Systems
- Filter Design Techniques
- The Discrete Fourier Transform
- Computation of the Discrete Fourier Transform
- Fourier Analysis of Signals using the Discrete Fourier Transform
- Discrete Hilbert Transforms

AE 122 VLSI DESIGN

- A review of microelectronics and an introduction to MOS technology
- Basic electrical properties of MOS and BiCMOS circuits
- MOS and BiCMOS circuit design processes
- Basic circuit concepts
- Scaling of MOS circuits
- Subsystem design and layout
- Subsystem design processes
- Illustration of the design process-computational elements
- Memory, registers and aspects of system timing
- Practical aspects and testability

AE 123 POWER ELECTRONICS

- Power Electronics
- Power Diodes and Power Transistors
- Thyristor Devices
- Single-Phase Controlled Rectifiers
- Three-Phase Controlled Rectifiers
- DC Choppers
- Inverters
- AC Voltage Controller
- Static Switches
- Some Applications

AE 124 OPERATING SYSTEMS

- Introduction
- System Structures
- Process Concept
- Multithreaded Programming
- Process Scheduling
- Synchronization
- Deadlocks
- Memory-Management Strategies
- Virtual-Memory Management
- File System
- Implementing File Systems
- Secondary-Storage Structure
- System Protection

AE 125 INFORMATION THEORY AND CODING

- Random Signal Theory
- Continuous Random Signal Theory
- Basics of Information Theory
- Fundamental Limits on Performance and Source Coding
- Discrete Memoryless Channels

- Continuous Channels
- Error Control Coding – Linear Block Codes
- Cyclic and Convolutional Codes

AE 126 RADAR AND NAVIGATIONAL AIDS

- An Introduction to Radar
- The Radar Equation
- MTI and Pulse Doppler Radar
- Tracking Radar and Detection of Signals in Noise
- Radar Clutter
- The Radar Antenna
- Radar Receiver
- Navigational Aids

AE 127 WIRELESS & MOBILE SYSTEMS

- Introduction
- Probability, Statistics, and Traffic Theories
- Mobile Radio Propagation
- Channel Coding and Error Control
- Cellular Concept
- Multiple Radio Access for Traffic Channels
- Multiple Division Techniques
- Traffic Channel Allocation
- Satellite Systems
- Mobile Communication Systems
- Existing Wireless Systems
- Ad Hoc and Sensor Networks
- Wireless LANs, MANs and PANs
- Recent Advances

AE 128 INTERNET APPLICATIONS

- Hypertext Markup Language
- More HTML
- Cascading Stylesheets
- Cascading Stylesheets 2
- An Introduction to Javascript
- Objects in Javascript
- Dynamic HTML with Javascript
- Programming in Perl 5
- CGI Scripting
- Building Web Applications with Perl
- An Introduction to PHP
- Building Web Applications with PHP
- XML: Defining Data for Web Applications

AE 129 CYBER CRIMES & IPR

- Introduction
- Cyber Crimes – Their Kinds and Classification
- Modes & Techniques of Cyber Crime
- Cyber Crime and IPR Violation
- International Prospective of Cyber Crimes
- Prevention of Cyber Crimes
- Introductory
- Copyright
- Trademarks
- Patents – Historical Overview of Patent Law, Concept of Patent
- Patents - Patentable Inventions
- Patents - Procedure for Obtaining Patent
- Patents – Special Category
- Patents – Infringement and Remedies
- Patents – Offences and Penalties
- Industrial Designs
- Geograhical Indications
- The Information Technology Act, 2000

AE 130 OPTOELECTRONICS & COMMUNICATION

- Optical Fibers: Structures, Waveguiding and Fabrication
- Signal degradation in optical fibers
- Optical sources and detectors
- Power launching and coupling
- Optical receiver operation

- Analog Links
- Digital Links
- Advanced systems and techniques

AE 131 ADVANCED COMMUN ICATION SYSTEMS

- Optical Fiber Transmission Media
- Cellular Telephone Concepts
- Cellular Telephone Systems
- Introduction to Data Communications and Networking
- Fundamental Concepts of Data Communications
- Data-Link Protocols and Data Communication Networks
- Satellite Communications
- Satellite Multiple Accessing Arrangements

AE 132 MULTIMEDIA SYSTEMS

- Introduction to Multimedia
- Multimedia Authoring and Tools
- Graphics and Image Data Representation
- Color in Image and Video
- Fundamental Concepts in Video
- Basics of Digital Audio
- Lossless Compression Algorithms
- Lossy Compression Algorithms
- Image Compression Standards
- Basic Video Compression Techniques
- MPEG Video Coding I – MPEG-1 and 2
- MPEG Video II – MPEG-4, 7, and Beyond
- Basic Audio Compression Techniques
  MPEG Audio Compression
- Multimedia Network Communication and Applications

AE 133 DSP ALGORITHMS AND ARCHEITECTURE

- Introduction to Digital Signal Processing
- Architectures for Programmable Digital Signal Processing Devices
- Programmable Digital Signal Processors
- Programmable Digital Signal Processors (Continued) and Development Tools for DSP Implementations
- Implementation of Basic DSP Algorithms
- Implementation of FFT Algorithms and Interfacing Memory
- Parallel to I/O Peripherals to DSP Devices
- Interfacing and Applications of DSP Processor

AE 137 (ORAL) & AE 138 (Written) COMMUNICATION SKILLS AND TECHNICAL WRITING

- Communication: Its Types and Significance
- Grammar
- Syntax
- Reading Skills
- Writing Skills
- Listening Skills
- Speaking Skills
- Technical Report and Scientific Report
- Campus Recruitment, Interview and Group Discussion
- Meeting Negotiations, Phone and Mobile Phone Skill

Appendix 'G"

AMIETE (ET)
DETAILED SYLLABUS

Introduction

Most of the Student Members of the IETE are working engineers/ technicians/science graduates or under graduates. Thus, due to occupational reasons and other factors these students are deprived of a formal education and therefore have to learn the subjects through self-study only.

Review of Syllabus

2. IETE periodically reviews the syllabi of AMIETE and the aim of these reviews is not only to renovate and modernize the contents but also to make them contemporary. The syllabi for both Electronics & Telecommunications (ET),Computer Science & Engineering (CS) and Information Technology (IT) streams have been reviewed recently.

3. Keeping the above aspects in view and based on feed backs/suggestions received from the students, this syllabus has been formulated to meet the following criteria:-

- The Syllabus should cater to the technological advancements.
- The textbooks should be available and affordable to the students.
- In the absence of a formal coaching to the students, there should be a reasonable correlation between the topics in a subject and the textbooks.

Salient Features

4. Some salient features of the syllabus are:-

- Each subject has a code preceding it (viz AE101, AC101 and AT101 are codes for Mathematics-I in ET, CS and IT streams respectively).
- In order to guide the student and to enable him/her to prepare well for an examination, each subject is divided into 8 units and each unit has the course contents to be covered in 7 or 8 hours.
- The textbooks have been numbered in Roman Numerical (viz I, II, III)
- The chapters and sections are mentioned inside the bracket e.g. I (2.1) would indicates chapter 2 and section 1 of textbook-I.

Scheme of the Examination

5. For all theory subjects the Question Paper contains

- 10 objective questions for 20 marks covering the complete syllabus
- 8 questions are from each unit and each question carries 16 marks.

6. Regular feed back from the students, academicians, corporate members and professionals is requested to keep this syllabus updated, so that our students keep abreast of latest technological changes. Though every effort has been made to identify standard and best textbooks for each subject, we welcome suggestions on availability of better and cheaper textbooks.

AE 101 ENGINEERING MATHEMATICS – I

UNIT I

PARTIAL DIFFERENTIATION AND ITS APPLICATION 08 hrs

Introduction to function of two or more variables; Partial derivatives; Homogeneous functions – Euler's theorem; Total derivatives; Differentiation of Implicit functions; change of variables; Jacobians; properties of Jacobians; Taylor's theorem for functions of two variables (only statement); Maxima and Minima of functions of two variables; Lagrange's Method of undetermined Multipliers; Rule of differentiation under integral sign.

I (5.1, 5.2, 5.4, 5.5 (1), 5.5 (2), 5.6, 5.7 (1), 5.7 (2), 5.11 (1), 5.11 (2), 5.12, 5.13)

UNIT II

MULTIPLE INTEGRALS 08 hrs

Introduction to Double Integrals; Evaluation of Double Integrals; Evaluation of Double Integrals in polar coordinates; change of order of integration; Triple Integrals; Evaluation of Triple Integrals; Area by Double Integration; volume as Double Integral; volume as Triple Integral.Improer integrals,Gamma and Beta function.

I (7.1,7.2,7.3,7.4,7.5,7.6(1),7.6(2),7.7,7.14,7.15,7.16)

UNIT III

LINEAR ALGEBRA 07 hrs

Introduction to determinants and matrices; Elementary row operations on a matrix: Rank of a matrix: Consistency of system of linear equation; Gauss elimination and Gauss Jordan Methods to solve system of Linear equations; Eigen Values and Eigen Vectors of Matrix; Properties of Eigen values; Solution of a system of linear equations.

I (2.1, 2.2, 2.5, 2.8 (1), 2.8 (2), 2.11 (1), 28.6(1), 28.6(2) 2.14 (1), 2.15, 28.6 (1))

UNIT IV

NUMERICAL METHODS 07 hrs

Introduction; Solution of algebraic and transcendental equations; Regula – falsi method; Newton- Raphson method; Numerical solution of ordinary differential equation; Taylor's Series method; Euler's Method; Modified Euler's Method; IV order Runge Kutta method; Gauss – Siedel Method to solve system of linear equations; Power method to obtain the dominant Eigen value of a Matrix and its corresponding Eigen Vector.

I (28.1, 28.2 (2), 28.2(3),28.3,32.1,32.3,32.4,32.5,32.7,28.7(2),28.9)

UNIT V

LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER 07 hrs

Definition and General form of Linear differential equation of higher order; the operator D; complete solution of Linear differential equation as a sum of complementary function (C.F) and particular integral (P.I); Rules for finding the complementary function; the inverse operator 1/f (D); Rules for finding Particular integral; method of variation of parameter to find the Particular integral; Cauchy and Legendre Homogenous Linear equations; Simultaneous Linear equations with constant coefficients.

I (13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9, 13.11)

UNIT VI

SERIES SOLUTION OF DIFFERENTIAL EQUATIONS AND SPECIAL FUNCTION **08 hrs**

Series solution of Differential equations (Method of Frobenius); Validity of series solution; series solution when X=0 is an ordinary point of the equation; series solution when X=0 is a regular singularity of the equation.

Bessel equation-Bessel functions Equations Reducible to Bessel's equation Orthogonality of Bessel functions; Legendre's differential equation; Legendre Polynomials; Rodrigue's formula; Orthogonality of Legendre polynomials.

I (16.1,16.2,16.3,16.4,16.5,16.10,16.11,16.13,16.14,16.17)

UNIT VII

FOURIER SERIES **07 hrs**

Introduction,Euler's formulae,conditions for Fourier expansion,Functions having points of discontinuity,change of interval,Even and Odd functions,Half range series,Practical Harmonic Analysis.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6(1), 10.7, 10.11)

UNIT VIII

FOURIER TRANSFORMS AND Z-TRANSFORMS **08 hrs**

Introduction,Fourier Integral theorem(only statement),Infinite complex complex Fourier Transforms,Proporties of complex Fourier Transforms,Convolution theorem of complex Fourier Transforms,Parseval's indentity.Infinite Fourier sine and Cosine Transform.

Introduction to Z-Transform,Definition,some standard Z-Transforms,Linearity property,Damping rule,Shifting rule,Inverse Z-Transforms,Application of Z-Transformsto solve Difference equations.

I (22.1 to 22.7 and 23.1 to 23.7,23.15,23.16)

Text Book:

I. Higher Engineering Mathematics, Dr. B.S.Grewal, 41st Edition 2012, Khanna publishers, Delhi.

Reference books:

1. Advanced Engineering Mathematics, H.K. Dass, 17th Revised Edition 2007, S.Chand & Company Ltd, New Delhi.
2. Text book of Engineering Mathematics, N.P. Bali and Manish Goyal, 8th Edition 2011, Laxmi Publication (P) Ltd

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 102 COMPUTER CONCEPTS & C PROGRAMMING

UNIT I

INTRODUCTION TO COMPUTER SYSTEMS **07 hrs**

Introduction, The computer defined, Basic parts and structure of computer system, Categorizing computers, Information processing life cycle, Essential computer hardware, Essential computer software, Input device, Inputting data in other ways, Output devices.

I (1.1, 1.2, 1.4 to 1.11)

UNIT II

STORAGE DEVICE CONCEPTS, OPERATING SYSTEMS AND NETWORK **08 hrs**

Introduction, Number systems and computer codes, Central processing unit, Motherboard, Storage media, Software, Operating system, Computer processing techniques, Memory management techniques, Computer networks.

I (2)

UNIT III

FUNDAMENTALS OF PROBLEM SOLVING AND INTRODUCTION TO C **07 hrs**

Introduction, Problem solving, System development programs, Creating and running a program, Software development steps, Applying software development method, Introduction to C, Basic structure of C programs, Programming style, Program development steps, Unix system, MS-DOS system

I (3)

UNIT IV

CONSTANTS, VARIABLES, AND DATA TYPES **08 hrs**

Introduction, Character set, C tokens, Declaration of variables, Declaration of storage class, Assigning values to variables, Defining symbolic constants, Declaring a variable as constant, Declaring a variable as volatile, Overflow and underflow of data, Some additional examples

MANAGING INPUT AND OUTPUT OPERATIONS

Introduction, Reading a character, Writing a character, Formatted input, Formatted output

I (4, 5)

UNIT V

STRUCTURE OF A C PROGRAM **07 hrs**

Operators and Expressions: Introduction, Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operator, Bitwise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Some computational problems, Type conversions in expressions, Operator precedence and associativity, Mathematical functions.

I (6)

UNIT VI

FUNCTIONS **08 hrs**

User-Defined Functions: Introduction, Need for user-defined functions, A multi-function program, Elements of user-defined functions, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions, No arguments and no return values, Arguments but no return values, No arguments but returns a value, Functions that return multiple values, Nesting of functions, Recursion, Passing arrays to functions, Passing strings to functions, The scope, visibility and lifetime of variables, Multifile programs

I (7)

UNIT VII

SELECTION – MAKING DECISIONS AND REPETITIONS **07 hrs**

Decision Making and Branching: Introduction, Decision making with if statement, Simple if statement, The if….else statement, Nesting of if….else statements, The else if ladder, The switch statement, The ?: Operator, The goto statement

Decision Making and Looping: Introduction, The while statement, The do statement, The for statement, Jumps in loops

I (8, 9)

UNIT VIII

ARRAYS AND STRINGS **08 hrs**

Arrays: Introduction, One-dimensional arrays, Declaration of one-dimensional arrays, Initialization of one-dimensional arrays, Two-dimensional arrays, Initializing two-dimensional arrays, Multi-dimensional arrays, Dynamic arrays, Some additional examples

Character arrays and strings: Introduction, Declaring and initializing string variables, Reading strings from terminal, Writing strings to screen, Arithmetic operations on characters, Putting strings together, Comparison of two strings, String-handling functions, Table of strings,

I (10.1 to 10.8, 10.10, 11.1 to 11.9)

Text Book:

I. Computer Concepts and Programming in C, E. Balagurusamy, Tata McGraw-Hill, 2010

Reference Books:

1. Introduction to Computers, Peter Norton, 7th Edition (Special Indian Edition), Tata McGraw-Hill, 2011
2. Programming with C, 2nd Edition (Special Indian Edition) Schaum's Outline Series, Tata McGraw-Hill, 2006
3. Computer Science – A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, 3rd Edition, CENGAGE Learning, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 103 ELECTRONIC DEVICES AND CIRCUITS

UNIT I

CIRCUIT THEORY **07 hrs**

Introduction; Voltage and Current Sources; Resistance; The Basic laws of Electric Circuits; Resistances in Series and Parallel; General Methods of Network Analysis; Network Theorems; Step Response of RC Circuits; Duality of Networks; Sinusoidal Steady-State Circuit Analysis; Resonance; Miller's Theorem; Two-port Networks.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10, 10.11, 10.12, 10.13)

UNIT II

SEMICONDUCTORS, DIODES AND DIODE CIRCUITS **08 hrs**

Introduction to Electronics, Typical Electronic Systems; Classification of Electronic Systems and Devices; The Future; Conduction in Solids; Doped Semiconductors; Junction Diodes; DC Analysis of Diode Circuits; Zener Diode as Voltage Regulator; Diode Circuits with Time-Varying Sources; Transition and Diffusion Capacitances; Switching Characteristics of a Diode; Special Purpose Diodes; Rectifiers and Power Supplies; Filters; Some Diode Wave Shaping Circuits; Additional examples.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17)

UNIT III

TRANSISTORS AND OTHER DEVICES **08 hrs**

Introduction; Bipolar Junction Transistor; Junction Field Effect Transistor and Metal Oxide Semiconductor Field Effect Transistor; Four-Layer Devices – Thyristors; Additional Examples.

I (2.1, 2.2, 2.3, 2.5, 2.6)

UNIT IV

SMALL-SIGNAL MODELS, AMPLIFICATION AND BIASING **08 hrs**

Introduction, Small-signal Transistor Models; Hybrid-π Model; h-Parameter Model; Transistor Biasing; Bias Design, AC Gain, Input-Output Impedances; Some Special Circuits; Darlington Pair; Emitter Coupled Pair; CMOS Circuits; Additional Examples.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 3.9, 3.11, 3.12, 3.13)

UNIT V

SMALL-SIGNAL AMPLIFIERS-FREQUENCY RESPONSE **08 hrs**

Introduction; Single-Stage RC-Coupled Amplifier; Frequency Response; Tuned Amplifier; Gain-Bandwidth Product; Multistage Amplifiers; Additional Examples.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.8)

UNIT VI

LARGE -SIGNAL AMPLIFIERS **07 hrs**

Amplifier Classes; Class-A Power Amplifiers; Transformer-Coupled Power Amplifier; Class-B Power Amplifier; Complementary-Symmetry Circuits; Distortion in Amplifiers; Class-AB Amplifiers; Class-C Power Amplifiers; Additional Examples.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.10)

UNIT VII

FEEDBACK AMPLIFIERS AND OSCILLATORS 07 hrs

Feedback Concepts; Types of Feedback Circuits; Block Diagram Representation of Feedback Amplifiers; Effect of Feedback on Impedances; Some Negative Feedback Circuits; Properties of Negative Feedback; Stability in Feedback Amplifiers; Oscillator Operation; Phase Shift Oscillators; Wein Bridge Oscillators; Tuned Oscillators; Crystal Oscillators; Unijunction Oscillator; Additional Examples.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.15)

UNIT VIII

INTEGRATED CIRCUITS FABRICATION 07 hrs

Introduction; Pre-Fabrication Stage; IC Fabrication; The Planar Processes; Illustration-A Simple IC Fabrication; Monolithic Transistors-Bipolar; Fabrication of MOSFET; Monolithic Diodes; Integrated Resistors; Integrated Capacitors; Metal-Semiconductor Contact; Characteristics of IC Components; Monolithic Circuit Layout; Levels of Integration.

I (9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 9.11, 9.12, 9.13, 9.14)

Text Book:

I. Electronic Devices and Circuits, 2009, I. J. Nagrath, PHI.

Reference Book:

1. Electronic Devices and Circuits, Fifth Edition, David A Bell, Oxford University Press.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 104 LINEAR ICs AND DIGITAL ELECTRONICS

PART A: LINEAR ICs

UNIT I

INTEGRATED CIRCUIT FABRICATION & OPERATIONAL AMPLIFIER 07 hrs

Introduction, Classification; IC Chip Size and Circuit Complexity; Fundamentals of Monolithic IC Technology; Basic Information of Op-Amp; The Ideal Operational Amplifier; Operational Amplifier Internal Circuit.

I (1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.4.1, 2.4.2)

UNIT II

OPERATIONAL AMPLIFIER CHARACTERISTICS 04 hrs

Introduction; DC Characteristics; AC Characteristics; Frequency Response; Stability of Op-Amp (Qualitative Analysis); Slew Rate; Analysis of Data Sheets of an Op-Amp.

I (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.4, 3.4)

OPERATIONAL AMPLIFIER APPLICATIONS 03 hrs

Introduction; Basic Op-Amp Applications; Instrumentation Amplifier; AC Amplifier; V to I and I to V Converters.

I (4.1, 4.2, 4.3, 4.4, 4.5)

UNIT III

OPERATIONAL AMPLIFIER APPLICATIONS (Continued…) 06 hrs

Op-Amp Circuits using Diodes; Sample and Hold Circuit; Differentiator; Integrator; Operational transconductance Amplifier (OTA).

I (4.6, 4.7, 4.10, 4.11, 4.13)

COMPARATORS 02 hrs

Introduction; Comparator; Regenerative Comparator (Schmitt Trigger).

I (5.1, 5.2, 5.3)

UNIT IV

WAVEFORM GENERATORS AND 555 TIMER 05 hrs

Square Wave Generator; Astable Multivibrator; Monostable Multivibrator; Triangular Wave Generator; Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation.

I (5.4, 5.5, 5.6, 8.1, 8.2, 8.3, 8.4, (8.3.1 and 8.4.1 not Included))

VOLTAGE REGULATOR D-A AND A-D CONVERTERS 03 hrs

Introduction; Series Op-Amp Regulator; Basic DAC Techniques Weighted Resistor DAC,R-2R DAC ; A-D Converters, Flash ADC, Successive approximation Converter.

I (6.1, 6.2, 10.1, 10.2, 10.2.1, 10.2.2, 10.3, 10.3.1, 10.3.4)

PART B: DIGITAL ELECTRONICS

UNIT V

INTRODUCTORY CONCEPTS 03 hrs

Introduction; Numerical Representations; Digital and Analog Systems; Digital Number Systems; Representing Binary Quantities; Digital Circuits / Logic Circuits; Parallel and Serial Transmission; Memory; Digital Computers.

II (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8)

NUMBER SYSTEMS AND CODE's 04 hrs

Introduction; Binary to Decimal Conversions; Decimal to Binary Conversions; Octal Number System; Hexadecimal Number System; BCD Code; Gray Code, Putting it all together; The Byte; Nibble and Word; Alphanumeric Codes;

II (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9)

UNIT VI

DESCRIBING LOGIC CIRCUITS 04 hrs

Introduction; Boolean Constants and Variables; Truth Tables: OR, AND, NOT Operations; NOR, NAND Gates; Boolean Theorems; De-Morgan's Theorems; Universality of NAND and NOR Gates.

II (3.1, 3.2, 3.3, 3.4, 3.5, 3.9, 3.10, 3.11, 3.12)

COMBINATIONAL LOGIC CIRCUITS 04 hrs

Introduction; Sum of Product Form; Simplifying Logic Circuits; Algebraic Simplification; Designing Combinational Logic Circuits; Karnaugh Map Method (3 and 4 Variables); Exclusive OR and Exclusive NOR Circuits.

II (4.1, 4.2, 4.3, 4.4, 4.5, 4.6)

UNIT VII

DIGITAL ARITHMETIC: OPERATIONS AND CIRCUITS 04 hrs

Introduction; Binary Addition; Representing Signed Numbers; Addition and Subtraction in 2's Complement System; BCD Addition; Arithmetic Circuits; Parallel Binary Adder; Design of a Full Adder; Carry Propagation; BCD Adder.

II (6.1, 6.2, 6.3, 6.4, 6.7, 6.9, 6.10, 6.11, 6.13, 6.16)

MSI LOGIC CIRCUITS 04 hrs

Introduction; Decoders; Encoders; Multiplexers; De-Multiplexers (Application Not Included); Magnitude Comparator.

II (9.1, 9.4, 9.5, 9.7, 9.8)

UNIT VIII

FLIP-FLOPS AND THEIR APPLICATIONS 04 hrs

Introduction; NAND Gate Latch; NOR Gate Latch; Clock Signals and Clocked Flip-Flops; Clocked SR Flip-Flop; Clocked JK Flip-Flop; Clocked D Flip-Flop; D Latch.

II (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8)

COUNTERS AND REGISTERS 03 hrs

Introduction; Asynchronous Counters; Propagation Delay in Ripple Counters; Synchronous (Parallel) Counters State machine; Integrated Circuit Registers; Parallel In / Serial Out; Parallel In / Parallel Out; Serial In / Serial Out; Serial In / Parallel Out registers; Shift Register Counters.

II (7.1, 7.4, 7.5, 7.6, 7.15, 7.16, 7.17, 7.18, 7.19, 7.21)

Text Books:

I. Linear Integrated Circuits, Fourth Edition 2010, Reprint-2011, D Roy Choudhury, Shail B. Jain, New Age International Publishers.
II. Digital Systems – Principles and Applications, Tenth Edition, Ronald J Tocci, Neal S Widmer and Gregory L. Moss, Pearson Education, 2009.

Reference Books:

1. Operational Amplifiers and Linear IC's, Second Edition, David A Bell, PHI.
2. Digital Fundamentals, Thomas L. Floyd and R. P. Jain, Eighth edition, Pearson Education Publisher.
3. Digital Electronics and Microprocessors – Problems and Solutions, R. P. Jain, 2007, Tata-McGraw Hill.

Note*:* Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting at least **TWO** questions from each part.

AE 105 PRINCIPLES OF ELECTRICAL ENGINEERING

UNIT I

MAGNETIC CIRCUITS **07 hrs**

Introduction, Amperes Law-Magnetic Quantities, Magnetic Circuits, Magnetic Materials and Magnetization Characteristics, Electromagnetic Induction and Force, Inductance: Self and Mutual, Energy Stored In Magnetic Systems, AC Operation of Magnetic Circuits, Hysteresis and Eddy Current Losses.

I (7.1,7.2,7.3,7.4,7.5,7.6,7.7,7.8,7.9)

UNIT II

TRANSFORMERS **08 hrs**

Introduction,Ideal Transformer, Accounting for Finite permeability and Core loss, Circuit model of Transformer, Determination of parameters of Circuit Model of Transformer, Voltage Regulation.

I (8.1,8.2,8.3,8.4,8.6,8.7)

UNIT III

D.C. MACHINES **08 hrs**

Introduction, Construction, EMF Equation, Torque Equation, Circuit Model, Armature Reaction, Commutation, Methods of Excitation, Characteristics of DC Motor and Speed Control of Shunt Motor (Field and Armature Control).

I (10.1,10.2,10.4,10.5,10.6,10.7,10.8,10.9)

UNIT IV

D.C. MACHINES AND SYNCHRONOUS MACHINES **08 hrs**

DC Motor Starting, Efficiency of DC Motors, Application of DC Motors.

Synchronous Machine: Introduction, circuit Model (Equivalent circuit), operating characteristics.

I (10.10,10.11,10.12,11.1,11.2,11.3)

UNIT V

INDUCTION MACHINES **08 hrs**

Introduction, Construction, Circuit Model (Equivalent circuit), Torque-Slip Characteristic, Determination of Circuit Model Parameters, Starting, Induction Generator.

I (12.1,12.2,12.3,12.4,12.5,12.6,12.7)

UNIT VI

INDUCTION MACHINES AND FRACTIONAL kW MOTORS **07 hrs**

Induction Generator, High efficiency induction motors.

Introduction, single phase-induction motors, single phase synchronous motors, AC series motor- Universal Motor

I (12.7,12.8,13.1,13.2,13.3,13.4)

UNIT VII

POWER SYSTEMS **07 hrs**

Introduction, Energy systems, Electrical supply systems, Passive Electric elements, concept of power transmission, system voltage and transmission efficiency, HVDC transmission

I (15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.12)

UNIT VIII

DOMESTIC WIRING AND MEASURING TECHNIQUES OF ELECTRICAL AND ELECTRONICS INSTRUMENTS 07 hrs

Types of wiring, Specification of wires, Earthing, Methods of Earthing, Protective Devices. Classification of instruments, Types of indicating Instruments, Electronic Voltmeter, Electronic Multimeter, Measurement of Electronic Components.

I (16.1,16.2,16.3,16.4,16.5,14.3,14.4,14.7,14.8,14.9)

Text Book:

I. Basic Electrical Engineering, D.P. Kothari and I.J. Nagrath, Tata McGraw-Hill Publishing Company Limited, Third Edition, 4th Reprint 2011.

Reference Books:

1. Electric Machines, I.J. Nagrath and D.P. Kothari, Tata McGraw-Hill Publishing Company Limited.
2. Power System Engineering, I.J. Nagrath and D.P. Kothari, Tata McGraw-Hill Publishing Company Limited.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 106 MATERIALS & PROCESSES

UNIT I

CRYSTAL GEOMETRY, ATOMIC STRUCTURE & BONDING 08 hrs

Geometry of crystals-Space Lattices; Bravais Lattice-SC, BCC & FCC lattices; Crystal Structure, Directions & Planes; Miller Indices; Structure determination by X-ray diffraction; Bragg's law; The Powder Method; Structure Determination; Structure of Atom-Quantum states; Periodic Table; Ionization Potential; Electron Affinity & Electronegativity; Chemical Bonding-Bond energy; Bond Type and Bond Length.

Ionic Bonding-Production of Ions of Opposite Sign-Coulomb Attraction; Short Range Repulsion and Covalent Bonding; Metallic Bonding; Secondary Bonding; Variation in bonding Character and properties.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9)

UNIT II

STRUCTURE OF SOLIDS & CRYSTAL IMPERFECTIONS 08 hrs

Crystalline & Non-crystalline states; Inorganic solids; Covalent solids; Metals and Alloys; Ionic Solids; Structure of Silica & Silicates; Polymers-Classification; Structure of Long Chain Polymers; Crystallinity of Long Chain Polymers; Crystal Imperfections-Point imperfections; Enthalpy; Gibbs Free Energy; Geometry of Dislocation; Other Properties of Dislocation; Surface Imperfections.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 6.1, 6.2, 6.3, 6.4)

UNIT III

DIFFUSION IN SOLIDS & CONDUCTING MATERIALS 08 hrs

Diffusion in Solids-Fick's Law of Diffusion; Solution to Fick's Second Law; Application Fick's Second Law Solution-Experimental Determination of D; Corrosion Resistance of Duralumin; Carburization and Decarburization of Steel; Doping of Semiconductors; Kirkendall Effect; Atomic Model of Diffusion; Other Diffusion Processes; Conductivity of Metals; Introduction; Resistivity and Factors Affecting Resistivity of conducting materials; The Electron Gas Model of Metal; Motion of Electron in Electric Field; Equation of Motion of An Electron; Current Carried by Electron; Mobility; Energy Levels of a Molecule; Fermi Energy; Fermi-Dirac Distribution; Contact Potential; Effect of Temperature on Electrical Conductivity of Metals; Superconductivity; Electrical Conducting Materials-Copper, Aluminium, Tungsten, Carbon and graphite, Iron and Steel, Nickel, Lead and Tin.

I (8.1, 8.2, 8.3, 8.4, 8.5, 8.6)

II (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.6, 3.7, 3.8, 3.9)

UNIT IV

DIELECTRIC MATERIALS IN STATIC & ALTERNATING FIELDS 08 hrs

Dielectric Materials in Static Fields-Effect of a Dielectric on the Behavior of a Capacitor; Polarization; Dielectric Constant of Monatomic Gas; Polarization Mechanisms-Electronic, Ionic and Dipolar Polarization; Internal Fields in Solids and Liquids-Lorentz Field; Clausius-Mosotti Relation; Polarisability Catastrophe. Dielectric Materials in Alternating Fields; Introduction-Frequency Dependence of Electronic Polarizability; Permittivity; Ionic Polarizability; Dielectric Losses and Loss Tangent; Dipolar Relaxation; Frequency and Temperature Dependence of Dielectric Constant of Polar Dieletrics; Dielectric Properties of Polymeric Systems; Ionic Conductivity in Insulators; Insulating Materials; Breakdown in Gaseous; Liquid and Solid Dielectric Materials; Ferro Electricity and Piezoelectricity.

II (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.11.1, 5.12, 5.13)

UNIT V

MAGNETIC MATERIALS 07 hrs

Introduction; Classification of Magnetic Materials; Origin of Permanent Magnetic Dipoles-Diamagnetism; Paramagnetism; Ferromagnetism-Origin and Ferromagnetic Domains; Magnetization and Hysteresis loop; Magnetostriction; Factors Affecting Permeability and Hysteresis Loss; Common Magnetic Materials -Iron and Silicon Iron Alloys; Nickel-Iron Alloys and Permanent Magnet Materials and Design of Permanent Magnets; Anti-Ferromagnetism and Ferrimagnetism; Magnetic Resonance.

II (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16)

UNIT VI

SEMICONDUCTING MATERIALS 07 hrs

Introduction; Energy Bands in Solids; Energy Bands in Conductors, Semiconductors and Insulators; Types of Semiconductors; Intrinsic Semiconductors; Impurity Type Semiconductor; Interaction of Semiconductor

with Time-Dependent Fields; Diffusion and Einstein Relation; Hall-Effect-Hall Voltage, Hall coefficient; Thermal Conductivity of Semiconductors; Electrical Conductivity of Doped Materials; Materials for Fabrication of Semiconductor Devices.

Passive Materials Integral to Device-Metals; Capacitance Materials; Junction Coatings; Device Potting; Packaging; Process Aids; Susceptor Materials; Reactor Envelopes; Plastics and Pump fluids; Solvents and Etchants.

II (7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12, 7.13, 7.13.1)

UNIT VII

SEMI CONDUCTING DEVICES & ELECTRONIC COMPONENT MATERIALS **07 hrs**

Metal-Semiconductor contacts; P-N Junction; Barrier Capacitance; Breakdown Phenomena in Barrier Layer-Zener and Avalanche Breakdown; Junction Diodes-Zener, Varactor and Tunnel Diodes; Junction Transistor; Thermistors and Varistors; Semiconductor Materials-Silicon and Germanium; Silicon-Germanium Mixed Crystals; Silicon Carbide and Intermetallic Compounds; Silicon Controlled Rectifier-Two Transistor and Electromechanical Analogue; Materials for Electronic Components; Resistors-Carbon Composition; Insulated-Moulded; Film type; Cracked Carbon and Alloy Resistors; Metal-Oxide Film; Wire-Wound; High-Value; Non-Linear; Voltage-Sensitive; Non-Symmetrical and Variable Resistors. Capacitors-Paper, Mica, Ceramic, Glass-dielectric, Vitreous-enamel, Plastic, Electrolytic, Air-dielectric and Variable Capacitors; Inductors-Air-cored coils; Laminated-core; Powdered-core and Ferrite-core Inductors; Relays-Reed; Moving Coil; Induction; Thermal Type Relays; Electronic Valves; Function of Relays; Dry-reed; Mercury-wetted and Ferreed Relays.

II (8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 12.2, 12.3, 12.4, 12.5)

UNIT VIII

FABRICATION PROCESSES OF SEMI CONDUCTORS **07 hrs**

Fabrication Technology-Czochralski Method, Grown Junction and Alloyed Junction Processes; Diffused Junction Technique; Epitaxial Diffused Junction Diode; Fabrication of Junction Transistor; Field-Effect Devices; Distinguishing Properties from Bipolar Devices; JFET; Drain and Transfer Characteristics of JFET. Operation as far as pinch-off; operation of JFET with high drain voltages.

II (14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9)

Text Books:

I. Materials Science and Engineering – A First Course by V. Raghavan, Fifth Edition, Thirty-ninth Print, June 2010 Edition, Prentice-Hall Of India Pvt Ltd.
II. Introduction to Electrical Engineering Materials, C.S. Indulkar and S. Thiruvengadam, 6th Edition, Reprint 2012, S. Chand and Company Ltd.

Reference Books:

1. Electronic Engineering Materials and Devices, John Allison, Tata McGraw Hill, New Delhi.
2. Elements of Materials Science and Engineering, Lawrence H. Van Vlack, Pearson Education (6th Edition)

3. A text book of Material Science and Metallurgy, O.P. Khanna, Dhanpat Rai Publications, New Delhi

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 141 ANALOG ELECTRONICS LAB

List of Experiments:

1. **Characteristics of Semiconductor Diode and Zener Diode:** Determination of forward and reverse resistance from VI characteristics.
2. **Static Characteristics of BJT under CE Mode:** Determination of h-parameters h_{ie}, h_{re} from input characteristics and h_{fe} & h_{oe} from output characteristics.
3. **Static Characteristics of JFET:** Determination of r_d from drain characteristics and g_m from mutual characteristics and hence obtain μ.
4. **Characteristics of UJT:** Determination of intrinsic standoff ratio η from emitter characteristics.
5. **Resonant Circuits:** Characteristics of Series and Parallel Circuits, Determination of quality factor and bandwidth.
6. **Bridge Rectifier with and without C-Filter:** Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
7. **Diode Clipping Circuits:** Design and display the transfer characteristics of single ended series, shunt type and double ended shunt type clipping circuits.
8. **RC Coupled Single-stage BJT Amplifier:** Determination of lower and upper cutoff frequencies, mid band voltage gain, gain bandwidth product from the frequency response and Determination of input and output impedances at mid frequency range.
9. **Emitter Follower:** Determination of mid band voltage gain, input and output impedances at mid frequency range.
10. **Class-B Complementary Symmetry Power Amplifier:** Display of input and output waveforms and Determination of the conversion efficiency and optimum load.
11. **BJT Colpitt's Oscillator:** Design and test the performance for a given frequency.
12. **Study of Basic Op-Amp Circuits:** Design and verification of inverting amplifier, non-inverting amplifier, voltage follower, integrator, differentiator and inverting adder circuits.
13. **Op-Amp Schmitt Trigger:** Design, testing, and display of waveforms.
14. **Op-Amp RC Phase-Shift Oscillator:** Design and test the performance for the given frequency.
15. **Op-Amp Wein Bridge Oscillator:** Design and test the performance for the given frequency.
16. **Study of 555 Timer:** Design and test the performance of Monostable multivibrator circuit for a given pulse width.

17. **Study of 555 Timer:** Design and test the performance of Astable multivibrator circuit for a given frequency.
18. **Study of Voltage Regulator:** Design and study of IC7805 voltage regulator, calculation of line and load regulation.

Note: Experiments are to be conducted in the hardware lab as well as using the software **PSPICE 9.1 version** and above downloadable at http://pspice.en.softonic.com

AE 107 ENGINEERING MATHEMATICS – II

UNIT I

COMPLEX ANALYSIS **08 hrs**

Introduction; Function of complex variable w= f (z); Limit of a complex function; continuity of w - f (z); Derivative of f (z); Analytic function; Cauchy Riemann equations (both in Cartesian and polar form); Harmonic functions; Application to flow problems; construction of Analytic functions using Milne Thomson method; Geometric representation of w = f (z); standard transformation; Bilinear transformation; conformal transformation; Special conformal Transformations. Schwarz-Christoffel Transformation.

I (20.1, 20.2(1), 20.2(2), 20.3(1), 20.3(2), 20.4, 20.5(1), 20.6, 20.7, 20.8, 20.9, 20.10, 20.11)

UNIT II

COMPLEX INTEGRATION **07 hrs**

Line integral of w=f(z); Cauchy's theorem; Cauchy's integral formula; Morera's theorem; Series of complex terms; Taylor's and Laurent's series; singularities of analytic function; Types of singularities; Residues, calculation of residues. residue theorem

I (20.12, 20.13, 20.14, 20.15, 20.16, 20.17, 20.18, 20.19)

UNIT III

VECTOR CALCULUS **08 hrs**

Introduction to vectors; Differentiation of vectors; curves in space; velocity and acceleration; scalar and vector point functions; vector operator del; Del applied to scalar point functions; Gradient; Del applied to vector point functions; Divergence and curl; Physical interpretation of Divergence and Curl; Del applied twice to point functions and products of point functions; vector identities.

I (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7(1), 8.7(2), 8.8, 8.9)

UNIT IV

VECTOR INTEGRATION **08 hrs**

Integration of vectors; Line integral; surfaces; surface integral; Green's theorem in a plane (only statement and problems); Stoke's theorem (only statement and problems); volume integral; Gauss divergence theorem (only statement and problem).

I (8.10 to 8.16)

UNIT V

NUMERICAL METHODS **07 hrs**

Finite differences, Forward and Backward differences, Interpolation, Newton-Gregory Forward and Backward Interpolation, Interpolation with unequal intervals, Lagrange's and Newton general Interpolation formula, Inverse Interpolation, Numerical differentiation using Newton-Gregory Forward and Backward Interpolation formula.

Numerical Integration, Newton-cote'squdrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

I

(29.1,29.2,29.6,29.9,29.10.29.11,29.12,29.13,30.1,30.2(1),30.2(2),30.4,30.5,30.6,30.7,30.8)

UNIT VI

PARTIAL DIFFERENTIAL EQUATION **07 hrs**

Introduction; Formulation of partial differential equations; solutions of a partial differential equations; Equations solvable by direct integration; Lagrange's linear partial differential equation of first order; Solutions of non linear partial differential equations by Charpit's method; Solution of homogenous partial differential equation by the method of separation of variables.

I (17.1, 17.2, 17.3, 17.4, 17.5, 17.7, 18.2)

UNIT VII

THEORY OF PROBABILITY **07 hrs**

Introduction; Basic terms and definitions; probability and set notation; theorem of total probability; independent events; theorem of compound probability; conditional probability; Baye's theorem.

I (26.1, 26.2, 26.3, 26.4, 26.5(1), 26.5(2), 26.6)

UNIT VIII

RANDOM VARIABLES **08 hrs**

Random Variable; Discrete and continuous random variables; discrete and continuous probability distribution; probability mass and density function; mean and variance of discrete and continuous probability distribution; theoretical distributions; Binomial distribution; constants of the Binomial distribution; Binomial frequency distribution; Poisson's distribution, constants of the Poisson distribution, Normal distribution.

I (26.7, 26.8(1), 26.9, 26.10, 26.14(1), 26.14(2), 26.14(3), 26.14(4), 26.15(1), 26.15(2), 26.15(3), 26.16)

Text Book:

I. Higher Engineering Mathematics –Dr. B.S.Grewal, 41^{st} Edition 2007, Khanna Publishers, Delhi.

Reference books:

1. Advanced Engineering Mathematics- H.K. Dass- 17^{th} Revised Edition 2007, S.Chand & Company Ltd, New Delhi.
2. A Text book of engineering Mathematics – N.P. Bali and Manish Goyal , 8^{th} Edition 2011, Laxmi Publication(P) Ltd.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 108 MICROPROCESSORS & MICROCONTROLLERS

1.1 UNIT I

INTRODUCTION TO MICROPROCESSORS **08 hrs**

Evolution of Microprocessors, Fundamentals of a Computer, Number Representation – Unsigned binary integers, Signed binary integers; Fundamentals of Microprocessor – description of 8085 pins, Programmer's view of 8085, Registers A, B, C, D, E, H and L

First Assembly Language Program; Instruction set of 8085 – Data transfer group, Arithmetic group, Logical group, NOP and Stack group of instructions

I (1, 2, 3.1, 3.2, 4.2, 4.3, 4.4, 4.5, 5, 6, 7, 8, 9)

1.2 UNIT II

INTRODUCTION TO MICROPROCESSORS (CONTD) **08 hrs**

Instruction set of 8085 continued – Branch group, Chip select logic, Addressing of I/O ports, Architecture of 8085 – Details of 8085 architecture, Instruction cycle, Comparison of different machine cycles

I (10, 11, 12, 13.1, 13.2, 13.3)

1.3 UNIT III

ASSEMBLY LANGUAGE PROGRAMS **07 hrs**

Exchange 10 bytes, Add 2 multibyte numbers, Add 2 multibyte BCD numbers, Block movement without overlap, Monitor routines, Multiply two numbers

Linear search, Find the smallest number, HCF of two numbers, Convert BCD to binary, Convert binary to BCD

I (14.1 to 14.4, 14.6.1, 16.1, 16.2, 16.3, 16.7.1, 16.7.2, 16.8.1, 16.8.2)

1.4 UNIT IV

INTERRUPTS IN 8085 **07 hrs**

Data transfer schemes, 8085 interrupts, EI and DI instructions, INTR and INTA* pins, RST 5.5, RST 6.5, RST 7.5, and TRAP pins, SIM and RIM instructions,

8255 Programmable peripheral interface chip

Description of 8255, Operational modes, Control port of 8255

I (18.1 to 18.7, 18.9, 20.1 to 20.3)

1.5 UNIT V

PROGRAMS USING INTERFACE MODULES **07 hrs**

Logic controller interface, Evaluation of Boolean expression, Decimal counter, Simulation of 4-bit ALU, Interfacing of I/O devices.

Interfacing of 7-segment display, Interfacing simple keyboard, Interfacing a matrix keyboard, Intel 8279 Keyboard and Display controller

I (21.1.1, 21.1.3, 21.1.4, 22.1, 22.3, 22.4, 22.6)

1.6 UNIT VI

1.6.1 INTEL 8259A- PROGRAMMABLE INTERRUPT CONTROLLER 08 hrs

Need for interrupt controller, Overview of 8259, Pins of 8259, Registers of 8259, Programming with no slaves – ICW1, ICW2, ICW3, ICW4, OCW1

Intel 8257 – Programmable DMA controller

Concept of DMA, Need for DMA, Description of 8257, Programming the 8257, Pins of 8257, Working of 8257
I (23.1 to 23.4, 23.5.1 to 23.5.5, 24.1 to 24.6)

1.7 UNIT VII

INTEL 8253 – PROGRAMMABLE INTERVAL TIMER 08 hrs

Need for programmable interval timer, Description of 8253, Programming the 8253, Mode 0, Mode 1, Mode 3 operations
Intel 8251A – Universal synchronous asynchronous receiver transmitter
Need for USART, Asynchronous transmission, Asynchronous reception, Synchronous transmission, Synchronous reception, Pin description of 8251, Programming the 8251
I (25.1 to 25.5, 25.7, 26.1 to 26.7)

1.8 UNIT VIII

8051 MICROCONTROLLER 07 hrs

Main features, Functional blocks, Program memory structure, Data memory structure, Programmer's view, Addressing modes, Instruction set, Programming examples
I (29)

Text Book:

I. The 8085 Microprocessor; Architecture, Programming and Interfacing, K. Udaya Kumar and B. S. Umashankar, Pearson Education, 2008

Reference Books:

1. Microprocessor Architecture, Programming and Applications with the 8085, 5th Edition, R. S. Gaonkar, Penram International Publishing (India), 2011
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2009

Note*:* Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 109 CONTROL ENGINEERING

UNIT I

MODELING OF SYSTEMS 07 hrs

The Control System; Servomechanisms; The Control Problem; Introduction to Mathematical Models; Differential Equations of Physical Systems; Transfer Functions; Illustrative Examples.
I (1.1, 1.2, 1.6, 2.1, 2.2, 2.4, 2.7)

UNIT II

BLOCK DIAGRAMS AND SIGNAL FLOW GRAPHS 07 hrs

Block Diagram Algebra; Signal Flow Graphs; Illustrative Examples.
I (2.5, 2.6, 2.7)

UNIT III

FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS 03 hrs

Feedback and Non-Feedback Systems; Reduction of Parameter Variations by Use of Feedback; Control Over System Dynamics by Use of Feedback; Control of the Effects of Disturbance Signals by Use of Feedback; Illustrative Examples.

I (3.1, 3.2, 3.3, 3.4, 3.7)

CONTROL SYSTEMS AND COMPONENTS 04 hrs

Introduction; Controller Components; Stepper Motors; Hydraulic Systems.

I (4.1, 4.3, 4.4, 4.5)

UNIT IV

TIME RESPONSE ANALYSIS 04 hrs

Introduction; Standard Test Signals; Time Response of First and Second-Order Systems; Steady-State Errors and Error Constants; Effect of Adding a Zero to a System; Design Specifications of Second-Order Systems; Illustrative Examples; State Variable Analysis-Laplace Transform Technique.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.10, 5.12)

CONCEPTS OF STABILITY 04 hrs

Concept of Stability; Necessary Conditions for stability; Hurwitz Stability Criteria; Routh Stability Criteria; Relative Stability Analysis; Stability of Systems Modeled in State Variable Form.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.7)

UNIT V

ROOT LOCUS TECHNIQUE 07 hrs

Introduction; Root Locus Concepts; Construction of ROOT LOCI; Sensitivity of Roots of Characteristic Equation.

I (7.1, 7.2, 7.3, 7.6)

UNIT VI

FREQUENCY DOMAIN ANALYSIS 08 hrs

Introduction; Correlation Between Time and Frequency Response; Polar Plots; Bode Plots; All-Pass And Minimum-Phase Systems; Experimental Determination of Transfer Functions; Mathematical Preliminaries; Nyquist Stability Criterion; Assessment of Relative Stability; Closed Loop Frequency Response; Sensitivity Analysis in Frequency Domain.

I (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6)

UNIT VII

COMPENSATION 08 hrs

The Design Problem; Preliminary Considerations of Classical Design; Realization Of Basic Compensators; Cascade Compensation in Time and Frequency Domains; Tuning of PID Controllers; Feedback Compensation.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

UNIT VIII

STATE VARIABLE ANALYSIS 08 hrs

Introduction; Concepts of State, State Variables and State Model; State Models for Linear Continuous-Time Systems; Diagonalization; Solution of State Equations; Concepts of Controllability and Observability; Pole Placement by

State Feedback; Liapunov's Stability Criterion; Direct Method of Liapunov and Linear Systems.

I (12.1, 12.2, 12.3, 12.5, 12.6, 12.7, 12.8, 13.1, 13.2, 13.3)

Text Book:

I. Control Systems Engineering, Fifth Edition, Reprint 2011, I.J. Nagrath and M. Gopal, New Age International Pvt. Ltd.

Reference Books:

1. Modern Control Engineering, D. Roy Choudhury, Prentice Hall India Pvt Ltd (2006)
2. Modern Control Engineering, K. Ogata, Pearson Education/Prentice-Hall of India Pvt. Ltd.
3. Schaum's Outline of Theory and Problems of Feedback and Control Systems, Second Edition (2007), J. J. DiStefano, III, A.R. Stubberud and I. J. Williams, Tata McGraw-Hill Publishing Company Ltd.
4. Modern Control Systems, Tenth Edition (2007), Richard. C. Dorf and Robert. H. Bishop, Pearson Education.
5. Automatic Control Systems, B.C. Kuo, Prentice-Hall of India Pvt. Ltd.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 110 CIRCUIT THEORY AND DESIGN

UNIT I

CONVENTIONS FOR DESCRIBING NETWORKS **02 hrs**

Reference Directions for Current and Voltage; Active Element Conventions; Topological Description of Networks.

I (2.1, 2.2, 2.4)

1.9 NETWORK EQUATIONS **05 hrs**

Kirchhoff's Laws; Source Transformations; Formulation of Network Equations; Loop and Node Variable Analysis; Duality.

I (3.1, 3.3, 3.4, 3.5, 3.6, 3.8)

UNIT II

INITIAL CONDITIONS IN NETWORKS **02 hrs**

Initial Conditions in Elements; Geometrical Interpretation of Derivatives; Procedure for Evaluating Initial conditions.

I (5.1, 5.2, 5.3, 5.4)

DIFFERENTIAL EQUATIONS **03 hrs**

Networks Excited by External Energy Sources; Response as related to the s-plane Location of Roots; General Solutions in terms of s, Q and ω_n.

I (6.3, 6.4, 6.5)

SIGNALS, AMPLITUDE, PHASE & DELAY **03 hrs**

General Description of Signals; Amplitude and Phase Response; Single-Tuned Circuits; Double-Tuned Circuits; On Poles and Zeros and Time Delay.

1.10 II (2.2, 8.1, 8.3, 8.4, 8.5)

1.10.1 UNIT III

THE LAPLACE TRANSFORMATION **04 hrs**

The Laplace Transformation; Some Basic Theorems; Examples of the Solution of Problems with the Laplace Transformation; Partial Fraction Expansion; Heaviside's Expansion Theorem; Examples of Solution by the Laplace Transformation.

I (7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7)

TRANSFORMS OF OTHER SIGNAL WAVEFORMS **04 hrs**

The Shifted Unit step function; The Ramp and Impulse Functions; Waveform Synthesis; The Initial and Final values of f (t) from F (s); the Convolution Integral.

I (8.1, 8.2, 8.3, 8.4, 8.5)

UNIT IV

1.11 IMPENDANCE FUNCTIONS AND NETWORK THEOREMS **07 hrs**

The Concept of Complex Frequency; Transform Impedance and Transform Circuits; Series and Parallel Combinations of Elements; Superposition and Reciprocity; Thevenin and Norton Theorems.

I (9.1, 9.2, 9.3, 9.4, 9.5)

UNIT V

NETWORK FUNCTIONS; POLES AND ZEROS **05 hrs**

Terminal Pairs or Ports; Network Functions for the One-Port and Two-Port; The Calculation of Network Functions; Poles and Zeros of Network Functions; Restrictions on Pole and Zero Locations for driving point and Transfer Functions; Time-Domain Behavior from the Pole and Zero Plot

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

ELEMENTS OF REALISABILITY THEORY **03 hrs**

Causality and Stability; Hurwitz Polynomials; Positive Real Functions; Elementary Synthesis Procedures.

II (10.1, 10.2, 10.3, 10.4)

1.11.1 UNIT VI

1.12 TWO-PORT PARAMETERS **07 hrs**

Relationship of Two-Port Variables; Short-Circuit Admittance, Open-Circuit Impedance, Transmission and Hybrid Parameters; Relationships between Parameter sets; Parallel Connection of Two-Port Networks.

I (11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7)

1.13 UNIT VII

SYNTHESIS OF ONE-PORT NETWORKS **07 hrs**

Properties of L-C Immittance Functions; R-C Driving-Point Impedances; R-L Impedances and R-C Admittances; Synthesis of: L-C Driving-Point Immittances, R-C Impedances, R-L Admittances, R-L-C Functions.

II (11.1. to 11.6)

1.13.1 UNIT VIII

1.14 ELEMENTS OF TRANSFER FUNCTION SYNTHESIS **04 hrs**

Properties of Transfer Functions; Zeros of Transmission; Synthesis of Y21 and Z21 with a 1-Ω Termination; Synthesis of Constant-Resistance Networks;

II (12.1, 12.2, 12.3, 12.4)

TOPICS IN FILTER DESIGN **04 hrs**

The Approximation Problem in Network Theory; Maximally Flat and other Low-Pass Filter Approximations; Synthesis of Low-Pass Filters; Magnitude and Frequency Normalisation; Frequency Transformations.

II (13.2, 13.3, 13.4, 13.8, 13.9, 13.10)

1.14.1.1 Text Books:

I. Network Analysis, M.E.Van Valkenberg, 3rd Edition, Prentice-Hall India, EEE 2011.
II. Network Analysis and Synthesis, Franklin F Kuo, 2nd Edition, Wiley India Student Edition, Reprint 2010.

Reference Book:

1. Circuits: Engineering Concepts and Analysis of Linear Electric Circuits, A. Bruce Carlson, Thomson Brooks / Cole, 2006.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 111 INSTRUMENTATION AND MEASUREMENTS

UNIT I

MEASUREMENT FUNDAMENTALS **08 hrs**

Significance of measurements; Methods of measurements; Instruments and measurement systems; mechanical, electrical and electronic instruments; classification of instruments.

Characteristics of Instruments; Static characteristics; Errors in Measurement; True value; Static Error; Static Correction; Scale Range and Scale Span; Error calibration; Accuracy and precision; Indication of Precision; Significant of figures; Linearity; Hysteresis; Threshold; Dead Time and Dead Zone; Resolution.

Limiting Errors; Relative Limiting Error; Combination of Quantities with Limiting Errors; Known and types of Errors; Gross errors; Systematic errors; Random errors.

Dynamic Characteristics of Instrument and measurement systems - Dynamic response; Dynamic Analysis; Time domain response; Response of a First and Second Order System to a Unit Step Input; Frequency responses of I and II order systems, correlation ship between time & frequency response of II order systems.

I (1.2 to 1.6, 2.3 to 2.9, 2.13 to 2.15, 2.18 to 2.23, 3.1 to 3.8, 4.1, 4.2, 4.17, 4.22, 4.26, 4.31, 4.32,4.34)

UNIT II

MEASUREMENT OF RESISTANCE, INDUCTANCE AND CAPACITANCE **08 hrs**

Measurement Resistance - Classification of resistances, Measurement of Medium resistances - Wheatstone ’s bridge; Sensitivity and Limitations of Wheatstone’s Bridge, precision measurement of medium resistance ,, limitations

of wheat stone bridge; Measurement of Low resistance - Kelvin double bridge; Measurement of High resistance – Difficulties; Earth resistance measurement using Megger.

Measurement of Inductance – sources & detectors ,General form of an AC Bridge; Measurement of self Inductance using Anderson Bridge; Measurement of Capacitance using Schering bridge; High Voltage Schering bridge; Sources of Errors in bridge circuits; Precautions and techniques used for reducing errors.

I (14.1, 14.2, 14.2.3, 14.2.4, 14.2.5,14.2.8, 14.3,14.3.2, 14.4, 14.4.1, 14.5,14.5.1 16.4, 16.5.4, 16.6.2, 16.6.3, 16.10, 16.10.1)

UNIT III

INSTRUMENTS TO MEASURE CURRENT AND VOLTAGES 07 hrs

Measurement of current by DC Ammeter; Multi range Ammeters; RF Ammeters; Limitations of Thermocouple; Effect of Frequency on Calibration; Measurement of very large currents by Thermocouple.

Measurement of voltage by DC Voltmeter; DC Voltmeter; Multi range AC voltmeter; Solid state Voltmeter; AC Voltmeter using Rectifier, Half-wave and Full Wave Rectifier;

Average and Peak responding voltmeter; True RMS voltmeter, Multimeter, Digital Multimeters.

II (3.1, 3.2, 3.6, 3.7, 3.8, 3.9, 4.2, 4.3, 4.4, 4.9, 4.12 to 4.14, 4.16 to 4.18, 4.25, 6.2)

UNIT IV

DIGITAL MEASURING INSTRUMENTS 07 hrs

Digital voltmeter – Dual slope Integrating type DVM; Integrated type DVM; Successive approximation DVM, Continuous balanced DVM; 3½ Digit; General specification of DVM.

Digital meter for measuring frequency and time; Counter – Universal, Decade, Electronics; Digital Tachometer; Digital pH meter; Digital Phase meter; Digital Capacitance meter.

Other measuring Instruments - Output power meter; Field strength meter; Phase meter; Q-Meter

II (5.3, 5.4, 5.5, 5.7, 5.8, 5.10, 6.3 to 6.10, 6.12, 6.13, 10.2, 10.3, 10.5, 10.7)

UNIT V

SIGNAL GENERATORS AND OSCILLOSCOPE 08 hrs

Introduction; Basic Standard Signal Generator; Standard Signal Generator; Modern Laboratory signal Generator; AF Sine and Square wave generator; Function generator; Square and pulse generator; Standard specifications of a signal generator.

Oscilloscope – Basic Principle; CRT Features; Block diagram; Simple CRO; Vertical Amplifier;Horizontal Deflecting system; Triggered CRO; Triggered Pulse Circuits; Delay Line in Triggered Sweep; Storage and Sampling Oscilloscope,. Use of Lissajous figures for phase measurement

II (8.1, 8.4 to 8.9, 8.20, 7.1 to 7.10, 7.17, 7.18, 7.20)

UNIT VI

SIGNAL ANALYSIS INSTRUMENTS AND R.F POWER MEASUREMENT TECHNIQUES 08 hrs

Wave Analyzers – Basic, Frequency Selective, Heterodyne Wave Analyzer, Harmonic Distortion and Spectrum Analyzer.

Bolometer method of power measurement; Bolometer Element and Mount; Measurement of Power by means of Bolometer Bridge; Unbalanced and Self Balancing Bolometer Bridge; Measurement of large amount of RF power; SWR measurement.

II (9.2, 9.3, 9.4, 9.5, 9.6, 20.4 to 20.10, 20.12)

UNIT VII

RECORDERS **07 hrs**

Objective and Requirement of Recording Data; Recorder Selection for Particular applications; Recorders – Strip chart, Galvanometer type, Null type, circular chart type, X-Y, Magnetic, Potentiometric type; Digital Data Recording; Recorder Specifications.

II (12.1 to 12.7, 12.9 to 12.13)

UNIT VIII

TRANSDUCERS AND DATA ACQUISITION SYSTEM **07 hrs**

Electrical transducer; Selecting a Transducer; Resistive transducer; Resistive Position Transducer; Strain gauges; Resistance Thermometer; Thermistor; Inductive transducer, Differential output transducers; LVDT; Pressure Inductive; Capacitive Transducers; Load Cell, piezo electrical transducer; Temperature transducers, Flow measurement transducer; Mechanical Flowmeter.

Data Acquisition System – Objective of Data Acquisition System, Signal Conditioning of the inputs; Single and Multi Channel Data Acquisition System; Computer based DAS; A to D and D to A converters.

II (13.2 to 13.15, 13.20, 13.23 to 13.24, 17.1 to 17.7)

Text Books:

I. A Course in Electrical and Electronic Measurements and Instrumentation, A.K Sawhney, Dhanpat Rai & Co,New Delhi, 19th Revised Edition 2011(Reprint 2012).
II. Electronic Instrumentation, H.S Kalsi, Tata McGraw Hill, 3rd Edition (fourth reprint 2012).

Reference Books:

1. Electronic Instrumentation and Measurement Techniques, W.D. Cooper and A.D Helfrick, Prentice Hall of India Pvt. Ltd., New Delhi
2. Electronic Instrumentation and Measurements, David A. Bell, Second Edition, PHI, 2007.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 112 SIGNALS AND SYSTEMS

UNIT I

SIGNALS AND SYSTEMS **03 hrs**

Continuous and Discrete-Time Signals; Transformations of the Independent Variable; Exponential and Sinusoidal Signals; Unit Impulse and Unit Step Functions; Continuous and Discrete -Time Systems; Basic System Properties.

I (1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

LINEAR-TIME INVARIANT SYSTEMS 04 hrs

Discrete-Time LTI Systems: The Convolution Sum; Continuous-Time LTI Systems: The Convolution Integral; Properties of Linear Time-Invariant Systems; Causal LTI Systems Described by Differential and Difference Equations.

I (2.0, 2.1, 2.2, 2.3, 2.4)

UNIT II

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS 07 hrs

Response of LTI Systems to Complex Exponentials; Fourier Series Representation of Continuous-Time Periodic Signals; Convergence of the Fourier Series; Properties of Continuous-Time Fourier Series; Fourier Series Representation of Discrete-Time Periodic Signals; Properties of Discrete-Time Fourier Series;

I (3.0, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

UNIT III

THE CONTINUOUS-TIME FOURIER TRANSFORM 07 hrs

Representation of Aperiodic Signals; The Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform; The Convolution and Multiplication Properties; Fourier Transform Properties and Fourier Transform Pairs

I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6)

UNIT IV

THE DISCRETE-TIME FOURIER TRANSFORM 08 hrs

Representation of Aperiodic Signals: The Discrete-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Discrete-Time Fourier Transform; The Convolution and Multiplication Properties; Fourier Transform Properties and Fourier Transform Pairs; Duality.

I (5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7)

UNIT V

TIME AND FREQUENCY CHARACTERIZATION OF SIGNALS AND SYSTEMS 04 hrs

The Magnitude-Phase Representation of The Fourier Transform; The Magnitude-Phase Representation of The Frequency Response of LTI Systems; Time-Domain Properties of Ideal Frequency-Selective Filters; Time-Domain and Frequency-Domain Aspects of Non Ideal Filters.

I (6.0, 6.1, 6.2, 6.3, 6.4)

SAMPLING 04 hrs

Representation of a Continuous-Time Signal by its Samples; The Sampling Theorem; Reconstruction of a Signal From its Samples Using Interpolation; The Effect of Under Sampling; Aliasing; Discrete-Time Processing of Continuous-Time Signals; Sampling of Discrete-Time Signals.

I (7.0, 7.1, 7.2, 7.3, 7.4, 7.5)

UNIT VI

THE LAPLACE TRANSFORMS 08 hrs

The Laplace transform; The Region of Convergence for Laplace Transforms; The Inverse Laplace Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of the Laplace Transform; Laplace Transform

Pairs; Analysis and Characterization of LTI Systems Using the Laplace Transform.

I (9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7)

UNIT VII

THE Z-TRANSFORM 08 hrs

The Z-Transform; The Region of Convergence for the Z-Transform; The Inverse Z-Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of the Z-Transform; Z-Transform Pairs; Analysis and Characterization of LTI Systems using Z-Transforms.

I (10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

UNIT VIII

RANDOM PROCESSES 07 hrs

Introduction; Mathematical Definition of a Random Process; Stationary Processes; Mean, Correlation and Covariance Functions; Ergodic Processes; Transmission of a Random Process Through a Linear Time-Invariant Filter; Power Spectral Density; Gaussian Process; Noise; Narrowband Noise; Summary and Discussion.

II (1.1 to 1.10, 1.15)

Text Books:

I. Signals and Systems, A.V. Oppenheim and A.S. Willsky with S. H. Nawab, Second Edition, PHI Private limited, 2006.
II. Communication Systems, Simon Haykin, 4th Edition, Wiley Student Edition, 7th Reprint 2007.

Reference Books:

1. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
2. Schaum's Outline of Theory and Problems of Signals and Systems, McGraw-Hill Publishing Company Ltd.
3. Signals and Systems, M.J. Roberts, Tata McGraw-Hill Publishing Co. Ltd.
4. Probabilistic Methods of Signal and System Analysis, Third Edition, G.R. Cooper and C.D. McGillem, Oxford University Press.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 142 DIGITAL ELECTRONICS LAB

List of Experiments

1. **Study of Logic Gates:** Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. **Implement Circuits** using basic gates for the given **Boolean expression.**
3. **Half Adder / Full Adder:** Realization using basic and XOR gates.
4. **Half Subtractor / Full Subtractor:** Realization using NAND gates.

5. **Parallel Adder / Subtractor:** Perform adder and subtractor operation using IC7483 chip.
6. **Perform BCD addition using TWO four Bit parallel adder 7483 IC** and also implement BCD correction.
7. **4-Bit Binary-to-Gray & Gray-to-Binary Code Converter:** Realization using XOR gates.
8. **4-Bit and 8-Bit Comparator:** Implementation using IC7485 magnitude comparator chips.
9. **Multiplexer:** Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
10. **Demultiplexer:** Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
11. **LED Display:** Use of BCD to 7 Segment decoder / driver chip to drive LED display.
12. **Flip Flops:** Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
13. **Asynchronous Counter:** Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
14. **Synchronous Counter:** Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
15. **Shift Register:** Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
16. **Ring counter and Twisted Ring Counter**: Realization using IC7495 chip.
17. **RAM:** Study of RAM (2K x 8 RAM) operation.
18. **DAC Operation:** Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.

Note:

- All the experiments can be performed using IC Trainer Kits.
- Experiments are to be conducted in the hardware lab as well as using the software **PSPICE 9.1 version** and above downloadable at http://pspice.en.softonic.com

AE 113 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

PART A: OPERATIONS RESEARCH

UNIT I

WHAT IS OPERATIONS RESEARCH? 02 hrs

Operations Research Models; Solving the OR Model; Queuing and Simulation Models; Art of Modeling; More Than Just Mathematics; Phases of an OR.

I (1.1 to 1.6)

MODELING WITH LINEAR PROGRAMMING 05 hrs

Two-Variable LP Model; Graphical LP Solution; Selected LP Applications.

I (2.1 to 2.3)

UNIT II

THE SIMPLEX METHOD AND SENSITIVITY ANALYSIS 05 hrs

LP Model in Equation Form; The Simplex Method; Artificial Starting Solution; Special Cases in Simplex Method.

I (3.1, 3.3, 3.4, 3.5, 3.5.1, 3.5.2, 3.5.3, 3.5.4)

DUALITY AND POST-OPTIMAL ANALYSIS **03 hrs**

Definition of the Dual Problem; Simplex Tableau Computations.

I (4.1, 4.2.4)

UNIT III

TRANSPORTATION MODEL AND ITS VARIANTS **07 hrs**

Definition of the Transportation Model; Nontraditional Transportation Models; The Transportation Algorithm; The Assignment Model.

I (5.1, 5.2, 5.3, 5.4)

UNIT IV

NETWORK MODELS **08hrs**

Scope and Definition of Network Models; Shortest-Route Problem; CPM and PERT.

I (6.1, 6.3, 6.5)

UNIT V

DECISION ANALYSIS AND GAMES **03 hrs**

Game Theory - Optimal Solution of Two-Person Zero-Sum Games; Solution of Mixed Strategy Games.

I (13.4, 13.4.1, 13.4.2)

QUEUING SYSTEMS **05 hrs**

Why Study Queues?; Elements of a Queuing Model; Role of Exponential Distribution; Pure Birth and Death Models; Generalized Poisson Queuing Model; Specialized Poisson Queues.

I (15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.6.1, 15.6.2, 15.6.3)

PART B: ENGINEERING MANAGEMENT

UNIT VI

INTRODUCTION TO ENGINEERING MANAGEMENT

Engineering and Management **03 hrs**

Preview, Engineering; Management; Engineering Management-A Synthesis;

2 **HISTORICAL DEVELOPMENT OF ENGINEERING MANAGEMENT** **04 hrs**

Preview, Origins; The Industrial Revolution; Management Philosophies; Scientific Management; Administrative Management; Behavioral Management; Current Contributions.

II (Chapters 1 and 2)

UNIT VII

FUNCTIONS OF TECHNOLOGY MANAGEMENT PLANNING AND FORECASTING **03 hrs**

Preview; Nature of Planning; Foundations for Planning; Some Planning Concepts; Forecasting; Strategies for Managing Technology.

3 **DECISION MAKING** **03 hrs**

Preview; Nature of Decision Making; Management Science; Tools for Decision Making; Computer based Information Systems; Implementation.

4 **ORGANIZING** **02 hrs**

Preview; Nature of Organizing; Traditional Organization Theory; Technology and Modern Organization Structures; Teams.

II (Chapters 3, 4 and 5)

UNIT VIII

SOME HUMAN ASPECTS OF ORGANIZING **03 hrs**

Preview; Staffing Technical Organizations; Authority and Power; Delegations; Committees and Meetings.

5 **LEADING TECHNICAL PEOPLE** **02 hrs**

Preview; Leadership; Motivation; Motivating and Leading Technical Professionals.

6 **CONTROLLING** **02 hrs**

Preview; The Process of Control; Financial Controls.

II (Chapters 6, 7 and 8)

Text Books:

I. Operations Research, An Introduction, Hamdy A. Taha, Eighth Edition, PHI, Third Impression 2012.
II. Managing Engineering & Technology, Lucy C. Morse and Daniel L. Babcock, Pearson Education, Fourth Edition, First Impression 2008.

Reference Books:

1. Introduction to Operation Research, Hiller and Liberman, McGraw Hill Publications.
2. Operations Research, S.D. Sharma, Kedarnath, Ramnath & Co
3. Engineering Management, Fraidoon Mazda, Low Price Indian Edition, Addison-Wesley.
4. Management – A Competency Based Approach, Helriegel / Jackson / Slocum, Thomson South Western.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting **THREE** questions from Part A and **TWO** from Part B.

AE 114 ELECTROMAGNETICS AND RADIATION SYSTEMS

UNIT I

COULOMB'S LAW AND ELECTRIC FIELD INTENSITY **04 hrs**

The Experimental law of Coulomb; Electric Field Intensity; Field Due to a Continuous Volume Charge Distribution; Field of a Line Charge; Field of a Sheet of Charge.

I (2.1 to 2.5)

ELECTRIC FLUX DENSITY, GAUSS'S LAW AND DIVERGENCE **04 hrs**

Electric Flux Density; Gauss's Law; Divergence; Maxwell's First Equation (Electrostatics); The Vector Operator and the Divergence Theorem.

I (3.1, 3.2, 3.5, 3.6, 3.7)

UNIT II

ENERGY AND POTENTIAL **04 hrs**

Energy Expended in Moving a Point Charge in an Electric Field; The Line Integral; Definition of Potential Difference and Potential; The Potential Field of a

Point Charge; The Potential Field of a System of Charges: Conservative Property; Potential Gradient; Energy Density in the Electrostatic Field.
I (4.1 to 4.6, 4.8)

CURRENT AND CONDUCTORS, DIELECTRICS AND CAPACITANCE 04 hrs

Current and Current Density; Continuity of Current; Metallic Conductors; Conductor Properties and Boundary Conditions.
Boundary Conditions for Perfect Dielectric Materials; Capacitance; Examples.
I (5.1 to 5.4, 6.2 to 6.4)

UNIT III

POISSON'S AND LAPLACE'S EQUATIONS 07 hrs

Derivation of Poisson's and Laplace's Equations; Uniqueness Theorem; Examples of the Solution of Laplace's Equation; Example of Solution of Poisson's Equation;
I (7.1 to 7.4)

UNIT IV

THE STEADY MAGNETIC FIELD 07 hrs

Biot-Savart Law; Ampere's Circuital Law; Curl; Stoke's Theorem; Magnetic Flux and Magnetic Flux Density; The Scalar and Vector Magnetic Potentials.
I (8.1 to 8.6)

UNIT V

MAGNETIC FORCES, MATERIALS AND INDUCTANCE 08 hrs

Force on a Moving Charge; Force on a Differential Current Element; Force Between Differential Current Elements; Force and Torque on a Closed Circuit; Magnetization and Permeability; Magnetic Boundary Conditions; The Magnetic Circuit; Potential Energy and Forces on Magnetic Materials; Inductance and Mutual Inductance.
I (9.1 to 9.4, 9.6 to 9.10)

UNIT VI

TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS 07 hrs

Faraday's Law; Displacement Current; Maxwell's Equations in Point Form; Maxwell's Equations in Integral Form; The Retarded Potentials.
I (10.1 to 10.5)

UNIT VII

RADIATION AND PROPAGATION OF WAVES 03 hrs

Electromagnetic Radiation; Propagation of Waves.
II (8.1, 8.2)

ANTENNAS 04 hrs

Basic Considerations; Wire Radiators in Space.
II (9.1, 9.2)

UNIT VIII

ANTENNAS (CONTINUED) 08 hrs

Terms and Definitions; Effects of Ground on Antennas; Antenna Coupling at Medium Frequencies; Directional High-Frequency Antennas; UHF and Microwave Antennas; Wideband and Special-Purpose Antennas.
II (9.3, 9.4, 9.5, 9.6, 9.7, 9.8)

Text Books:

I. Engineering Electromagnetics, W. H. Hayt and J. A. Buck, Seventh Edition, Tata McGraw Hill, 7th Edition, 2012.
II. Electronic Communication Systems, George Kennedy and Bernard Davis, Fourth Edition, Thirty-fifth Reprint (2008), Tata McGraw Hill Publishing Company Ltd.

Reference Book:

1. Elements of Engineering Electromagnetics, Nannapaneni Narayana Rao, 6th Edition, Pearson Education Low Price Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 115 TELECOMMUNICATION SWITCHING SYSTEMS

UNIT I

SWITCHING SYSTEMS **08 hrs**

Evolution of Telecommunications; Network Structures; Network Services; Terminology; Regulation; Standards; The ISO Reference Model for Open Systems Interconnections; Basics of a Switching System; Functions of a Switching System; Message Switching; Circuit Switching; Crossbar Switching-Principle of crossbar switching, crossbar switch configurations, Crosspoint technology, Crossbar Exchange Organization; A General Trunking; Electronic Switching; Reed Electronic Systems; Digital Switching Systems.

I (1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 3.2, 3.3, 3.5, 3.10, 3.11, 3.12, 3.13); II (1.1, 1.3, 3.3, 3.4, 3.5, 3.6)

UNIT II

TELECOMMUNICATIONS TRAFFIC **08 hrs**

Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems – Theory, Traffic Performance, Loss Systems in Tandem, Use of Traffic Tables; Queuing Systems – The Second Erlang Distribution, Probability of Delay, Finite Queue Capacity, Some other useful results, Systems with a Single Server, Queues in Tandem, Delay Tables, Applications of Delay Formulae.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)

UNIT III

SWITCHING NETWORKS **08 hrs**

Introduction; Single Stage Networks; Gradings-Principle, Design of Progressive Gradings, Other forms of Grading, Traffic Capacity of Gradings, Application of Gradings; Link Systems-General, Two Stage Networks, Three Stage Networks, Four Stage Networks, Discussion; Grades of Service of Link Systems; Application of Graph Theory to Link Systems; Strict Sense Non-Blocking Networks.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.10)

UNIT IV

TIME DIVISION SWITCHING **07 hrs**

Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching; Grades of Service of Time Division Switching Networks; Synchronization.

II (6.1, 6.2, 6.3, 6.4, 6.5, 6.6); I (6.4, 6.6)

UNIT V

CONTROL OF SWITCHING SYSTEMS **07 hrs**

Introduction; Call Processing Functions:-Sequence of operations, Signal Exchanges; State Transition Diagrams; Common Control; Reliability, Availability and Security; Stored Program Control; Centralized SPC, Distributed SPC.

I (7.1, 7.2, 7.3, 7.4, 7.5); II (4.1, 4.2, 4.3)

UNIT VI

SIGNALLING **08 hrs**

Introduction; Customer Line Signalling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems – Outband Signalling, Inband (VF) Signalling; PCM Signalling; Inter Register Signalling; Common Channel Signalling Principles – General, Signalling Networks; CCITT Signalling System Number 6; CCITT Signalling System Number 7; The High Level Data Link Control Protocol, Signal Units, The Signalling Information Field; Digital Customer Line Signalling.

I (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10)

UNIT VII

PACKET SWITCHING **07 hrs**

Introduction; Statistical Multiplexing; Local Area and Wide Area Networks – Bus Networks, Ring Networks, Comparison of Bus and Ring Networks, Optical Fiber Networks; Large Scale Networks – General, Datagrams and Virtual Circuits, Routing, Flow Control, Standards, Frame Relay; Broadband Networks – General, The Asynchronous Transfer Mode, ATM Switches.

I (9.1, 9.2, 9.3, 9.4, 9.5)

UNIT VIII

NETWORKS **07 hrs**

Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks; Private Networks; Numbering – National Schemes, International Numbering, Numbering Plans for the ISDN, Public Data Networks; Charging; Routing – General, Automatic Alternative Routing.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10)

Text Books:

I. Telecommunications Switching, Traffic and Networks, J.E.Flood, Pearson Education, Fourth Impression-2008.
II. Telecommunication Switching Systems and Networks, Thiagarajan Viswanathan, Prentice Hall of India Pvt. Ltd, Thirty-fifth Printing, August 2011.

Reference Book:

1. Digital Telephony, John C Bellamy, John Wiley (International Student Edition).

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 116 ANALOG COMMUNICATIONS

UNIT I

INTRODUCTION TO COMMUNICATION SYSTEMS **03 hrs**

Communications; Communication Systems; Modulation; Bandwidth Requirements.

I (1.1, 1.2, 1.3, 1.4)

NOISE

04 hrs External Noise; Internal Noise; Noise Calculations; Noise Figure; Noise Temperature.

I (2.1, 2.2, 2.3, 2.4, 2.5)

UNIT II

AMPLITUDE MODULATION **04 hrs**

Amplitude Modulation Theory; Generation of AM.

I (3.1, 3.2)

SINGLE-SIDEBAND TECHNIQUES **04 hrs**

Evolution and Description of SSB; Suppression of Carrier; Suppression of Unwanted Sideband; Extensions of SSB.

I (4.1, 4.2, 4.3, 4.4)

UNIT III

FREQUENCY MODULATION **08hrs**

Theory of Frequency and Phase Modulation; Noise and Frequency Modulation; Generation of Frequency Modulation.

I (5.1, 5.2, 5.3)

UNIT IV

RADIO RECEIVERS **08 hrs**

Receiver Types; AM Receivers; FM Receivers; Single and Independent Sideband Receivers.

I (6.1, 6.2, 6.4, 6.5)

UNIT V

TRANSMISSION LINES **07 hrs**

Basic principles; The Smith Chart and its Applications; Transmission-line components.

I (7.1, 7.2, 7.3)

UNIT VI

WAVEGUIDES, RESONATORS AND COMPONENTS **08 hrs**

Rectangular Waveguides; Circular and Other Waveguides; Waveguide Coupling, Matching and Attenuation; Cavity resonators; Auxiliary components.

I (10.1, 10.2, 10.3, 10.4, 10.5)

UNIT VII

PULSE COMMUNICATIONS **07 hrs**

Information Theory; Pulse Modulation; Pulse Systems.

I (13.1, 13.2, 13.3)

UNIT VIII

BROADBAND AND COMMUNICATIONS SYSTEMS **07hrs**

Multiplexing; Short and Medium-Haul Systems; Long-Haul Systems; Elements of Long-Distance Telephony.

I (15.1, 15.2, 15.3, 15.4)

Text Book:

I. Electronic Communication Systems, George Kennedy and Bernard Davis, Fourth Edition, Tata McGraw Hill Publishing Company Ltd.

Reference Books:

1. Communication Systems, 4rd Edition, Simon Haykin, John Wiley & Sons.
2. Telecommunications Principles Circuits Systems and Experiments, S. Ramabhadran, Khanna Publishers, Sixth Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 117 EMBEDDED SYSTEMS DESIGN

UNIT I

INTRODUCTION TO EMBEDDED SYSTEMS **04 hrs**

Embedded Systems Overview; Design Challenge-Optimizing Design Metrics: Common Design Metrics, The time to Market Design Metric, The NRE and Unit Cost Design Metrics, The performance Design Metric; Processor Technology: GPPs, SPPs, ASIPs; IC Technology: Full Custom, Semicustom, PLD; Design Technology: Compilation, Libraries, Test, ; Trade-Offs: Design Productivity Gap.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

CUSTOM SINGLE PURPOSE PROCESSORS: HARDWARE **04 hrs**

Introduction; Combinational Logic: Transistors and Logic Gates, Basic Combinational Logic Design, RT Level Combinational Components; Sequential Logic: Flip-Flops, RT Level Sequential Components, Sequential Logic design; Custom Single Purpose Processor Design; RT-Level Custom Single Purpose Processor Design; Optimizing Custom Single Purpose Processors: Optimizing the Original Program, FSMD, Datapath, FSM.

I (2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

UNIT II

GENERAL PURPOSE PROCESSORS: SOFTWARE **07 hrs**

Introduction; Basic Architecture: Datapath, Control Unit, Memory; Operation: Instruction Execution, Pipelining, Superscalar and VLIW Architectures; Programmer's View; Development Environment: Design Flow and Tools, Example (ISS for a simple processor), Testing and Debugging; ASIPs:

Microcontrollers, DSPs; Selecting a Microprocessor; General Purpose Processor Design

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8)

UNIT III

STANDARD SINGLE-PURPOSE PROCESSORS: PERIPHERALS 07 hrs

Introduction; Timers, Counters and Watchdog Timers: Examples of Reaction Timer and ATM Timeout Using a WDT; UART; Pulse Width Modulators: Overview, Controlling a DC Motor Using a PWM; LCD Controllers; Keypad Controllers; Stepper Motor Controllers: Overview, Examples; Analog to Digital Converters: Successive Approximation; Real Time Clocks.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9)

UNIT IV

MEMORY 07 hrs

Introduction; Memory Write Ability and Storage Permanence: Trade-offs; Common Memory Types: ROMs, RAMs; Composing Memory; Memory Hierarchy and Cache: Cache Mapping Techniques, Replacement Policy, Write Techniques, Impact on System Performance; Advanced RAM: The Basic DRAM, FPM DRAM, EDO DRAM, ES DRAM, RDRAM, MMU.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6)

UNIT V

INTERFACING 08 hrs

Introduction, Communication Basics; Microprocessor Interfacing: I/O Addressing; Microprocessor Interfacing: Interrupts; Microprocessor Interfacing: Direct Memory Access; Arbitration; Multilevel Bus Architecture; Advance Communication Principles; Serial Protocols; Parallel Protocols; Wireless Protocols.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11)

UNIT VI

INTRODUCTION TO REAL TIME OPERATING SYSTEMS 08 hrs

Tasks and Task States: The Scheduler, A Simple Example ; Tasks and Data: Shared-Data Problems, Reentrancy ; Semaphores and Shared Data: RTOS Semaphores, Initializing Semaphores, Reentrancy and Semaphores, Multiple Semaphores, Semaphores as a Signaling Device, Semaphore Problems, Ways to Protect Shared Data .

II (6.1, 6.2, 6.3)

UNIT VII

MORE OPERATING SYSTEMS SERVICES 08 hrs

Message Queues, Mail Boxes and Pipes: Pointers and Queues, Mailboxes, Pipes; Timer Functions: Other Timing Services; Events: A Brief Comparison of the Methods for Intertask Communication; Memory Management; Interrupt Routines in an RTOS Environment: Rule 1: No Blocking, Rule 2: No RTOS Calls without Fair Warning, Rule 2 and Nested Interrupts.

II (7.1, 7.2, 7.3, 7.4, 7.5)

UNIT VIII

BASIC DESIGN USING REAL TIME OPERATING SYSTEMS 07 hrs

Overview; Principles: General Operation, Write Short Interrupt Routines, Need Tasks for Priority and Encapsulation, Recommended Task Structure; An

Example: Underground Tank Monitoring System and Design ; Encapsulating Semaphores and Queues; Hard Real Time Scheduling Considerations; Saving Memory Space; Saving Power.
II (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7)

Text Books:

I. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid / Tony Givargis, Third Edition, 2010 reprint, John Wiley Student Edition.
II. An Embedded Software Primer, David E. Simon, Tenth Impression 2011, Pearson Education.

Reference Books:

1. Embedded Systems, Raj Kamal, Ninth reprint 2011, Tata-McGrawHill Publications.
2. Embedded Microcomputer Systems, Jonathan W. Valvano, Fourth Indian reprint 2009, 2nd Edition, Thomson or Cengage Learning.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 143 μP & C PROGRAMMING LAB

List of Experiments

1. Write an 8085 assembly language program to exchange 10 bytes of data stored from location X with 10 bytes of data stored from location Y.
2. Write an 8085 assembly language program to add 2 multibyte BCD numbers. The numbers are stored from locations X and Y in byte reversal form. The size in bytes of the multi-byte BCD numbers is given in the location, SIZE. The result is to be stored from location Z in byte reversal form, using one byte more than the size of multi-byte numbers.
3. Write an 8085 assembly language program to multiply two 8-bit numbers stored at locations X and Y. Store the 16-bit result in locations Z and Z+1. Also display the result in the address field of the microprocessor kit.
4. Write an 8085 assembly language program to search for a given byte in an array of bytes using Linear search algorithm. Location X contains the size of the array and location X+1 contains the element to be searched. The elements of the array are stored from location Y onwards. The program should display in the address field, the search element and the position where it was found. If the search element is not found, the position should be indicated as 00.
5. Write an 8085 assembly language program to find the smallest of N one-byte numbers. The N value is provided at location X and the numbers are present from location X+1. Display the smallest number in the data field, and its location in the address field.
6. Write an 8085 assembly language program to find the HCF of two 8-bit numbers. The numbers are stored at locations X and Y. Display the numbers in the address field and their HCF in the data field.
7. Write an 8085 assembly language program to convert an 8-bit binary number to equivalent BCD number. The binary number is at location X. Display the binary (hex) number in the data field and its equivalent BCD number in the address field.
8. Write a C program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by a given integer *x*.
9. Write a C program that will read a positive integer and determine and print its binary equivalent.
10. Given a number, write a C program using *while* loop to reverse the digits of the number. For e.g., the number 12345 should be printed as 54321.
11. Write a C program to read *n* numbers into an array, and compute the mean, variance and standard deviation of these numbers.
12. Write a C program using recursive calls to evaluate
    $f(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots$
13. Write a C program that uses a function to sort an array of n integers.
14. Write a C program to read in an array of names and to sort them in alphabetical order.

15. Write a C program to extract a portion of a character string and print the extracted string. Assume that *m* characters are extracted, starting with the *nth* character.
16. Write a C program using functions to read two matrices A (M x N) and B (P x Q), compute the product of A.B after checking compatibility for multiplication, and print the resultant product matrix.

Note:

- All the 8085 Assembly Language Programs have to be manually assembled and executed on a 8085 Microprocessor kit.
- All the C programs have to be executed using **Turbo C** or similar environment.

AE 118 DIGITAL COMMUNICATIONS

UNIT I

INTRODUCTION **02 hrs**

Sources and Signals; Basic Signal Processing Operations in Digital Communication; Channels for Digital Communications.

I (1.1, 1.2, 1.3)

FUNDAMENTAL LIMITS ON PERFORMANCE **05 hrs**

Uncertainty, Information and Entropy; Source Coding Theorem; Huffman Coding; Discrete Memoryless Channels; Mutual Information; Channel Capacity; Channel Coding Theorem; Channel Capacity Theorem.

I (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.9)

UNIT II

SAMPLING PROCESS **07 hrs**

Sampling Theorem; Quadrature Sampling of BP Signal; Reconstruction of a Message Process from its Samples, Signal Distortion in Sampling; Practical Aspects of Sampling and Signal Recovery; Pulse Amplitude Modulation; Time Division Multiplexing.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)

UNIT III

WAVEFORM CODING TECHNIQUES **08 hrs**

Pulse Code Modulation; Channel Noise and Error Probability; Quantization Noise and Signal to Noise Ratio; Robust Quantization; Differential PCM; Delta Modulation; Coding Speech at Low Bit Rates.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7)

UNIT IV

BASE-BAND SHAPING FOR DATA TRANSMISSION **08 hrs**

Discrete PAM Signals; Power Spectra of Discrete PAM Signals; Inter Symbol Interference; Nyquist's Criterion for Distortionless Base-Band Binary Transmission; Correlative Coding; Eye Pattern; Baseband M-ary PAM Systems; Adaptive Equalization for Data Transmission.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8)

UNIT V

DIGITAL MODULATION TECHNIQUES **08 hrs**

Digital Modulation Formats; Coherent Binary Modulation Techniques; Coherent Quadrature Modulation Techniques; Non-Coherent Binary Modulation Techniques; Comparison of Binary and Quaternary Modulation Techniques; M-ary Modulation Techniques; Effect of Inter Symbol Interference; Bit versus Symbol Error Probabilities; Synchronization.

I (7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.10, 7.11, 7.12)

UNIT VI

DETECTION AND ESTIMATION **07 hrs**

Gram-Schmidt Orthogonalization Procedure; Geometric Interpretation of Signals; Response of Bank of Correlators to Noisy Input; Detection of Known Signals in Noise; Probability of Error; Correlation Receiver; Matched Filter Receiver; Detection of Signals with Unknown Phase in Noise; Estimation: Concept and Criteria; Maximum Likelihood Estimation.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11)

UNIT VII

SPREAD SPECTRUM MODULATION **08 hrs**

Pseudo Noise Sequences; Notion of spread spectrum; direct sequence spread Coherent binary PSK; Signal Space Dimentionality and Processing Gain; Probability of Error; Frequency Hop Spread Spectrum.

I (9.1, 9.2, 9.3, 9.4, 9.5, 9.6)

UNIT VIII

APPLICATIONS **07 hrs**

Applications of Waveform Coding Techniques; Applications of Digital Modulation Techniques; Applications of Spread Spectrum Modulation.

I (5.8, 7.13, 9.7)

Text book:

I. Digital communications, Wiley Student Edition, Simon Haykin, reprint 2012

Reference Books:

1. Digital and Analog communication systems, K. Sam Shanmugham, John Wiley.
2. An Introduction to Analog and Digital Communication, Simon Haykin, John Wiley.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 119 DATA COMMUNICATION AND COMPUTER NETWORKS

UNIT I

DATA COMMUNICATIONS, DATA NETWORKING, AND THE INTERNET **04 hrs**

Data Communications and Networking for Today's Enterprise; A Communications Model; Data Communications; Networks; The Internet.

I (1.1, 1.2, 1.3, 1.4, 1.5)

PROTOCOL ARCHITECTURE, TCP/IP, AND INTERNET-BASED APPLICATIONS **03 hrs**

The Need for a Protocol Architecture; the TCP/IP Protocol Architecture; the OSI Model; Standardization within a Protocol Architecture.

I (2.1, 2.2, 2.3, 2.4)

UNIT II

DATA TRANSMISSION **05 hrs**

Concepts and Terminology; Analog and Digital Data Transmission; Transmission Impairments; Channel Capacity.

I (3.1, 3.2, 3.3, 3.4)

TRANSMISSION MEDIA

03hrs

Guided Transmission Media; Wireless Transmission.

I (4.1, 4.2)

UNIT III

SIGNAL ENCODING TECHNIQUES **05 hrs**

Digital Data, Digital Signals; Digital Data, Analog Signals; Analog Data, Digital Signals; Analog Data, Analog Signals.

I (5.1, 5.2, 5.3, 5.4)

DIGITAL DATA COMMUNICATION TECHNIQUES **03 hrs**

Asynchronous and Synchronous Transmission; Types of Errors; Error Detection; Line Configurations.

I (6.1, 6.2, 6.3, 6.5)

UNIT IV

DATA LINK CONTROL PROTOCOLS **03 hrs**

Flow Control; Error Control; High-Level Data Link Control (HDLC).

I (7.1, 7.2, 7.3)

MULTIPLEXING **04 hrs**

Frequency-Division Multiplexing; Synchronous Time-Division Multiplexing; Statistical Time-Division Multiplexing.

I (8.1, 8.2, 8.3)

UNIT V

CIRCUIT SWITCHING AND PACKET SWITCHING **02 hrs**

Switched Communications Networks; Circuit Switching Networks; Packet-Switching Principles.

I (10.1, 10.2, 10.5)

ROUTING IN SWITCHED NETWORKS **03 hrs**

Routing in Packet-Switching Networks; Least-Cost Algorithms.

I (12.1, 12.3)

CONGESTION CONTROL IN DATA NETWORKS **02 hrs**

Effects of Congestion; Congestion Control; Traffic Management; Congestion Control in Packet-Switching Networks.

I (13.1, 13.2, 13.3, 13.4)

UNIT VI

LOCAL AREA NETWORK OVERVIEW **04 hrs**

Background; Topologies and Transmission Media; LAN Protocol Architecture; Bridges.

I (15.1, 15.2, 15.3, 15.4)

HIGH-SPEED LANS **02 hrs**

The Emergence of High-Speed LANs; Ethernet.

I (16.1, 16.2)

WIRELESS LANS **02 hrs**

Overview; Wireless LAN Technology; IEEE 802.11 Architecture and Services.

I (17.1, 17.2, 17.3)

UNIT VII

INTERNETWORK PROTOCOLS **07 hrs**

Basic Protocol Functions; Principles of Internetworking; Internet Protocol Operation; Internet Protocol; IPv6.

I (18.1, 18.2, 18.3, 18.4, 18.5)

UNIT VIII

INTERNETWORK OPERATION **03 hrs**

Multicasting; Routing Protocols.

I (19.1, 19.2)

TRANSPORT PROTOCOLS **02hrs**

TCP; UDP.

I (20.2, 20.4)

INTERNET APPLICATIONS **03 hrs**

Electronic Mail: SMTP and MIME; Internet Directory Service: DNS.

I (22.1, 23.1)

Text Book:

I. Data and Computer Communications, Eight Edition, William Stallings, Pearson Education Low Price Edition.

Reference Book:

1. Data Communications and Computer Networks (2012), C.Murali, Reed Elsevier India Private limited (Fillip Learning, Bangalore).

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 120 MICROWAVE THEORY & TECHNIQUES

UNIT I

INTRODUCTION TO MICROWAVES AND MICROWAVE TRANSMISSION LINES **08 hrs**

Microwave frequencies, Introduction, Microwave transmission line equations and solutions. Reflection and Transmission coefficients. Standing Wave and SWR. Line impedance and admittance. Smith Chart. Impedance matching – Single Stub matching.

Double Stub matching.

I (0.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)

UNIT II

MICROWAVE WAVEGUIDES **08 hrs**

Introduction, Rectangular waveguides – Solution of Wave Equations in Rectangular waveguides. TE modes in Rectangular Waveguides. TM modes in Rectangular Waveguides, Power Transmission in Rectangular Waveguides. Power losses in Rectangular Waveguides, Excitation of modes in Rectangular Waveguides, Circular Waveguides - Solution of Wave Equations in Cylindrical Coordinates, TE and TM modes in Circular Waveguides, TEM modes in Circular Waveguides, Power Transmission in Circular Waveguides. Power losses in Circular Waveguides, Excitation of modes in Circular Waveguides.

I (4.0, 4.1, 4.1.1., 4.1.2., 4.1.3, 4.1.4, 4.1.5, 4.1.6, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7)

UNIT III

MICROWAVE COMPONENTS **07 hrs**

Microwave cavities – Rectangular and Circular Cavity Resonators. Semi-circular Cavity Resonators, Q-factor of a Cavity Resonators. Microwave Hybrid Circuits – Waveguide Tees and Scattering Matrices. Magic Tee and Hybrid Rings (Rat-race circuits) and their Scattering matrices. Waveguide Corners, Bends and Twists, Directional couplers. Two-hole Directional Couplers, S-matrix of a Directional Coupler. Circulators and Isolators.

I (4.3, 4.3.1, 4.3.2, 4.3.3, 4.4, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.5, 4.5.1, 4.5.2, 4.6, 4.6.1, 4.6.2)

UNIT IV

MICROWAVE SOLID-STATE DEVICES **08 hrs**

Transferred Electron Devices (TEDs); Introduction; Gunn-Effect Devices, Background, Gunn Effect- Differential Negative Resistance. High-Field Domain, Modes of operation – Gunn, LSA and Stable amplification modes, Microwave generation and amplification. Avalanche Transit-Time Devices – Introduction, Read Diode, Physical Description, Avalanche Multiplication. IMPATT Diodes – Physical Structure, Negative Resistance TRAPATT Diodes - Physical Structure, Principle of operation, BARITT Devices- Physical Description, Principle of operation, Microwave Performance. Parametric Devices – Non-linear Reactance and Manley-Rowe Power Relations. Parametric Amplifiers and Applications

I (7.0, 7.1, 7.1.1, 7.1.2, 7.2.1, 7.2.3, 7.3, 7.3.2, 7.3.3, 7.3.4, 7.7, 7.7.1, 7.7.2, 8.0, 8.1.1, 8.1.2, 8.2, 8.2.1, 8.2.2, 8.3, 8.3.1, 8.3.2, 8.4, 8.4.1, 8.4.2, 8.4.3, 8.5, 8.5.1, 8.5.2, 8.5.3, 8.5.4)

UNIT V

MICROWAVE LINEAR-BEAM TUBES (O-TYPE) **08 hrs**

Introduction – High frequency limitations of conventional vacuum tubes – Lead-inductance and interelectrode-capacitance effects – Transit-angle effects and GBW Limitation. KLYSTRONS – Reentrant cavities, Velocity-modulation process, Bunching process. Output Power and Beam-loading, Efficiency and Mutual Conductance of Klystron amplifier, Power required to bunch electron beam. Multi-cavity Klystron amplifier, Beam current density, Output Current and output power of Two-cavity Klystron. Reflex Klystron Oscillator – Velocity Modulation, Power output and efficiency, Electronic Admittance. Helix Traveling Tubes (TWTs), Slow-Wave Structures, Amplification Process, Convention Current. Axial Electric Field, Wave modes and Gain Consideration.

I (9.0, 9.1, 9.1.1, 9.1.2, 9.1.3, 9.2, 9.2.1, 9.2.2, 9.2.3, 9.2.4, 9.3, 9.3.1, 9.3.2, 9.4, 9.4.1, 9.4.2, 9.4.3, 9.5, 9.5.1, 9.5.2, 9.5.3, 9.5.4, 9.5.5, 9.5.6)

UNIT VI

MICROWAVE CROSS-FIELD TUBES (M- TYPE) **07 hrs**

Introduction – Magnetron Oscillator, Cylindrical Magnetron (8-Cavity), Equations of electron motion, Cyclotron angular frequency, Power output and efficiency, Linear Magnetron, Hartree condition, Co-axial Magnetron, Forward-Wave Cross-Field Amplifier, Principle of operation, Microwave characteristics. Backward-Wave Cross-field Amplifier (Amplitron),

I (10.0, 10.1.1, 10.1.2, 10.1.3, 10.2, 10.2.1, 10.2.2, 10.3)

UNIT VII

STRIP LINES AND MICROSTRIP LINES 07 hrs

Introduction,Microstrip Lines,Characteristic impedance of Microstrip Lines Effective dielectric constant, Transformation of a rectangular conductor into an equivalent circular conductor, Characteristic impedance equation. Losses in microstrip Lines, Dielectric, Ohmic and radiation losses. Quality Factor Q of Microstrip Lines, Parallel striplines Distributed Parameters, Characteristic Impedance, Attenuation Losses. Coplanar strip lines, Shielded Strip Lines.

I (11.1, 11.1.1, 11.1.2, 11.1.3, 11.2, 11.2.1, 11.2.2, 11.2.3, 11.3, 11.4)

UNIT VIII

MONOLITHIC MICROWAVE INTEGRATED CIRCUITS 07 hrs

Introduction – comparison between discrete circuit, integrated circuit and microwave integrated circuit, Advantages of MICs, Materials, Substrate Materials, Conductor Materials, Dielectric Materials and Resistive Materials, Monolithic Microwave Integrated-circuit Growth, MMIC Fabrication Techniques-Diffusion and ion implantation, Oxidation and film deposition, Epitaxial growth, Lithography, Etching and photoresist, Deposition, Vacuum Evaporation, Electron-Beam Evaporation and DC sputtering, Fabrication Example. Thin-film Formation – Planar resistor Film, Planar Inductor Film. Planar Capacitor Film, Hybrid IC Fabrication – Plate-through technique and Etchback technique

I (12.0, 12.1, 12.1.1, 12.1.2, 12.1.3, 12.1.4, 12.2, 12.2.1, 12.2.2, 12.4, 12.4.1, 12.4.2, 12.4.3, 12.5)

Text Book:

I. Microwave Devices and Circuits, Samuel Y. Liao, 3rd Edition, Prentice-Hall of India, New Delhi, Eighth impression-2009.

Reference Books:

1. Foundations of Microwave Engineering, R.E. Collin, McGraw Hill
2. Microwave Engineering and Applications, Om. P. Gandhi, Maxwell McMillan International Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 144 ANALOG & DIGITAL COMMUNICATIONS LAB

List of Experiments

1. Passive attenuators: T and π type-Design and study of attenuators for the given attenuation, source and load impedances.
2. **1st Order Active Filters:** Low pass, High pass and Notch Filters – Design for a given cutoff frequency, passband gain and to obtain frequency response curve.
3. **Class C Tuned Amplifier:** Design for a particular tuned frequency, plot of Efficiency Vs Load and to obtain optimum load.
4. **Collector Amplitude Modulation:** Display of AM output, calculation of modulation index.
5. **AM Detector using Envelope Detector:** To study the variation of output signal amplitude and AVC output with variations in AF input.
6. **DSBSC generation using Diodes:** Study of output waveforms for variations in the input.
7. **FM Modulation:** Study and display of waveforms.
8. **FM Detection:** Study and display of waveforms.
9. **PAM:** Generation and demodulation – Observe input and output waveforms.
10. **PWM:** Generation for the given analog frequency and study of PWM output.
11. **PPM:**Generation and detection.
12. **OPAMP preemphasis and deemphasis:** Design for a given time constant and plot of Gain Vs Frequency.
13. **Transistor Mixer:** Demonstration of mixing action of RF and oscillator frequency to produce IF. To obtain conversion trans-conductance of the mixer.
14. **Verification of sampling theorem** using natural / flat top sampling.
15. **Generation and Detection of ASK:** Study and display of waveforms.
16. **Generation and Detection of PSK:** Study and display of waveforms.
17. **Generation and Detection of FSK:** Study and display of waveforms
18. **TDM:** Study of TDM and recovery of two band limited signals.

Demonstration Experiments

1. Study of optical fiber characteristics.
2. Study of DPSK and QPSK.
3. Use of microwave bench.
4. Antenna Measurements.

Note: Experiments are to be conducted in the hardware lab as well as using the software **PSPICE 9.1 version** and above downloadable at http://pspice.en.softonic.com

AE 121 DIGITAL SIGNAL PROCESSING

UNIT I

6.1.1 SAMPLING OF CONTINUOUS-TIME SIGNALS **07 hrs**

Introduction, Periodic Sampling; Frequency Domain Representation of Sampling; Reconstruction of a Band limited Signal from its Samples; Discrete-Time Processing of Continuous-Time Signals; Continuous-Time Processing of Discrete-Time Signals; Digital Processing of Analog Signals

I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.8.1, 4.8.2, 4.8.3, 4.8.4)

UNIT II

6.1.2 TRANSFORM ANALYSIS OF LINEAR TIME-INVARIANT SYSTEMS **07 hrs**

Introduction, The Frequency Response of LTI systems; System Functions for Systems Characterized by Linear Constant-Coefficient Difference Equations; Frequency Response for Rational System Functions; Relationship between Magnitude and Phase; All Pass Systems; Minimum Phase Systems

I (5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6)

UNIT III

6.1.2.1 STRUCTURES FOR DISCRETE-TIME SYSTEMS **07 hrs**

Introduction, Block Diagram Representation of Linear Constant Coefficient Difference Equations; Signal Flow Graph Representation of Linear Constant Coefficient Difference Equations; Basic Structures for IIR Systems; Transposed Forms; Basic Network Structures for FIR Systems

I (6.0, 6.1, 6.2, 6.3, 6.4, 6.5)

UNIT IV

6.1.2.2 **FILTER DESIGN TECHNIQUES** **08 hrs**

Introduction, Design of Discrete-Time IIR Filters from Continuous-Time Filters; Design of FIR Filters by Windowing; FIR Filter Design by the Kaiser Window Method; Optimum Approximations of FIR Filters; IIR and FIR Discrete-Time Filters

I (7.0, 7.1, 7.2, 7.3, 7.4, 7.6)

UNIT V

6.1.3 **THE DISCRETE FOURIER TRANSFORM** **08 hrs**

Introduction, Sampling the Fourier Transform; Fourier Representation of Finite-Duration Sequences: The Discrete Fourier Transform; Properties of the Discrete Fourier Transform; Linear Convolution using the Discrete Fourier Transform

I (8.0, 8.4, 8.5, 8.6, 8.7)

UNIT VI

COMPUTATION OF THE DISCRETE FOURIER TRANSFORM **08 hrs**

Introduction, Efficient Computation of the Discrete Fourier Transform; The Goertzel Algorithm; Decimation-in-Time FFT Algorithms; Decimation-in-Frequency FFT Algorithms; Practical Considerations; Implementation of the DFT using Convolution-chirp transform algorithm.

I (9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6.2)

UNIT VII

FOURIER ANALYSIS OF SIGNALS USING THE DISCRETE FOURIER TRANSFORM **08 hrs**

Fourier Analysis of Signals using the DFT; DFT Analysis of Sinusoidal Signals; The Time-Dependent Fourier Transform; Block Convolution using the Time-Dependent

Fourier Transform; Fourier Analysis of Nonstationary Signals; Fourier Analysis of Stationary Random Signals: The Periodogram
I (10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6)

UNIT VIII

DISCRETE HILBERT TRANSFORMS **07 hrs**

Real and Imaginary Part Sufficiency of the Fourier Transform for Causal Sequences; Relationships between Magnitude and Phase; Hilbert Transform Relations for Complex Sequences.
I (11.0, 11.1, 11.3, 11.4)

Textbook:

I. Discrete-Time Signal Processing (1999), Oppenheim, A. V., and Schafer, R. W., with J. R. Buck, Second Edition, Pearson Education, Low Price Edition.

Reference Books:

1. Digital Signal Processing: Principles, Algorithms, and Applications (2007), Proakis, J. G., Manolakis, D. G., Fourth Edition, PHI Private Limited.
2. Signal Processing First (2003), McClellan, J. H., Schafer, R. W., Yoder, M. A., Prentice Hall.
3. Schaum's Outline of Digital Signal Processing, Hayes, H., Schaum's Outlines.
4. Digital Signal Processing – Theory, Analysis and Digital-filter Design, B. Somanathan Nair, PHI Pvt Ltd

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 122 VLSI DESIGN

UNIT I

A REVIEW OF MICROELECTRONICS AND AN INTRODUCTION TO MOS TECHNOLOGY **07 hrs**

Introduction to Integrated Circuit Technology; The Integrated Circuit (IC) Era; Metal-Oxide-Semiconductor (MOS) and Related VLSI Technology; Basic MOS Transistors; Enhancement Mode Transistor Action; Depletion Mode Transistor Action; nMOS Fabrication; CMOS Fabrication; Thermal Aspects of Processing; BiCMOS Technology; Production of E-beam masks.
I (1.1 to 1.10)

UNIT II

BASIC ELECTRICAL PROPERTIES OF MOS AND BICMOS CIRCUITS **08 hrs**

Drain-to-source current I_{ds} versus Voltage V_{ds} Relationships; Aspects of MOS Transistor Threshold Voltage V_t; MOS Transistor Transconductance g_m and Output Conductance g_{ds}; The Pass Transistor; The nMOS Inverter; Determination of Pull-up to Pull-down Ratio for an nMOS Inverter Driven by Another nMOS Inverter; Pull-up to Pull-down Ratio for an nMOS Inverter driven through One or More Pass Transistors; Alternative Forms of Pull-up; The CMOS

Inverter; MOS Transistor Circuit Model; Some Characteristics of npn Bipolar Transistors; Latch-up in CMOS Circuits; BiCMOS Latch-up Susceptibility.
I (2.1 to 2.14)

UNIT III

MOS AND BICMOS CIRCUIT DESIGN PROCESSES 07 hrs

MOS Layer; Stick Diagrams; Design Rules and Layout; General Observations on the Design Rules; 2μm Double Metal, Double Poly. CMOS/BiCMOS Rules; 1.2μm Double Metal, Single Poly. CMOS Rules; Layout Diagrams-A Brief Introduction; Symbolic Diagrams-Translation to Mask Form.
I (3.1 to 3.4, 3.7 to 3.8)

UNIT IV

BASIC CIRCUIT CONCEPTS 07 hrs

Sheet Resistance R_s; Sheet Resistance Concept Applied to MOS Transistors and Inverters; Area Capacitances of Layers; Standard Unit of Capacitance C_g; Some Area Capacitance Calculations; The Delay Unit τ; Inverter Delays; Driving Large Capacitive Loads
I (4.1 to 4.8.1)

UNIT V

SCALING OF MOS CIRCUITS 03 hrs

Scaling Models and Scaling Factors; Scaling Factors for Device Parameters; Some Discussion on Scaling and Limitations of Scaling.
I (5.1 to 5.3.2)

SUBSYSTEM DESIGN AND LAYOUT 05 hrs

Some Architectural Issues; Switch Logic; Gate (Restoring) Logic; Examples of Structured Design (Combinational Logic), parity generator
I (6.1 to 6.4.1)

UNIT VI

SUBSYSTEM DESIGN PROCESSES 04 hrs

Some General Considerations; An Illustration OF Design Processes.
I (7.1 to 7.2)

ILLUSTRATION OF THE DESIGN PROCESS – COMPUTATIONAL ELEMENTS 04 hrs

Some Observations on the Design Process; Regularity; Design of an ALU Subsystem; A Further Consideration of Adders.
I (8.1 to 8.4)

UNIT VII

MEMORY, REGISTERS AND ASPECTS OF SYSTEM TIMING 04 hrs

System Timing Considerations; Some Commonly Used Storage/Memory Elements.
I (9.1, 9.2)

PRACTICAL ASPECTS AND TESTABILITY 03 hrs

Some Thoughts on Performance; Further Thoughts on Floor Plans/Layout; Floor Plan Layout of the 4-bit Processor; Further Thoughts on System Delays; Ground Rules for Successful Design.

I (10.1 to 10.3)

UNIT VIII

PRACTICAL ASPECTS AND TESTABILITY (Continued) 08 hrs

Real World of VLSI Design; Design Styles and Philosophy; The Interface with the Fabrication House; CAD Tools for Design and Simulation; Aspects of Design Tools; Test and Testability.

I (10.8 to 10.13)

Text Book:

I. Basic VLSI Design, Douglas A. Pucknell and Kamran Eshraghian, PHI, 3rd Edition, 2010.

Reference Book:

1. CMOS VLSI Design, A Circuits and System Perspective, Neil H. E. Weste, David Harris and Ayan Banerjee, Pearson Education 3rd Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 123 POWER ELECTRONICS

UNIT I

POWER ELECTRONICS 02 hrs

Introduction; What is Power Electronics?; Why Power Electronics?; Power Semiconductor Switches; Power Losses in Real Switches; Types of Power Electronics Circuits; Applications of Power Electronics.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7)

POWER DIODES AND POWER TRANSISTORS 06 hrs

Introduction; The PN Junction Diode; The Voltage-Current Characteristic of a Diode; The Ideal Diode; The Schottky Diode; Diode Circuit Analysis; Diode Losses; Principal Ratings for Diodes; Diode Protection; Testing a Diode; Power Bipolar Junction Transistors (BJTs); Power Metal-Oxide Semiconductor Field-Effect Transistors (MOSFETs); Insulated-Gate Bipolar Transistors (IGBTs).

I (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 3.1, 3.2, 3.3, 3.4)

UNIT II

THYRISTOR DEVICES 07 hrs

Introduction; The Silicon Controlled Rectifier (SCR); SCR Characteristic Curves; Testing SCRs; SCR Ratings; Junction Temperature Rating; Increasing SCR Ratings; Series and Parallel SCR Connections; Power Loss; SCR Protection; Gate Circuit Protection; SCR Gate-Triggering Circuits; Triggering SCRs in Series and in Parallel; SCR Turn-Off (Commutation) Circuits; Other types of Thyristors.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15)

UNIT III

SINGLE-PHASE CONTROLLED RECTIFIERS **07 hrs**

Introduction; Half-Wave Controlled Rectifiers; Full-Wave Controlled Center-Tap Rectifiers; Full-Wave Controlled Bridge Rectifiers; Half-Controlled or Semi-Controlled Bridge Rectifiers; Dual Converters.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.6)

UNIT IV

THREE-PHASE CONTROLLED RECTIFIERS **08 hrs**

Introduction; Half-Wave (Three-Pulse) Controlled Rectifiers; Full-Wave (Six-Pulse) Controlled Bridge Rectifier; Full-Wave Half-Controlled Bridge Rectifiers with FWD.

I (8.1, 8.2, 8.3, 8.4)

UNIT V

DC CHOPPERS **07 hrs**

Introduction; The Principles of Basic DC Choppers; Step-Down (Buck) Choppers; Step-Up (Boost) Choppers; Buck-Boost Choppers.

I (9.1, 9.2, 9.3, 9.4, 9.5)

UNIT VI

INVERTERS **08 hrs**

Introduction; The Basic Inverter; Voltage Source Inverters (VSI); Pulse-Width Modulation (PWM); Pulse-Width Modulated (PWM) Inverters; Other Basic Types of Single-Phase Inverters; The Ideal Current Source Inverter (CSI).

I (10.1, 10.2, 10.3, 10.5, 10.6, 10.7, 10.9)

UNIT VII

AC VOLTAGE CONTROLLER **05 hrs**

Introduction; AC Power Control; Integral Cycle Control; AC Phase Control; Cycloconverters.

I (11.1, 11.2, 11.3, 11.4, 11.7)

STATIC SWITCHES **03 hrs**

Introduction; Comparison of Static and Mechanical Switches; Static AC Switches; Three-Phase Static Switches; Hybrid Switches; The Solid State Relay (SSR); Static Tap-Changing Control; The Static VAR Controller (SVC).

I (12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8)

UNIT VIII

SOME APPLICATIONS **07 hrs**

Switched Mode Power Supply(SMPS); Uninterruptible Power Supplies; High Voltage DC Transmission; Static Circuit Breakers; Induction Heating; Battery Chargers; Emergency Lighting System.

II (11.1, 11.2, 11.3, 11.5, 11.8, 11.9, 11.10)

Text Books:

I. Power Electronics for Technology, Ashfaq Ahmed, Purdue University - Calumet, Pearson Education.
II. Power Electronics, Fifth Edition (2012), Dr. P.S.Bimbhra, Khanna Publishers, New Delhi.

Reference Book:

1. Power Electronics – Circuits, Devices and Applications, Third Edition, Muhammad H. Rashid, Pearson Education / Prentice Hall of India Pvt. Ltd.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 124 OPERATING SYSTEMS

UNIT I

INTRODUCTION **08 hrs**

What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security

SYSTEM STRUCTURES

Operating System Services, User Operating -System Interface, System Calls, Types of System Calls

I (1.1 to 1.9, 2.1 to 2.4)

UNIT II

SYSTEM STRUCTURES CONTD. **07 hrs**

System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Debugging, Operating-System Generation, System Boot

PROCESS CONCEPT

Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication

I (2.5 to 2.11, 3.1 to 3.4)

UNIT III

MULTITHREADED PROGRAMMING **08 hrs**

Overview, Multithreading Models, Thread Libraries, Threading Issues

PROCESS SCHEDULING

Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling

I (4.1 to 4.4, 5.1 to 5.5)

UNIT IV

SYNCHRONIZATION **07 hrs**

Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors

I (6.1 to 6.7)

UNIT V

DEADLOCKS **07hrs**

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

I (7.1 to 7.7)

UNIT VI

MEMORY-MANAGEMENT STRATEGIES **08hrs**

Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation

VIRTUAL-MEMORY MANAGEMENT

Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing

I (8.1 to 8.6, 9.1 to 9.6)

UNIT VII

FILE SYSTEM **07hrs**

File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection

IMPLEMENTING FILE SYSTEMS

File-System Structure, File-System Implementation

I (10.1 to 10.6, 11.1 to 11.3)

UNIT VIII

SECONDARY-STORAGE STRUCTURE **08 hrs**

Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management

SYSTEM PROTECTION

Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems

I (12.1 to 12.6, 14.1 to 14.8)

Text Book:

I. Operating System Concepts, International Student Version, 8th Edition, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Wiley-India Edition, 2010

Reference Books:

1. Operating Systems Internals and Design Principles, 6th Edition, William Stallings, Pearson Education,2009
2. Operating Systems A Concept Based Approach, 3rd Edition, Dhananjay M. Dhamdhere,Tata McGraw Hill, 2012

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 125 INFORMATION THEORY & CODING

UNIT I

RANDOM SIGNAL THEORY **07 hrs**

Introduction, Introduction to Probabilities, Definitions, Probabilities of Random Events, Joint and Conditional Probabilities, Discrete Random Variables, Probability Mass Functions, Statistical Averages, Examples of Probability Mass Functions.

I (3.1, 3.2, 3.2.1, 3.2.2, 3.2.3, 3.3, 3.3.1, 3.3.2, 3.3.3)

UNIT II

RANDOM SIGNAL THEORY (CONTINUED) **07 hrs**

Continuous Random Variables, Probability Density Functions and Statistical Averages, Examples of Probability Density Functions, Transformation of Random Variables, Random Processes, Definitions and Notations, Stationarity, Time Averages and Ergodicity.

I (3.4, 3.4.1, 3.4.2, 3.4.3, 3.5, 3.5.1, 3.5.2)

UNIT III

BASICS OF INFORMATION THEORY **08 hrs**

Introduction, Measure of Information, Information content of a Message, Average Information Content (Entropy) of Symbols in Long Independent Sequences, Average Information Content of Symbols in Long Dependent Sequences, Markoff Statistical Model for Information Sources, Entropy and Information Rate of Markoff Sources.

I (4.1, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5)

UNIT IV

FUNDAMENTAL LIMITS ON PERFORMANCE & SOURCE CODING **08 hrs**

Uncertainty, Information and Entropy – Some Properties of Entropy, Extension of a Discrete Memoryless Source, Encoding of Source Output, Shannon's Encoding Algorithm, Source Coding Theorem, Prefix Coding, Huffman Coding.

I (4.3, 4.3.1); II (2.1, 2.2, 2.3)

UNIT V

DISCRETE MEMORYLESS CHANNELS **08 hrs**

Communication Channels, Discrete Communication Channels, Rate of information trammission over a discrete channel, Capacity of Discrete Memoryless Channels, Discrete Memoryless Channels, Mutual Information, Properties of Mutual Information, Channel Capacity, Channel Coding Theorem, Application of the Channel Coding Theorem to Binary Symmetric Channels.

I (4.4, 4.5, 4.5.1, 4.5.2); II (2.4, 2.5, 2.6, 2.7)

UNIT VI

CONTINUOUS CHANNELS **07 hrs**

Continuous Channels, Shannon-Hartley Theorem and Its Implications; Differential Entropy and Mutual Information for Continuous Ensembles, Mutual Information, Channel Capacity Theorem, Ideal System.

I (4.6, 4.6.1); II (2.8, 2.9)

UNIT VII

ERROR CONTROL CODING – LINEAR BLOCK CODES 07 hrs

Introduction, Example of Error Control Coding, Methods of controlling errors, Types of Errors, Types of Codes, Linear Block Codes, Matrix Description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error-Correcting Hamming Codes, Table Lookup Decoding Using Standard Array, rationale for coding and types of coding, discrete memoryless channels, linear block codes.

I (9.1, 9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.2, 9.2.1, 9.2.2, 9.2.3, 9.2.4); II (8.1, 8.2, 8.3)

UNIT VIII

ERROR CONTROL CODING – CYCLIC AND CONVOLUTIONAL CODES 08 hrs

Binary Cyclic codes, Algebraic Structure of Cyclic Codes, Generator and Parity-Check Polynomials, Encoding using an (n-k) Bit Shift Register, Syndrome Calculation, Error Detection and Error Correction, Special Classes of Cyclic Codes- Bose-Chaudhuri-Hocquenghem (BCH) Codes, Burst-Error-Correcting Codes, Burst- and Random-Error-Correcting Codes. Convolutional Codes, Time-domain Approach, Transform-Domain Approach, Encoders of Convolutional Codes, Decoders of Convolutional Codes, Performance of Convolutional Codes, Code Tree, Trellis and State Diagram, Maximum Likelihood Decoding of Convolutional Codes – Viterbi Algorithm.

I (9.3, 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.4, 9.5, 9.6, 9.6.1, 9.6.2, 9.6.3); II (8.4, 8.5, 8.6)

Text Books:

I. Digital and Analog Communication Systems by K. Sam Shanmugam, John Wiley India Edition, 2009 reprint.
II. Digital Communications by Simon Haykin, John Wiley & Sons, Wiley Student Edition, Reprint 2012.

Reference Book:

1. Digital Communication Fundamentals and Applications – Bernard Sklar, 2nd Edition, Pearson Education.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 126 RADAR AND NAVIGATIONAL AIDS

UNIT I

AN INTRODUCTION TO RADAR 07 hrs

Basic Radar; The Simple Form of the Radar Equation; Radar Block Diagram; Radar Frequencies; Applications of Radar; The Origins of Radar.

I (1.1 to 1.6)

UNIT II

THE RADAR EQUATION 08 hrs

Introduction; Detection of Signals in Noise; Receiver Noise and the Signal to Noise Ratio; Probabilities of Detection and False Alarm; Radar Cross Section of Targets; Transmitter Power; Pulse Repetition Frequency; System Losses.

I (2.1 to 2.3, 2.5, 2.7, 2.9, 2.10, 2.12)

UNIT III

MTI AND PULSE DOPPLER RADAR **08 hrs**

Introduction to Doppler and MTI Radar; Delay Line Cancellers; Digital MTI Processing; Moving Target Detector; Pulse Doppler Radar.

I (3.1, 3.2, 3.5, 3.6, 3.9)

UNIT IV

TRACKING RADAR AND DETECTION OF SIGNALS IN NOISE **07 hrs**

Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing, Tracking in Range, Detection of Signals in Noise, Introduction; Matched Filter Receiver; Detection Criteria; Detectors; Automatic Detection.

I (4.1, 4.2, 4.3, 4.6, 5.1 to 5.5)

UNIT V

RADAR CLUTTER **07 hrs**

Introduction to Radar Clutter; Surface Clutter; Radar Equation; Land Clutter; Sea Clutter; Weather Clutter.

I (7.1 to 7.4, 7.6)

UNIT VI

THE RADAR ANTENNA **08 hrs**

Functions of Radar Antenna; Antenna Parameters; Antenna Radiation Pattern and Aperture Illumination; Reflector Antennas; Electronically Steered Phased Array Antennas.

I (9.1, 9.2, 9.3, 9.4, 9.5)

UNIT VII

RADAR RECEIVER **07 hrs**

The Radar Receiver; Receiver Noise Figure; Superheterodyne Receiver; Duplexers and Receiver Protectors; Radar Displays.

I (11.1 to 11.5)

UNIT VIII

NAVIGATIONAL AIDS **08 hrs**

Four methods of Navigation; Radio-Direction Finding, The loop Antenna; An Aural-Null Direction Finder; The Goniometer; Automatic Direction Finders; The Radio Compass; Hyperbolic Systems of Navigation; LORAN-A, LORAN-C; The DECCA Navigation System; Distance Measuring Equipment(DME); Operation of DME; Tactical Air Navigation (TACAN); Instrument Landing System; Microwave Landing System.

II (1.2, 2.1, 2.3, 2.4, 2.8, 4.1, 4.4, 4.5, 5.1, 5.2, 5.3, 6.1, 6.3))

Text Books:

I. Introduction to Radar Systems, Merrill I. Skolnik, 3rd Edition, TMH, 27th Print 2011.
II. Elements of Electronic Navigation, N.S. Nagaraja, 2nd Edition, 26th Reprint 2010, TMH.

Reference Book:

1. Introduction to Radar Technology & Applications, Byron Edde, Pearson Education.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 127 WIRELESS & MOBILE SYSTEMS

UNIT I

INTRODUCTION **04 hrs**

History of Cellular Systems; Characteristics of Cellular Systems; Fundamentals of Cellular Systems; Cellular System Infrastructure; Satellite Systems; Network Protocols; Ad Hoc and Sensor Networks; Wireless MANs, LANs and PANs.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8)

PROBABILITY, STATISTICS, AND TRAFFIC THEORIES **04 hrs**

Introduction; Basic Probability and Statistics Theories; Traffic Theory; Basic Queuing Systems.

I (2.1, 2.2, 2.3, 2.4)

UNIT II

MOBILE RADIO PROPAGATION **04 hrs**

Introduction; Types of Radio Waves; Propagation Mechanisms; Free-Space Propagation; Land Propagation; Path Loss; Slow Fading; Fast Fading; Doppler Effect; Delay Spread; Intersymbol Interference; Coherence Bandwidth; Cochannel Interference.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13)

CHANNEL CODING AND ERROR CONTROL **03 hrs**

Introduction; Linear Block Codes; Cyclic Codes; Cyclic Redundancy Check; Convolutional Codes; Interleaver; Turbo Codes.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)

UNIT III

CELLULAR CONCEPT **04 hrs**

Introduction; Cell Area; Signal Strength and Cell Parameters; Capacity of a Cell; Frequency Reuse; How to form a Cluster; Cochannel Interference; Cell Splitting; Cell Sectoring.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9)

MULTIPLE RADIO ACCESS **03 hrs**

Introduction; Multiple Radio Access Protocols; Contention-Based Protocols.

I (6.1, 6.2, 6.3)

UNIT IV

MULTIPLE DIVISION TECHNIQUES FOR TRAFFIC CHANNELS **04 hrs**

Introduction; Concepts and Models for Multiple Divisions; Modulation Techniques.

I (7.1, 7.2, 7.3)

TRAFFIC CHANNEL ALLOCATION **03 hrs**

Introduction; Static Allocation versus Dynamic Allocation; Fixed Channel Allocation (FCA); Dynamic Channel Allocation (DCA); Allocation in Specialized System Structure.

I (8.1, 8.2, 8.3, 8.4, 8.6)

UNIT V

SATELLITE SYSTEMS **04 hrs**

Introduction; Types of Satellite Systems; Characteristics of Satellite Systems; Satellite System Infrastructure; Call Setup; Global Positioning System; A-GPS and E-911.

I (12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7)

MOBILE COMMUNICATION SYSTEMS **04 hrs**

Introduction; Cellular System Infrastructure; Registration; Handoff Parameters and Underlying Support; Roaming Support; Multicasting.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6)

UNIT VI

EXISTING WIRELESS SYSTEMS **08 hrs**

Introduction; AMPS; IS-41; GSM; PCS; IS-95; IMT-2000.

I (11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7)

UNIT VII

AD HOC AND SENSOR NETWORKS **07 hrs**

Introduction; Characteristics of MANETs; Applications; Routing; Table-Driven Routing Protocols; Source-Initiated On-Demand Routing; Wireless Sensor Networks; Fixed Wireless Sensor Networks.

I (13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 14.1, 14.2, 14.3)

UNIT VIII

WIRELESS LANs, MANs and PANs **06 hrs**

Introduction; Wireless Local Area Networks (WLANs); Enhancement for IEEE 802.11 WLANs, Wireless Metropolitan Area Networks (MANs); Wireless Personal Area Networks (WPANs); Zigbee.

I (15.1, 15.2, 15.3, 15.4, 15.6, 15.7)

RECENT ADVANCES **02 hrs**

Introduction; Ultra-Wideband Technology; RFID; Cognitive radio; Directional and Smart Antennas.

I (16.1, 16.3, 1*6.5,* 16.6, 16.11)

Text Book:

I. Introduction to Wireless and Mobile Systems, Third Edition (2011), Dharma Prakash Agrawal and Qing-An Zeng, CENGAGE Learning.

Reference Books:

1. Wireless Communications-Principles and Practice, Second Edition (2010), Theodore S. Rappaport, Pearson Education India.
2. Modern Wireless Communications, Simon Haykin and Michael Moher, Pearson Education, Low Price Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 128 INTERNET APPLICATIONS

UNIT I

HYPERTEXT MARKUP LANGUAGE **08 hrs**

Basic HTML, The Document Body, Text, Hyperlinks, Adding More Formatting, Lists, Using Colour and Images, Images

MORE HTML

Tables, Multimedia Objects, Frames, Forms – Toward Interactivity, The HTML Document Head in Detail, XHTML – An Evolutionary Markup

I (2, 3)

UNIT II

CASCADING STYLESHEETS **07 hrs**

Introduction, Using Styles: Simple Examples, Defining Your Own Styles, Properties and Values in Styles, Style Sheets – Worked Example, Formatting Blocks of Information, Layers

CASCADING STYLESHEETS 2

The Design of CSS2, Styling for Paged Media, Using Aural Representation, Counters and Numbering

I (4, 5)

UNIT III

AN INTRODUCTION TO JAVASCRIPT **08 hrs**

What is Dynamic HTML?, JavaScript, JavaScript – The Basics, Variables, String Manipulation, Mathematical Functions, Statement, Operators, Arrays, Functions

OBJECTS IN JAVASCRIPT

Data and Objects in JavaScript, Regular Expressions, Exception Handling, Built-in Objects, Cookies, Events

I (6, 7)

UNIT IV

DYNAMIC HTML WITH JAVASCRIPT **07 hrs**

Data Validation, Opening a New Window, Messages and Confirmations, The Status Bar, Writing to a Different Frame, Rollover Buttons, Moving Images, Multiple Pages in a Single Download, A Text-only Menu System, Floating Logos

I (8)

UNIT V

PROGRAMMING IN PERL 5 **07 hrs**

Why Perl, Online Documentation, The Basic Perl Program, Scalars, Arrays, Hashes, Control Structures, Processing Text, Regular Expressions, Using Files, Subroutines, Bits and Pieces

I (9)

UNIT VI

CGI SCRIPTING **08 hrs**

What is CGI?, Developing CGI Applications, Processing CGI, Introduction to CGI.pm, CGI.pm Methods, Creating HTML pages Dynamically, Using CGI.pm – An Example, Adding Robustness, Carp, Cookies

BUILDING WEB APPLICATIONS WITH PERL

Uploading Files, Tracking Users with Hidden Data, Using Relational Databases, Using lib www, Template based Sites with HTML::Mason, Creating and Manipulating Images

I (10, 11)

UNIT VII

AN INTRODUCTION TO PHP **08 hrs**

PHP, Introducing PHP, Including PHP in a Page, Data Types, Program Control, Arrays, User-defined Functions, Built-in Functions, Regular Expression, Using Files

BUILDING WEB APPLICATIONS WITH PHP

Tracking Users, Using Databases, Handling XML

I (12, 13)

UNIT VIII

XML: DEFINING DATA FOR WEB APPLICATIONS **07 hrs**

Basic XML, Document Type Definition, XML Schema, Document Object Model, Presenting XML, Handling XML with Perl, Using XML::Parser, Handling the DOM with Perl

I (14)

Text Book:

I. Web Programming – Building Internet Applications, Chris Bates, Third Edition, Wiley Student Edition, 2006.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 129 CYBER CRIMES & IPR

PART A: CYBER CRIMES

UNIT I

INTRODUCTION **03 hrs**

I (Chapter I complete)

CYBER CRIMES – THEIR KINDS AND CLASSIFICATION **05 hrs**

I (Chapter II complete)

UNIT II

MODES & TECHNIQUES OF CYBER CRIME **05 hrs**

I (Chapter III complete)

UNIT III

CYBER CRIME AND IPR VIOLATION **06 hrs**

I (Chapter IV complete)

UNIT IV

INTERNATIONAL PROSPECTIVE OF CYBER CRIMES **07 hrs**

I (Chapter VI complete)

UNIT V

PREVENTION OF CYBER CRIMES **06 hrs**

I (Chapter VII complete)

PART B: INTELLECTUAL PROPERTY RIGHTS

UNIT VI

INTRODUCTORY **01 hrs**
II (Part I complete)
COPYRIGHT **03 hrs**
II (Part II complete)
TRADEMARKS **04 hrs**
II (Part III complete)

UNIT VII

PATENTS – HISTORICAL OVERVIEW OF PATENT LAW, CONCEPT OF PATENT **02 hrs**
II (Part IV-Chapters I and II complete)
PATENTS - PATENTABLE INVENTIONS **02 hrs**
II (Part IV-Chapter III complete)
PATENTS - PROCEDURE FOR OBTAINING PATENT **02 hrs**
II (Part IV-Chapter IV complete)
PATENTS – SPECIAL CATEGORY **02 hrs**
II (Part IV-Chapter VI complete)

UNIT VIII

PATENTS – INFRINGEMENT AND REMEDIES **02 hrs**
II (Part IV-Chapters VII complete)
PATENTS – OFFENCES AND PENALTIES **01 hrs**
II (Part IV-Chapters VIII complete)
INDUSTRIAL DESIGNS **02 hrs**
II (Part V complete)
GEOGRAHICAL INDICATIONS **02 hrs**
II (Part VII complete)

THE INFORMATION TECHNOLOGY ACT, 2000 **02 hrs**
II (Part XII complete)

Text Books:

I. Cyber Crimes & Law, Dr. Vishwanath Paranjape, Central Law Agency, Allahabad, 2010.
II. Text book on Intellectual Property Rights, N. K. Acharya, 6th Edition, Asia law House, Hyderabad, 2012.

Reference Book:

1. Intellectual Property Law, P. Narayanan, 3rd Edition, Eastern Law House, 2012.

Web References:

(a) Using the internet for non-patent prior art searches, Derwent IP matters, July 2000. www.ipmatters.net/features/000707_gibbs.html
(b) Patents by N R Subbaram, Pharma book syndicate.
(c) www.iptoday.com
(d) http://www.wipo.int/portal/index.html.en

Note:

I. Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying **20 marks**, selecting **THREE** questions from **Part A** and **TWO** from **Part B.**

II. There will be no objective questions section for this theory subject.

AE 130 OPTOELECTRONICS & COMMUNICATION

7 **UNIT – I**

OPTICAL FIBERS: STRUCTURES, WAVEGUIDING AND FABRICATION **07 hrs**

Motivations for Light wave Communications; Optical Spectral Bands; The Nature of light; Basic Optical Laws and Definitions; Optical Fiber Modes and Configurations; Single- mode Fibers; Graded – index Fiber Structure; Fiber Materials; Fiber Fabrication; Mechanical Properties Of Fibers; Fiber Optic Cables.

I (1.1,1.2,2.1,2.2,2.3,2.5,2.6,2.7,2.9,2.10,2.11)

8 **UNIT – II**

SIGNAL DEGRADATION IN OPTICAL FIBERS **07 hrs**

Attenuation; Signal Distortion in Fibers; Characteristics of Single – Mode Fibers; Specialty Fibers.

I (3.1, 3.2, 3.3, 3.5)

9 **UNIT – III**

OPTICAL SOURCES AND DETECTORS **08 hrs**

Topics from Semiconductor Physics; Light Emitting Diodes; Laser Diodes; Physical principles of Photodiodes; Photo Detector Noise; Detector Response Time.

I (4.1, 4.2, 4.3, 6.1, 6.2, 6.3)

10 **UNIT – IV**

10.1 POWER LAUNCHING AND COUPLING **08 hrs**

Source – to – fiber Power launching; Lensing Schemes for Coupling Improvement; Fiber-to-Fiber Joints; LED Coupling to Single-Mode Fibers; Fiber Splicing; Optical Fiber Connectors.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6)

11 **UNIT – V**

11.1 OPTICAL RECEIVER OPERATION **08 hrs**

Fundamental Receiver Operation; Digital Receiver Performance; Eye Diagrams; Coherent Detection; Burst Mode Receivers.

I (7.1, 7.2, 7.3, 7.4, 7.5)

12 **UNIT – VI**

12.1 ANALOG LINKS **07 hrs**

Overview of Analog Links; Carrier-to-Noise Ratio; Multichannel Transmission Techniques; RF Over Fiber.

I (9.1, 9.2, 9.3, 9.4)

13 **UNIT – VII**

13.1 DIGITAL LINKS **07 hrs**

Point-to-point Links; Power penalties; Error Control.

I (8.1, 8.2, 8.3)

14 **UNIT – VIII**

14.1

14.2 ADVANCED SYSTEMS AND TECHNIQUES **08 hrs**

Overview of WDM; Passive Optical Couplers; Basic Applications and Types of Optical Amplifiers; Semiconductor Optical Amplifiers; Network Concepts; SONET/SDH ;

High-Speed Light wave links.

I (10.1, 10.2, 11.1, 11.2, 13.1, 13.3, 13.4)

Text Book:

I. Optical Fiber Communications: Gerd Keiser 4th Edition, Mc Graw Hill Publications.

Reference books:

1. Fiber – Optic Communication Systems : Govind P Agarwal , John Wiley Publications, 4th Edition. April 2010.
2. **Optical Communication System – John Gower,** (PHI) Second Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 131 ADVANCED COMMUNICATION SYSTEMS

UNIT-I

OPTICAL FIBER TRANSMISSION MEDIA **08 hrs**

Introduction; History of optical fiber communications; Optical Fibers versus Metallic Cable Facilities; Electromagnetic Spectrum; Block Diagram of an Optical Fiber Communications System; Optical Fiber Types; Light Propagation; Optical Fiber Configurations; Losses in Optical Fiber Cables; Light Sources; Optical Sources; Light Detectors; LASERs; Optical Fiber System Link Budget.

I (13.1 to 13.15)

UNIT-II

CELLULAR TELEPHONE CONCEPTS **07 hrs**

Introduction; Mobile Telephone Service; Evolution of Cellular Telephone; Cellular Telephone; Frequency Reuse; Interference; Cell Splitting, Sectoring, Segmentation and Dualization; Cellular System Topology; Roaming and Handoffs; Cellular Telephone Network Components; Cellular Telephone Call Processing.

I (19.1 to 19.11)

UNIT-III

CELLULAR TELEPHONE SYSTEMS **08 hrs**

Introduction; First-Generation Analog Cellular Telephone; Personal Communications System; Second-Generation Cellular Telephone Systems;

N-amps; Digital Cellular Telephone; Interim Standard 95 (IS-95); North American Cellular and PCS Summary.; Global System for Mobile Communications; Personal Satellite Communications System.

I (20.1 to 20.10)

UNIT-IV

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING 07 hrs

Introduction; history of data communications; Data Communications Network Architecture, Protocols and Standards; Standards Organizations for Data Communication; Layered Network Architecture; Open Systems Interconnection; Data Communications Circuits; Serial and Parallel Data Transmission; Data Communications Circuit Arrangements; Data Communication Networks; Alternate Protocol Suites.

I (21.1 to 21.11)

UNIT-V

FUNDAMENTAL CONCEPTS OF DATA COMMUNICATIONS 08 hrs

Introduction; Data Communication Codes; Bar Codes; Error Control; Error Detection; Error Correction; Character Synchronization; Data Communications Hardware; Data Communication Circuits; Line Control Unit; Serial Interfaces; Data Communications MODEMs; ITU-T MODEM Recommendations.

I (22.1 to 22.13)

UNIT-VI

DATA-LINK PROTOCOLS AND DATA COMMUNICATIONS NETWORKS 08 hrs

Introduction; Data-Link Protocol Functions; Character- and Bit-oriented Data-Link Protocols; Asynchronous Data-Link Protocols; Synchronous Data-Link Protocols; Synchronous Data-Link Control; High-level Data-Link Control; Public Switched Data Networks; CCITT X.25 user-to-network Interface Protocol; Integrated Services Digital Network; Asynchronous Transfer Mode; Local Area Networks; Ethernet.

I (23.1 to 23.13)

UNIT-VII

SATELLITE COMMUNICATIONS 07 hrs

Introduction; History of Satellites; Kepler's Laws; Satellite Orbits; Geosynchronous Satellites; Antenna Look Angles; Satellite Antenna Radiation Patterns: Footprints; Satellite System Link Models; Satellite System Parameters; Satellite System Link Equations; Link Budget.

I (25.1 to 25.12)

UNIT-VIII

SATELLITE MULTIPLE ACCESSING ARRANGEMENTS 07 hrs

Introduction; FDM/FM Satellite Systems; Multiple Accessing; Channel Capacity; Satellite Radio Navigation.

I (26.1 to 26.5)

Text Book:

I. Electronic Communications Systems, Fifth Edition, Wayne Tomasi, Pearson Education Publisher, Second Impression-2009.

Reference Books:

1. Digital Communication Techniques, Signaling and Detection, M.K. Simon, S.M. Hinedi and W.C. Lindsay, PHI, 1995.

2. Modern Digital and Analog Communication System, B.P. Lathi, 1998, 3rd Edition, Oxford University Press.
3. Satellite Communications, Dennis Roddy, Fourth edition, 2006, TMH Publisher.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 132 MULTIMEDIA SYSTEMS

UNIT I

INTRODUCTION TO MULTIMEDIA **08 hrs**

What is Multimedia – Components of Multimedia, Multimedia and Hypermedia – History of multimedia, Hypermedia and Multimedia, Overview of Multimedia Software Tools – Music sequencing and Notation, Digital Audio, Graphics and Image Editing, Video Editing, Animation, Multimedia Authoring

MULTIMEDIA AUTHORING AND TOOLS

Some Useful Editing and Authoring Tools – Adobe premiere, Macromedia Director, Macromedia Flash, Dreamweaver, VRML – Overview, Animation and Interactions, VRML Specifics

GRAPHICS AND IMAGE DATA REPRESENTATION

Graphics/Image Data types – 1-Bit Images, 8-Bit Gray – Level Images, Image Data Types, 24-bit Color Images, 8-Bit Color Images, Color Lookup Tables (LUTs), Popular File Formats – GIF, JPEG, PNG,TIFF, EXIF, Graphics Animation files, PS and PDF, Windows BMP

I (1.1, 1.2, 1.4, 2.2, 2.3, 3.1, 3.2)

UNIT II

COLOR IN IMAGE AND VIDEO **08 hrs**

Color Science – Light and Spectra, Human Vision, Spectral Sensitivity of the Eye, Image Formation, Camera systems, Color Models in Images – RGB Color Model for CRT Displays, Subtractive Color: CMY Color Model, Transformation from RGB to CMY, Color Models in Video – Video Color Transforms, YUV Color Model, YIQ Color Model, YCbCr Color Model

FUNDAMENTAL CONCEPTS IN VIDEO

Types of Video Signals – Components Video, Composite Video, S-Video, Anlog Video – NTSC Video, PAL Video, SECAM Video, Digital Video – Chroma Sub sampling, CCIR Standards for Digital Video, High Definition TV (HDTV)

I (4.1, 4.2, 4.3, 5.1 to 5.3)

UNIT III

BASICS OF DIGITAL AUDIO **08 hrs**

Digitization of Sound - What is Sound, Digitization, Nyquist Theorem, Signal-to-Noise Ratio(SNR), Signal-to-Quantization-Noise ratio(SQNR), Audio Quality versus Data Rate, MIDI – MIDI Overview, Hardware Aspects of MIDI, Structure of MIDI Messages, Quantization and Transmission of Audio – Coding of Audio, Pulse Code Modulation, Differential Coding of Audio, Lossless predictive Coding, DPCM, ADPCM

LOSSLESS COMPRESSION ALGORITHMS

Introduction , Basics of Information Theory, Run-length Coding, Variable Length Coding - Huffman Coding, Adaptive Huffman Coding, Dictionary Based Coding, Arithmetic Coding. Lossless Image Compression- Differential Coding Images, Lossless JPEG.

I (6.1 to 6.3, 7.1 to 7.7)

UNIT IV

LOSSY COMPRESSION ALGORITHMS 07 hrs

Introduction, Transform coding – Discrete Cosine Transform, Karhunen-Loeve Transform, Wavelet-Based Coding – Introduction, Continuous Wavelet Transform Discrete Wavelet Transform

IMAGE COMPRESSION STANDARDS

The JPEG Standard – Main Steps in JPEG Image Compression, JPEG Modes, A Glance at the JPEG BitStream, The JPEG2000 Standard

I (8.1, 8.5, 8.6, 9.1)

UNIT V

BASIC VIDEO COMPRESSION TECHNIQUES 08 hrs

Introduction to Video Compression, H.261 – Intra-Frame (I-Frame) Coding, Inter-Frame (P – Frame) predictive coding, Quantization in H.261, H.261 encoder and Decoder, H.263 – Motion Compensation in H.263, Optional H.263 Coding Modes, H.263+ and H.263++

MPEG VIDEO CODING I – MPEG-1 and 2

Overview , MPEG -1 – Motion Compensation in MPEG – 1, other major differences form H.261, MPEG-1 Video Bitstream, MPEG-2 – Supporting interlaced Video , other major differences from MPEG-1

I (10.1, 10.4, 10.5, 11.1, 11.2, 11.3)

UNIT VI

MPEG VIDEO II – MPEG-4, 7, AND BEYOND 07 hrs

Overview of MPEG-4, Object-Based Visual Coding in MPEG-4, MPEG-7, MPEG-21

I (12.1, 12.2, 12.6, 12.7)

UNIT VII

BASIC AUDIO COMPRESSION TECHNIQUES 07 hrs

ADPCM in Speech Coding – ADPCM, G.726 ADPCM, Vocoders

MPEG AUDIO COMPRESSION

MPEG Audio – MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithm

I (13.1 to 13.3, 14.2)

UNIT VIII

MULTIMEDIA NETWORK COMMUNICATION AND APPLICATIONS 07 hrs

Quality of Multimedia Data Transmission – Quality of service (QoS) , Multimedia over IP – IP – Multicast, RTP (Real-time Transport Protocol), Real-time Control protocol(RTCP), Resource ReServation protocol (RSVP), Real-Time Streaming protocol (RTSP), Internet Telephony, Multimedia over ATM Networks - Video Bitrates over ATM, ATM Adaptation Layer (AAL), Multicast over ATM, Transport of MPEG – 4 , Media on Demand

I (14.2, 16.1 to 16.3)

Text Book:

I. Fundamentals of Multimedia, Ze-Nian Li and Mark S. Drew, Prentice Hall, Edition – 2010

Reference Books:

1. **Multimedia Fundamentals: Volume 1 – Media Coding and Content Processing, Ralf Steinmetz, Klara Narsted, 2nd Edition, Pearson Education/PHI, 2003**
2. Multimedia System Design, **Prabhat K. Andleigh** , Kiran Thakrar, PHI, 2003
3. Principles of Multimedia, Ranjan Parekh, Tata McGraw-Hill, Edition 2006

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE 133 DSP ALGORITHMS AND ARCHEITECTURE

UNIT I

INTRODUCTION TO DIGITAL SIGNAL PROCESSING 07hrs

Introduction, A Digital signal –processing system, Programmable Digital Signal Processors, Major Features of Programmable Digital Processors, The Sampling Process, Discrete Time sequences, Discrete Fourier (DFT) and Fast Fourier Transform (FFT), Linear Time-invariant systems, Digital filters, Decimation and Interpolation.

I (1.1,1.2,1.3,2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8)

UNIT II

ARCHITECTURES FOR PROGRAMMABLE DIGITAL SIGNAL PROCESSORS 08hrs

Introduction, Basic Architectural Features, DSP Computational building blocks, Bus Architecture and Memory. Data Addressing Capabilities, Address Generation unit, Programmability and program Execution, Features for External interfacing, Speed Issues.

I (4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8)

UNIT III

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS 07 hrs

Introduction, Commercial Digital Signal-Processing Devices, Data Addressing Modes of TMS320C54xx,Memory Space of TMS320C54xx Processors, Program control.

I (5.1,5.2,5.3.5.4,5.5,5.6,5.7)

UNIT IV

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS (CONTINUED) AND DEVLOPMENT TOOLS FOR DSP IMPLEMENTATIONS 08 hrs

On Chip Pheripherals, Interrupts of TMS320C54xx Processors, DSP Development tools, DSP System Design kit(DSK), Software for Development.

I (5.8,5.9,6.1,6.2,6.3,6.4)

UNIT V

IMPLEMENTATION OF BASIC DSP ALGORITHMS 07 hrs

Introduction, The Q-notation, FIR filters, IIR Filters, Interpolation and Decimation Filters.(one example in each case).

I (7.1,7.2,7.3.7.4,7.5,7.6)

UNIT VI

IMPLEMENTATION OF FFT ALGORITHMS 08hrs

Introduction, An FFT Algorithm for DFT Computation, Overflow and Scaling, Bit-Reversed Index Generation and implementation on the TMS320C54xx.

I (8.1,8.2,8.3.8.4,8.5,8.6)

UNIT VII

INTERFACING MEMORY AND PARALLEL TO I/O PERIPHERALS TO DSP DEVICES 08 hrs

Introduction, Memory Space Organisation, External Bus Interfacing Signals, Memory Interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O Direct Memory Access(DMA).

I (9.1,9.2,9.3.9.4,9.5,9.6,9.7,9.8)

UNIT VIII

INTERFACING AND APPLICATIONS OF DSP PROCESSOR 07 hrs

Introduction, Synchronous Serial Interface, A CODEC Interface Circuit, DSP Based Bio-telemetry Receiver, A Speech Processing System, An Image Processing System.

I (10.1,10.2,10.4,10.5,10.7,11.4,11.5)

Text book:

I. Digital Signal Processing, Avtar Singh and S.Srinivasan, Thomson Learning, Cengage learning, 2004

Reference books:

1. Digital Signal Processing: A practical approach, E. C. Ifeachor and B. W. Jevis, Pearson-Education, PHI, 2002
2. Digital Signal processors, B Venkataramani and M.Bhaskar, TMH, 2002
3. Architectures for Digital Signal Processing, Peter Pirsch, John Weily, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

GENERAL GUIDELINES for AMIETE Project work and Seminar

PROJECT WORK

15 Eligibility

For eligibility students may refer to the website **www.iete.org**

16

The project will consist of hardware/software, design/development, experimental / theoretical work of a contemporary topic or a combination of these. There will be no joint project work.
The students may work for the project in any industry, in any educational institution or in R&D laboratory. The student will be required to have a project guide from one of these places who can supervise and guide. In case of difficulties, the students may contact the local centre.
Pass marks for the project will be 5 CGPA. Students not getting 5 CGPA marks will be required to re-register for the project following the usual procedure. The students will have the option of taking up a new project or continue with the earlier project.

17 **AE 135 Project work;**

Eligible students are required to forward their applications for registration of Project Work to the respective IETE Centres/Sub Centres where the examinations are conducted. The applications should include the synopsis of the Project Work, guide's bio-data and his willingness letter to guide the student, along with requisite project fees.

Project guide

Project guide can be chosen from any one of the following categories

(a) An academic person with a Master's qualification in Engineering having atleast 5 years of experience
(b) A person working in industry/institution with a Bachelor's degree in Engineering having atleast 10 years of experience
(c) IETE corporate member with 10 years of experience

AE 135 Project work;

18 Execution of the Project Approved and Submission of Project Reports

A student is expected to put in at least 6 hours/week spread over a period of 12 weeks for the project after the same has been approved.
Two bound copies of the project report are required to be submitted by the student (one copy for Evaluation board & one copy for IETE HQ record) to their respective local Centres who will intimate the date, time and venue for appearing before the Evaluation Board & presentation of the Project Work by the student.

19 Evaluation Board

The Regional Evaluation Board already set up for scrutinizing of the proposals will also form the Evaluation Board for assessment of the final Project Reports with one of the member acting as Chairman of the Evaluation Board. **IETE Centre will only act as facilitator and are not to be associated with the Examination Work**.

Evaluation is for 200 Marks (8 Credits)

The following points are required to be checked by the Evaluation Board at the time of assessment of the Project Reports.

(a) **Time Limit;** The Project Report is required to be completed within a period of one year.
(b) **Project Report;** The Project Report should contain the following certificate from the guide:

20 CERTIFICATE

This is to certify that this is a bonafide record of the Project Work done satisfactorily at _____ by Mr/Ms. _____ in partial fulfillment of his/her AMIETE Examination. This report has not been submitted for any other examination and does not form part of any other course undergone by the candidate.

(Signature, Name, Designation
and Address of the Guide with the seal of
the Organization/Institution/Laboratory)

21

22 **Project Fee**

Project Fee of Rs.1500/- is required to be submitted by the student while forwarding his/her application for the project work. The DD of requisite amount is to be drawn in favour of the IETE Centre.

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AE 136 SEMINAR

Eligibility:
For eligibility students may refer to the website **www.iete.org**

Registration:
Eligible students are required to submit their applications for the registration of seminar to the respective Centres/Sub-Centres where the examinations are conducted with a brief write up of the topic selected for approval. Seminar topic should be selected from the emerging technologies in ET,CS,IT only. Students who have undergone industrial training may make their presentation of their training report.

Scrutiny/Approval of Seminar proposals:
The members of Regional Evaluation Board will approve the topic of seminar. The students should make presentation on approved topics only.

Seminar Fees:
Each student is required to pay Rs.600/- Seminar fee to the respective IETE Centre/Sub-Centre.

Examination/Evaluation:
The IETE Centre / Sub-Centre will fix up a suitable date immediately after the main examination for the conduct of Seminar. The students should make Power Point presentation on the approved topic. In addition, they have to submit a complete report on the Seminar topic presented.

Evaluation is for 100 Marks (4 Credits)

AE138 (WRITTEN) COMMUNICATION SKILLS AND TECHNICAL WRITING

UNIT I

COMMUNICATION: ITS TYPES AND SIGNIFICANCE **06 hrs**

What is Communication; Process of Communication; Types of communication; The Media of Communication; Barriers in Communication; Effective Communication.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

UNIT II

GRAMMAR **07 hrs**

Synonyms; Antonyms; Words used as different parts of Speech; Spotting errors; Concord; Principle of proximity between subject and verb.

I (4.1, 4.2, 4.3, 4.6, 4.7, 4.8)

UNIT III

SYNTAX **06 hrs**

Sentence Structure; Combination of Sentences; Transformation of Sentences; Verb Patterns in English.

I (5.1, 5.2, 5.3, 5.4)

UNIT IV

READING SKILLS **07 hrs**

The Purpose of Reading; The Process of Reading; How to get Concentration in Reading; How to Develop Reading Skills; Reading Strategies; Reading Comprehension; Paraphrase; Preparing outlines.

I (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.10, 2.11)

UNIT V

WRITING SKILLS **07 hrs**

Effective Writing; Job Application, Bio-data, Personal Resume and Curriculum Vitae; Agenda and Minutes of a Meeting; Back office job for organizing a conference/seminar; Writing Styles; Scientific and Technical Writing; Precis Writing; Writing Sum and Substance; Writing paragraphs; Writing Essays.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.11)

UNIT VI

23 **LISTENING SKILLS** **04 hrs**

23.1 The Process of listening; Two Styles of Communication; Soft Skills; Feedback Skills; Essentials of Good Communications; Types of Listening; Barriers to Listening; Note taking and Note making Listening.

I (8.1, 8.2, 8.3, 8.4, 8.6, 8.7 8.8, 8.9, 8.10)

SPEAKING SKILLS **03 hrs**

Skills of Effective Speaking; The Components of an Effective Talk; Tone of Voice; Body Language; Timing and Duration of Speech; Audio-Visual Aids in Speech.

I (9.1, 9.2, 9.4, 9.5, 9.6, 9.7)

24 **UNIT VII**

TECHNICAL REPORT AND SCIENTIFIC REPORT **06 hrs**

Writing a good report; Types of Report; Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports.

I (15.1, 15.2, 15.3, 15.4, 15.5, 15.8, 15.9)

UNIT VIII

CAMPUS RECRUITMENT, INTERVIEW AND GROUP DISCUSSION 03 hrs

Main Features of Campus Recruitment; Tips for giving an Interview; Body language for Interviews; Group Discussion.

I (10.1, 10.2, 10.3, 10.4)

MEETINGS NEGOTIATIONS, PHONE AND MOBILE PHONE SKILLS 03 hrs

Conducting Meetings, Skills for Participating in a Meeting; Attending Telephonic Calls; Soft Skills for Global Leadership.

I (11.1, 11.2, 11.5, Chapter 16)

Text Book:

I. The Functional Aspects of Communication Skills, Prajapati Prasad, S. K. Kataria & Sons, New Delhi, Fifth Edition, July 2011-12.

25

26 **Reference Books:**

1. Business Communication, Sinha K. K, S. Chand, New Delhi.
2. Business Communication, Asha Kaul, Prentice Hall of India.
3. Business Correspondence and Report Writing: A Practical Approach to Business and Technical Communication, Sharma, R.C. and Krishna Mohan, Tata McGraw-Hill.
4. A New Approach to English Grammar for High Schools, Madan Sabina, Spectrum Books, New Delhi.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

NOTE: Examination procedure.

(a) Theory: Consists of written examination for 80 marks.

(b) Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 12 marks.

AE 137 (ORAL)

(c) Oral Test: Consists of an Oral Test to test the Communication Skills which includes

an oral presentation on any subject, of the choice of students (e.g. About IETE, General knowledge topics etc.). This presentation need not be on technical subject. This test carries 20 marks.

AE 139 Quality Assurance & Reliability *

The dynamic nature of electronic Industry in terms of introduction of new technologies at rapid pace, increasing consumer awareness and the imperatives of stiff competition demand that the products being developed and released into the market meet the stringent Quality & Reliability assurance requirements. The proposed course at undergraduates level aims to address the following topics of interest to electronics and computer engineers.

- Fundamentals of Quality assurance & Reliability.
- Specific QA requirements of Electronics products
- Component selection
- Design for reliability (FMECA, Derating, worst case analysis…)
- Process control for electronics fabrication
- Electro static discharge Control
- Product evaluation including environmental testing
- Reliability Assurance – Definitions, apportionment, prediction and demonstration.
- Applicable Standards
- Software assurance fundamentals
- Special requirements of Hi-rel application(Space, defence etc.,)
-

The emphasis will be more on familiarizing the tools necessary to inculate quality awareness and provide further guidance, incase some one likes to pursue specific topics of interest. Insight into the existing analytical tools, current practices and their application potentical will be highlighted.

*(Elective which will be included)

AE 140 Foundation Course on EMI-EMC

The course includes the basics of Electromagnetic Interference and Compatibility. The Engineers need to well-equip with the concept of EMI/EMC to handle the EMI problems in a systematic way. The course mainly focuses on the design criterias to be taken into considerations to realize a EMI/EMC compliant system. The syllabus also addresses the practical aspects of electromagnetic compatibility engineering ideas covering emissions and susceptibility.

Unit-1

Introduction: History and concept of EMI, definitions of EMI-EMC, Sources of Electromagnetic noise, typical nose paths, EMI-EMC requirements for commercial and military applications(IEC and MIL-STD-461 standards).

Unit-2

Cabling and Grounding: Cable types: coax, twisted pair and ribbon cables. Cable shielding, terminations. Electric and Magnetic field coupling. Grounding systems: single point, multipoint, and hybrid. Ground loops, Return current paths, signal and power grounds, EMC grounding philosophy, AC power grounds.

Unit-3

Shielding and bonding: Effectiveness of shielding, near and far fields/impedances, total loss due to absorption and reflection effects, magnetic materials as shield, shield discontinuities, slots and holes, seams and joints, conductive gaskets. Electrical bonding, Characteristics of good bonds.

Unit-4

Conducted emissions and susceptibility: Introduction to current probes, Line Impedance Stabilisation Network (LISN), Concept of common mode and differential mode currents, typical power line filters to reduce common mode and differential mode noise. Switched Mode Power Supplies (SMPS).

Unit-5

Radiated emissions and susceptibility: Simple Radiated emission models for wires: Differential and common mode current emission models. Simple susceptibility models for wires. Coaxial cables: Surface and transfer impedances.

Unit-6

EMC Applications : Digital Circuit Power Distribution, Digital Circuit Radiation, PCB layout and Stackup

Unit-7

Electrostatic Discharge (ESD): Basics of ESD: Static generation and discharge, Human body model, basics of ESD protection and mitigation techniques. ESD grounding, Field induced upsets.

Unit-8

Precompliance EMC Measurements: Near Field Measurements, Noise voltage Measurement, Condcuted Emission Testing, Precompliance Immunity Testing

References:

1. C.R. Paul, “Introduction to Electromagnetic Compatibility”, John Wiley series.
2. Henry W.Ott, “Electromagnetic Compatibility Engineering”, John Wiley series.

*(Elective which will be included)

Appendix-'I'

RECOGNITION BY GOVERNMENT OF INDIA STATE GOVERNMENTS/UNIVERSITIES/INSTITUTIONS

The following State Governments/Universities/Institutions have recognized the Graduate-ship Examination AMIETE for the purpose of Recruitment to Superior Services/Posts/Higher Education.

State Governments

1.	Govt. of Kerala	-	Gazette No. 7 dt.14 February 1978 Part I General administration (Rules Department) G O (P) No.60/78 GAD.
2.	Govt. of Uttar Pradesh	-	Pravidhik Shiksha Vibhag, Lucknow (UP) No. 2031 – F/89-18 dt. 01 April 1989. Office Memorandum.
3.	Govt. of Nepal	-	Nepal Public Service Commission letter dated 10.05.1990.

Universities

1.	Association of Indian Universities	-	No. EV/II (515)/2010/1307 dated 30 Sept 2010
2.	Anna University, Madras	-	Letter No. 26869/AA1/88 dt. 4.02.89 from the Registrar
3.	Andhra University, Waltair	-	Letter No. LII(3)/19 15/90 dt. 08.07.1992
4.	Amaravati University	-	Gazette Notification No. 46/1992 dt. 14th May, 1992
5.	Banaras Hindu University,Varanasi-		No. IT/ACD/GEN/VI – 7/689 dt. 21.09.1994.
6.	Bharatidasan University, Tiruchirapali-		No. 10656/D2/93 dt. 28.10.1993
7.	Bombay University, Mumbai	-	Letter no. E1/C/8155 dt. 22 November, 1988 from the Registrar.
8.	Calcutta University	-	Resolution No. 319/75 Secy dt. 10.06.1991

9.	Cochin University of Science and Technology	-	University Order No. AC, 3/213559/84 dt. 05.09.1984.
10.	University of Indore (Now Devi Ahilya Viswavidyalaya)	-	No. ACM-II (195)/79 dt. 11.01.1980
11.	Goa University, Goa	-	No. GU/1/Recog/Engg/130/94 18259 dt. 09.12.1994
12.	Gulbarga University, Gulbarga	-	Notification No. UOG/ACA/92-93/2569 dt.17.10.1992
13.	Gurunanak Dev University Amritsar	-	D.O. No. 3688 dt. 11.02.1986
14.	HNB Garhwal University	-	No. UOG/Acad/92/2657 dt. 11.02.1992
15.	Hyderabad University	-	Acad/U2/Recog/3941(1) dt. 23.08.1990
16.	Indira Gandhi Nation Open University	-	No. B.IV/6/(8)/93/1155 dt. 6.06.1993.
17.	Kakatiya University Warangal (AP)	-	No. 868/81/1985 dt. 26.07.1985.
18.	Kerala University, Trivandrum	-	No. Acad. AIII/3/3 300/94 dt. 12.08.1994
19.	Kurukshetra University Kurukshetra	-	No. ACM.II/267/92/32413 dt. 26.12.1992
20.	Kuvempu University	-	No. KU/AC/BOS-I/2929/93-94 dt. 28/29.07/1993.
21.	University of Madras	-	No. CR III/Recog/2029 dt. 23rd March 1978
22.	Mother Teresa Women's University,	-	No. 2/EC/WU/R/1992. Dt 18.11.92 (Resolution Chennai No. 1992-113)
23.	Mysore University	-	No. AC5/R5/407/87-88 dt. 28.05.91
24.	Maharshi Dayanand University Rohtak	-	Resolution. No. 50 of 25.09.1989
25.	Marathwada University	-	Ex/EQUI-Misc-41/89-90/50660-92 dt 18.09.1989.
26.	Nagpur University	-	Exam/Recog/4276 dt. 05.09.1984
27.	Nirma University, Ahmedabad	-	No. NU/AC/Equivalence/IT/10-1078 dt:30.07.2010

28.	Pondicherry University	-	No. PU/Aca-2/3/5681 dt. 26.02.1993
29.	Punjab University	-	No. 2724/GM dt. 03.12.1991 ST 996 dt18.02.1986
30.	Rani Durgavati Viswa Vidyalaya, Jabalpur	-	Notifications No. GS/89/66
31.	University of Roorkee (Now IIT, Roorkee)	-	No. Acd/1160/R-122 (Recog.) dt. 10.06.92
32.	Sardar Patel University	-	DB/38 dt. 25.04.1994.
33.	Shivaji University, Kolhapur	-	Letter No. SU/Eligi/340 dt. 30 May 1989
34.	Tribhuvan University Kathmandu, Nepal-		Letter No. 107/041 dt. 31st July 1984
35.	Sri Venkateswara (Tirupati) University-		Letter No. 27-826-C 1 (2)/89 dt. 16.11.1989.
36.	Visva Bharati	-	No. G/D 43/163 dt. 13.11.1992
37.	Bharathiar University, Coimbatore	-	No. 1603/B/2/95/Recog. Dt. 18.09.1995
38.	Bangalore University	-	No. ACA-I/R2/Prof. Course/ AMIETE/96-97 dt 28.01.1997.
39.	Sambalpur University	-	Notification No. 10420/Acad I dt. 10.07.1978.
40.	Bengal Engg. College, Howrah	-	Notification – Admission to Post Graduate (Deemed University) Programme 1999-2000.
41.	GGS Indraprastha University, Delhi	-	No. F IPV-3/10(1)/99/6246 dt 23/24-10-2000.
42.	University of Jammu	-	Letter No. F Acad/V/122/2001/8548-49 dt
43.	Gujarat University	-	No. Exam / 3A / Eli / 6370 / 2002 dt. 12.09.2002.
44.	UP Technical University, Lucknow	-	No. U.P.T.U./ K.S.K./ 2003 / 1815 dt. 22.05.2003.10.03.2001.

Institutions

1.	Indian Institute of Science, Bangalore-	As per IISC advertisement.
2.	Indian Institute of Technology Delhi -	BPGS/75/96/207 and Item No. 2 of the minutes of 38th Senate meeting at 18.10.1975.
3.	Indian Institute of Technology, Chennai-	Letter No. F /Acad/ACU/M2/86/658 dt.17.06.1986.
4.	Indian Institute of Technology, Mumbai-	D-III/1-9/94/523 dt 21.07.1994.
5.	Indian School of Mines, Dhanbad -	Letter No. 29.6/2/AC/84 dt. 14.06.1984
6.	Thapar Instt. of Engg & Tech., Patiala-	Letter No. EE/702/32 dt. 02 February 1990.
7.	Institution of Engineers (I) -	Letter No. EEA/AD/7 dt 29.04.1998.

Annexure - I

No.F.18-13/73-T-2.
Government of India
Ministry of Education & Social Welfare
Department of Education

New Delhi-110001, dated the 28th June, '75.

OFFICE MEMORANDUM

Subject: Recognition of Technical and Professional Qualifications.

In continuation of this Ministry's O.M.No.18-94/61-T-2, dated 17th December, 1969 (copy enclosed), this is to inform that on the recommendations of the Board of Assessment for Educational Qualifications, the Government of India have decided that a pass in the examinations of the Indian Professional Bodies/Institutions partly by exemption and partly by examination would continue to be treated as recognised for purposes of recruitment to superior posts and services under the Central Government.

(V.R. Reddy)
Deputy Educational Adviser(T).

To

All Ministries/Departments of the Government of India/State Governments, etc.,

Annexure -II

No. F.18-4/85-T.7
Government of India
Ministry of Human Resource Development,
(Department of Education)

New Delhi, the
26th February, 1986.

To

Shri K.Thomas Kora,
President,
The Institution of Electronics and
Tele-communication Engineers,
2, Institutional Area, Lodi Road,
New Delhi - 110003.

Sub:- Recognition of Educational Qualifications

Sir,

With reference to your letter No. IETE/738/Exam/85 dated 20th December, 1985 on the subject cited above, I am directed to confirm that a pass in the Examination of the Indian Professional bodies/Institution partly by exemption and partly by examination should be treated as recognised by the Govt. of India for the purpose of recruitment to superior posts and services under the Central Govt. and the recognition still holds good for the above purpose.

Yours faithfully,

(S.N. Chakraborti)
Deputy Educational Adviser (Tech.)

Annexure - III

No.F.17/2/76-E.I(B).
UNION PUBLIC SERVICE COMMISSION
DHOLPUR HOUSE
....

New Delhi-110011, the 31/12/77
2/1/78

To

The Secretary,
The Institution of Electronics and Tele-
Communication Engineers,
2, Institutional Area,
Lodi Road, New Delhi-110003.

Subject:-Graduateship Examination of the Institution of Electronics and Tele-communication Engineers - Question of eligibility of candidates with the qualification for admission to the IAS etc. and other Examinations conducted by the UPSC.

Sir,

In continuation of this office letter of even number dated the 28th October, 1976, on the subject noted above, I am directed to enclose a copy of the Press Note regarding the recognition of technical and professional qualifications for the purpose of admission to the IAS etc. and other Examinations conducted by the Union Public Service Commission for recruitment to non-technical Services and posts under the Central Government.

Yours faithfully,

(B. DASGUPTA)
Under Secretary,
Union Public Service Commission.
....

Annexure - IV

भारतीय विश्वविद्यालय संघ
ए आई यू हाउस, 16, कॉमरेड इन्द्रजीत गुप्ता मार्ग
(कोटला मार्ग) नई दिल्ली-110002
Association of Indian Universities
AIU House, 16, Comrade Indrajit Gupta Marg (Kotla Marg)
New Delhi 110 002

NO: EV/II(515)/2010/ 1307
September 30, 2010

The Secretary General,
Institution of Electronics &
Telecommunication Engineering
2 Institutional Area, Lodhi Road
New Delhi -110003.

Dear Sir,

This has reference to your letter No. IETE/738/2010/Recog-AMIET dated September 17, 2010 seeking clarification on the parity of Associate Membership Examination of Institution of Electronics and Telecommunication, New Delhi.

We would like to mention that 'Associate Membership (Graduateship) Examination of Institution of Electronics and Telecommunication Engineers (IETE), Lodhi Road, New Delhi has been recognized by the Government of India for purpose of employment where Bachelor degree in Engineering is prescribed qualification.

As IETE Examinations are recognized by the Government of India, we do not foresee any difficulty in acceptance of the qualifications at Indian Universities, on merits of admission to higher courses.

Thanking you,

Yours faithfully,

Sambhav Srivastava
Section Officer (Ev)

(7)

उत्तर प्रदेश शासन
प्राविधिक शिक्षा अनुभाग-1
संख्या-2031-एक/89-18-प्रा0 शि0-1-4 /79.
लखनऊ, दिनांक 15 जुलाई, 1989.

कार्यालय-ज्ञाप

अधोहस्ताक्षरी को यह कहने का निदेश हुआ है कि राज्यपाल महोदय इन्स्टीट्यूट ऑफ इलेक्ट्रानिक्स एण्ड टेलीकम्यूनिकेशन इंजीनियर्स नई दिल्ली द्वारा आयोजित ग्रेजुएट-आई0 ई0 टी0 ई0 परीक्षा को राज्य सेवाओं में, जिनमें बी0 ई0/बी0 टेक0 की अर्हता निर्धारित हो, को भी समान पात्रता प्रदान किये जाने की मान्यता प्रदान करते हैं।

वृजेश कुमार,
सचिव।

संख्या-2031-एक॥1/89-18-प्रा0 शि0-1-4 0/79, तद्दिनांक

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित :--

॥1॥ सचिव, इन्स्टीट्यूट ऑफ इलेक्ट्रानिक्स एण्ड टेलीकम्यूनिकेशन इंजीनियर्स, 2 इन्स्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110003 को उनके पत्र संख्या-आई0 ई0 टी0 ई0/7308/111/89/ दिनांक 7-4-89 के सन्दर्भ में।
॥2॥ सचिव, लोक सेवा आयोग, उत्तर प्रदेश, इलाहाबाद को संयुक्त सचिव, लोक सेवा आयोग के अशासकीय पत्र सं0-566/34/सेस-7/83-84, दिनांक 23-5-84 के सन्दर्भ में।
॥3॥ निदेशक, प्राविधिक शिक्षा, उत्तर प्रदेश, कानपुर।
॥4॥ कुल सचिव, रुहेली खण्ड विश्वविद्यालय, रुहेलखण्ड।
॥5॥ प्रधानाचार्य, राजकीय केन्द्रीय वस्त्र संस्थान, कानपुर।
॥6॥ प्रधानाचार्य, राजकीय चारुकला महाविद्यालय, लखनऊ।
॥7॥ प्रधानाचार्य, मदन मोहन मालवीय इंजी0 कालेज, गोरखपुर।
॥8॥ प्रधानाचार्य, बुन्देलखण्ड इंजी0 कालेज, झांसी।
॥9॥ निदेशक, इन्स्टीट्यूट ऑफ इंजी0 एण्ड टेक्नोलोजी, लखनऊ।
॥10॥ निदेशक, कमला नेहरू इन्स्टीट्यूट ऑफ टेक्नालोजी, सुल्तानपुर।
॥11॥ प्रधानाचार्य, मोतीलाल नेहरू रीजनल इंजी0 कालेज, इलाहाबाद।
॥12॥ निदेशक, एच0 बी0 टी0 आई0, कानपुर।
॥13॥ डीन, पंत कालेज ऑफ टेक्नालोजी, पंतनगर, नैनीताल।
॥14॥ रजिस्ट्रार, दयालबाग इंजी0 कालेज, आगरा।
॥15॥ सचिवालय के समस्त अनुभाग।
॥16॥ सचिव, उत्तर प्रदेश राज्य विद्युत परिषद, लखनऊ।

आज्ञा से,
17.07.89
॥ नरेन्द्र कुमार श्रीवास्तव ॥
अनु सचिव।

24 JUL 1989

Extracts of the Recognitions Granted to Graduateship Examination (AMIETE) by Government of India

Ministry of Scientific Research and Cultural Affairs
(now Ministry of HRD) O.M.
No.F.18.62.57.T.5 dated 24th June 1959

Subject Recognition of Technical and Professional Qualifications

The undersigned is directed to say that the Government of India, on the recommendations of the Board of Assessment for Technical and Professional Qualifications, have decided that a pass in the Graduate membership Examination of the *Institution of Teleqommunication Engineers (India) be recognized for purposes of recruitment to superior posts and services under the Central Government.

Sd/
DVNarsimhan
Deputy Educational Adviser (Tech.)

* Now known as The Institution of Electronics & Telecommunication Engineers (IETE)

Recognition of Graduateship Examination by UPSC

(Extract of the press note regarding the recognition of Technical and Professional Qualification for the purpose of Admission to the lAS etc. and other examination conducted by the Union Public Service commission for Recruitment to Non-technical Service and posts under the Central Government).

Vide letter No.F.17/2/76 (B) dated 31 st December, 1977 the Union Public Service Commission have decided that professional and technical qualifications such as a pass in Section Aand B of the AMIETE Graduateship Examination of Institution of Electronics and Telecommunication Engineers, etc. which are recognized by the Government as equivalent to degree in engineering for purpose of recruitment to superior Services/Posts under the Central Government should also be recognized for purposes of admission to competitive examinations conducted by them for recruitment to non-technical services/posts (viz., the lAS etc. Assistant's Grade and Combined Defence Service Examination) for admission to which a degree of recognized University or equivalent has been prescribed as the basic educational qualification .

Association of Indian Universities: Recognition of AMIETE

(No EV/II (515)/93/42311 dated June 10, 1993)

We thankfully acknowledge your letter NO.IETE/38/93 dated April 19, 1993 addressed to our Secretary General.

We are happy to know that IETE, the country's premier professional body devoted to progress in Electronics and Telecommunication Engineers have conducted three examination of 'C' Level (M.Tech. Level) in Computer science which carries the accreditation of the Ministry of Human Resource Development, Govt. of India. We are also aware thatAMIETE conducted by the Institution is already recognised by the Govt. of India and is accepted by national level GATE. As IETE Examinations are recognised are recognised by Govt. of India, we do not foresee any difficulty in acceptance of the Institution qualifications at Indian Universities, on merits for purpose of admission to higher courses.

We should be glad to write to any university in case of any difficulty to IETE Graduates.

Thanking you,

Yours faithfully,
Sd/
K.C.Kalra
Deputy Secretary

Present Status of Recognition of IETE Courses by MHRD

Current status in respect of IETE writ petition No. W.P.(C.) N. 3239/2013 & CM Appl. 6125/2013 in respect of recognition of its Courses by MHRD.

The above writ petition filed by IETE HQ in Delhi High Court on 13 May 2013 came up for 5th hearing on 09 Jan 2014.

The Hon'ble High Court directed the parties to complete the pleadings before the Joint Registrar on 23 Apr 2014 before the next date of hearing. The Joint Registrar is directed to list these matters before the Court after completion of the pleadings. **Interim Order will continue (Stay)**.

Issued by
Secretary General
For and on behalf of The Institution of Electronics and Telecommunication Engineers (IETE)

Status in respect of recognitions granted for the examinations conducted by IETE.

A writ petition was filed by the Institution in Delhi High Court on 13 May 2013 for quashing the orders of MHRD dated 10 July 2012 and 06 Dec 2012 withdrawing the recognition in perpetuity for equivalence in Central Govt jobs after 31 May 2013. The writ petition came up for hearing on 17 May, 21 May and 23 May 2013.

The Hon'ble High Court, Delhi is pleased to stay the orders of the Ministry of Human Resource Development dated 06 Dec. 2012 with respect to the dead line of 31 May 2013 till the next date of hearing i.e. 06 Aug 2013. However, the admissions, which are made, will be subject to final orders, which will be passed in the writ petition.

The matter came up for further hearing before the Delhi High Court on 06 Aug 2013.

On the last date of hearing of our Writ Petition in Hon. High Court Delhi, following order has been issued

(i) The case listed for next hearing on 9th January 2014.

(ii) The OM dated 6/12/2012 with respect to the dead line of

31/05/2013 qua the petitioners shall remain stayed till further of the Court.

The above statement does not affect students who have passed & enrolled for IETE courses before 31st May 2013.

The last date of hearing of our case regarding recognitions of our courses from MHRD was 9th Jan 2014 in Hon'ble High Court of Delhi. The Hon'ble High Court has decided the interim orders to continue.

Issued by

Secretary General
The Institution of Electronics and Telecommunication Engineers (IETE)

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The matter has now been fixed for further hearing before the Delhi High Court on 06 Aug. 2013.

Issued by

Secretary General
The Institution of Electronics and Telecommunication Engineers (IETE)

Appendix 'I'

MISCELLANEOUS INFORMATION

AWARD FOR AMIETE

- **Eligibility**

To be eligible to get AMIETE a student is required to score a minimum grade D in individual subjects and minimum grade C in Project, Seminar & Lab examinations, and should have CGPA of 5 or more.

- **Procedure for obtaining Certificate of passing AMIETE Section A and B examinations.**

Once all requirements to complete AMIETE are met, students are eligible for award of certificate.

Provisional Certificate/Consolidated Grade Sheet is issued on receipt of

(a) A declaration that the student would not appear for any improvement in future.
(b) A Bank draft of requisite fee for AMIETE Certificate.

Final Degree Certificate is sent to the student within 6 months time or handed over during Convocation Ceremony (usually held in December every year with prior information.)

A student on completion of AMIETE and after paying requisite fee is automatically enrolled as Associate Member .

- **Bonafide Certificate**

Bonafide certificate authenticating student's registration with IETE, is issued to those who are yet to complete the course on a payment of Rs 100/-.

Migration & Character Certificate

For the purpose of admission to other Universities for higher studies, Migration & Character certificate are also issued from IETE HQ on payment of Rs.100/-(US $20) for each

- **Transcripts**

Transcripts (certifying written records) ,student's details, recognition of course passed, duration of the course, medium of instructions, required by Universities abroad. Can be obtained from IETE HQ on payment of Rs.100/- (US $ 20) for each transcript.

- **Duplicate Final Grade Sheet and Certificate**

A student is required to submit an application with the details of membership no., year of completion, stream etc. along with the following documents, in case he requires duplicate Grade Sheet /Certificate

(a) Fee in the form of (DD) in favour of **IETE, and New Delhi,** for Rs 500/- each for Grade sheet and certificate.
(b) An affidavit (on stamp paper of Rs 10/-) affirming and verifying the loss etc. duly signed by a notary.

- **Semester Grade Sheet**

Duplicate Grade Sheet for the past semester examinations can be obtained on payment of Rs 100/- per semester.

Last Date for Enrolment for June exam is 28 February and for December exam is 31 August. Please submit your application preferably 15 days before these dates.

Form IETE-2

THE INSTITUTION OF ELECTRONICS AND TELECOMMUNICATION ENGINEERS (IETE)

2, Institutional Area, Lodhi Road, New Delhi-110 003
Phone: 011-43538858/41/55/56
Email: membership@iete.org

Signature of the candidate

A B
Size of photograph 3.5x3.5cm exact.
*Paste within the box ABCD.
*To be attested by the gazette Officer/ Corporate Member of IETE
C D

To,
The Secretary General, IETE
2, Institutional Area,
Lodhi Road, New Delhi-110 003

Sir

1. I wish to enroll myself as a Student Member of (Please tick √ the course opted by you carefully out of the following)

   AMIETE : Electronics & Telecommunication (ET) ☐
   (Degree level)

2. Name _____
   (In Capital Letters) (Name should be written as per High School Certificate)

3. Date of Birth _____

4. Father's/Husband Name _____

5. Correspondence Address _____
   (In Capital Letter)
   _____
   _____ Dist _____
   State _____ PIN _____

6. Permanent Address _____
   (In Capital Letter)
   _____
   _____ Dist _____
   State _____ PIN _____

7. Phone No. (O)_____ (R)_____ Mobile _____

   Fax _____ Email _____

FOR OFFICE USE ONLY

1. Accepted
2. Withheld/ Rejected with reason
3. Remarks

Mem No. SG-

Student Member (AM) ET/CS/IT

Signature _____

8. Educational Qualifications
(Attach attested copies of certificates Age/ Qualification/ Training/ Study etc.)

Examination Passed	Subjects	Board/ University	Year of Passing	Initial of Proposer(s)
Class 10 with General Science and Maths				
10+2/ Intermediate (Physics and Maths)				
Diploma				
B.Sc / M.Sc/ BE / B.Tech				

9. I enclose herewith Bank Draft No ……Dated ……..for Rs.6000/- Drawn on …… in favour of IETE, New Delhi.(Please see Sl No.10 of Instructions to applicants)

If you are using downloaded form, Please Send a **Photograph (3.5x3.5cms) and Separate Bank Drafts** in the name of IETE, Delhi.
*Rs.350/- - Cost of Regulation. Detailed Syllabus and Postage
*Rs.6000/- - Enrollment Fee

10. Certificate Practical Experience/Training/Study to be filled in by the Head of Dept/ Institution/ Organization (See Bylaw 17 Refer para 2, on page No 4 of the Regulation of DipIETE Examination) or (See Bylaw 15 / Bylaw 16 on page no.4 of the Regulation & Syllabi of AMIETE Examination). I/ We certify that …….. has been studying / working/ engaged ……(Write the field of his working/ study) since …….

Seal of Dept/ Org.

Signature & Date……..……
Name ……..……
Designation …….

11. *PROPOSAR'S RECOMMENDATION (TO BE FILLED BY A CORPORATE MEMBER OF IETE ONLY) Having satisfied myself in respect of the applicant's qualification and experience, I recommend him/ her to the Council as being in every way a fit and proper person to be admitted as a STUDENT MEMBER of the Institution, in accordance with Byelaw 17 (for DipIETE) or Bylaw 15 / Bylaw 16 (for AMIETE).

Mem. No…… Signature & Date……..
Name of the Proposer……

DECLARATION BY THE CANDIDATE

I declare that the information given in this form is accurate to the best of my knowledge. Obligation duly signed is given on the Card enclosed.

Name of the Candidate…… Signature of the Candidate……
Date ……

IMPORTANT

1. The institution of Electronics & Telecommunication Engineers (IETE) neither recognizes nor accepts affiliations of any Private Coaching Institute/ College.
2. Membership form IETE-2 forms part of the Regulation & Syllabi of DIPIETE/AMIETE Examination
3. * In Case candidate is finding difficulty in getting his application proposed, he may send his application to HQ, IETE directly for necessary assistance.
4. Student member are advised to ensure that they do not accept the membership form (IETE-2) without the copy of the Regulation and syllabi of DIPIETE/ AMIETE Examination.
5. Fees once paid will neither be adjusted nor be refunded under any circumstances.

INSTRUCTIONS TO APPLICANTS (To be retained by the student)

(To be read in conjunction with Regulations & Syllabi for AMIETE Examination)

1. a) There are two streams available to a candidate for enrolment in DipIETE viz. Electronics & Telecommunication Engineering and Computer Science & Engineering. Applicant is required to write his enrolment option in Column 1.

b) There are three streams available to a candidate for enrolment in AMIETE viz. Electronics & Telecommunication Engineering, Computer Science & Engineering and Information Technology. Applicant is required to write his enrolment option in Column 1.

2. Applicants are advised to submit their forms duly filled in direct to the IETE HQ. IETE neither recognizes nor accepts affiliation of any private coaching institution. Col 10 if filled and certified by these institutions will not be accepted. Incomplete application form will be rejected.
3. One shall be allowed to appear in the DipIETE/ AMIETE Examination only after one's enrolment as a Student member with the Institution. Only those Student members who get enrolled on or before 28th February and 31st August will be allowed to appear in the next DipIETE/ AMIETE Examination, held in June and December respectively. Processing of application takes minimum 15 days, therefore to get enrolled, the application completed in all respect must reach IETE HQ well before 14th February for June examination and 14th August for December Examination. Time period for LAB practice examination is counted from the date of enrollment, therefore, students are advised not to wait for last dates but get enrolled as early as possible.
4. Candidates are advised to submit all documents such as Membership Form, Identity Card, IETE Membership Card, self addressed envelope duly filled in, Qualification Certificates, Mark Sheet, Date of Birth Certificate and Experience Certificate (attested copies are required to be submitted) along with, the declaration on the reverse of the Membership Card duly signed by the candidate to IETE HQ only.
5. Membership No. will be allotted by IETE HQ Office. Candidates are advised to leave these columns blank. Membership No will be mentioned while corresponding with IETE HQ.
6. Candidates are advised to paste their stamp size photograph and fill in other columns of the Identity Card and IETE Membership Card. The photographs pasted (not stapled) on the application and Membership Card should be attested by either a Corporate member of the Institution or a Gazetted Officer, with his membership No./ Stamp affixed on it. They must write their complete address with Pin Code No.
7. Membership number, Identity card, receipt of amount paid and examination form will be sent to the applicant within 8-10 weeks of receipt of the application in IETE HQ.
8. FEE FOR ENROLMENT

	Members in India (Rs)	Members Abroad (US $)
Admission Fee	200.00	40.00
Application Fee	200.00	40.00
Building-cum-Library Fee	1300.00	260.00
Composite Subscription (for 5 years)	2500.00	360.00
Lab Infrastructure Fee	600.00	100.00
Development Fee	500.00	100.00
Establishment Fee	700.00	100.00
Total	6000.00	1000.00
Enrolment Form submission Fee	250.00	

9. Once the candidate is enrolled, the enrolment fee will not be refunded under any circumstances.
10. All remittances shall be made by crossed Bank Draft, drawn in favour of "Secretary General, IETE, New Delhi".MONEY ORDER, CHEQUES, IPO or CASH WILL NOT BE ACCEPTED.

11. Any change in the mailing address should be notified immediately. This will help the Office to keep its database up-to-date, and mail important Circulars/Notices/Letters and Journals of Education at the correspondence address.
12. The IETE neither recognizes nor accepts affiliations of any private coaching institution.
13. The student membership will be valid for 10 consecutive examinations from the date of enrollment. Thereafter, the student members not completing their DIPIETE/ AMIETE Examination are to seek re-enrollment by remitting applicable amount before or immediately after the expiry of the membership period to continue their membership to enable them to appear in the remaining papers and complete DipIETE/ AMIETE. Any examination chance not availed by a student due to whatsoever reason will be counted within 10 examinations. No Notice for renewal of membership will be sent.
14. A student is required to complete DipIETE/ AMIETE Examination within 2 enrollment periods from the date of initial enrollment. The student will, therefore, be permitted to seek only one renewal of membership. Renewal is to be applied for before or immediately after the expiry of initial enrollment with continuity of enrollment maintained by the student. Missed chances will be counted towards total number of examinations and no relaxation in this regard will be permissible. If the request for renewal is made after the stipulated period of two enrollments, admission will be treated as a fresh enrollment and no benefit in terms of exemptions in respect of subject(s) passed or exempted during the earlier enrolment will be granted. Students must renew their membership in time. Otherwise they will not be allowed to appear in the DipIETE/ AMIETE examination.
15. All Legal cases concerning IETE HQ shall lie within jurisdiction of Delhi courts only.
16. Every Student member successfully completing Sections A&B subjects including lab examinations with project work, seminar and a course in Communication Skills & Technical Writing of AMIETE Examination as per regulations prescribed by the Council from time to time shall be eligible to become a Associate Member (AMIETE). On payment of requisite fee for membership, he/she will be awarded a certificate of having passed the AMIETE examination of the institution and shall then be eligible for transfer to the class of AMIETE. To pass AMIETE Examination, a student is required to score a minimum grade of “D” having a grade point of 4 for each subject and having an aggregate of 5 CGPA. However for Project, Seminar and lab examinations he/she should get a minimum grade of “C” having a grade point of 5.
17. First examination application form as per the stream opted by the student will be dispatched to him/her along with the identity card at the time of enrolment.

The Institution of Electronics and Telecommunication Engineers
2, Institutional area, Lodhi Road, New Delhi-110 003.

EXEMPTION APPLICATION FORM

Dear Sir/Madam,

1. I student membership No……Name……..of stream…….request you to grant me exemption based on my qualification in the following subject.

	Sub Code	Subject	Qualification based on which exemption asked from Univ./Institution should be mentioned correctly
(a)			
(b)			
(c)			
(d)			

(For more subjects, use photo copy of this from)

2. A DD of Rs…….bearing machine no……..……of …..……..…is enclosed herewith as exemption fee.

3. I am enclosing following documents (Photo-copies duly attested)

   (a) Final/Provisional certificate.
   (b) Marksheets of all semesters.
   (c) Copy of the syllabus of the course.(Marked on it subject code for which exemption of the subject is applied.
   (d) Any other document.

4. Email address :……..

5. Phone No……..

(Signature of Student)

Note :
1. Fee for exemption for AMIETE is Rs 800/- where as for DipIETE, it is Rs 700/-
2. This application is not to be clubbed with exam form.
3. Relevant sufficient syllabus matching upto 80% mentioning the Textbooks & Reference Books should be enclosed.