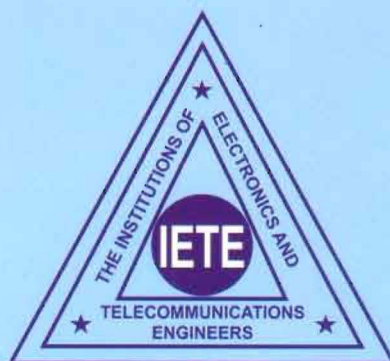# Regulations & Syllabi for AMIETE Examination (Electronics & Telecommunication)

सह वीर्यं करवावहै

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

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Prof. V N R Pillai VC, IGNOU Chief Guest lighting the ceremonial lamp with Prof. B S Sonde, Past President IETE and Shri S Narayana, President, IETE at the 1st Convocation Day - 02 Nov. 2007

Dr. Anil Kakodkar, Shri G Madhvan Nair and Shri S Narayana at the Inauguration of Exhibition during 50th Annual Technical Convention at Hyderabad -29-30 Sept. 2007.

Students after attending 1st Convocation on 02 Nov. 2007.
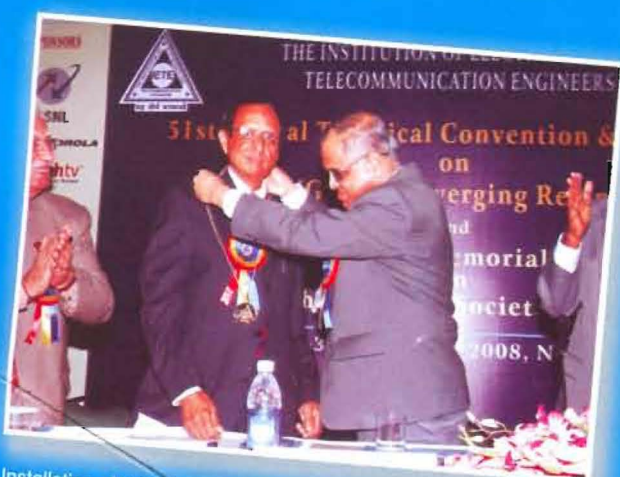
Installation of New President Lt Gen Ashok Agarwal, PVSM (Retd) for the year 2008-09 by the Chief Guest Shri N R Narayana Murthy, Chairman of the Board and Chief Mentor, Infosys Technologies Ltd, Bangalore during the inaugural session of the 51st Annual Technical Convention of 29 Sep 2008

Release of Special Issue of IETE Technical Review during the inaugural session at the 51st Annual Technical Convention on 29 Sep 2008. Seen in the picture are - Shri P N Chopra, Shri S Narayana, Shri N R Narayana Murthy (Chief Guest), Lt Gen Agarwal, PVSM (Retd), Shri A Bhaskaranarayana and Brig V K Panday.

Prospectus
Containing
Regulations & Syllabi
For
AMIETE Examination
(Electronics & Telecommunication)

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Rs. 250/-

CONTENTS

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 Science 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 **Appendix 'H' (Annexure I, II, III, IV and V)** .

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 58 Centres spread all over the country including a centre at Kathmandu and examination centre at Abu 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, Palakkad, Mankapur and Imphal.

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 pursuing new scheme implemented from Jun 09 exams 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, 2 Institutional Area, Lodi Road, New Delhi-110003..

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) Copy of recognition letter is appended at **(Annexure I).**

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

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

TRANSITION FROM OLD SYLLABUS TO REVISED SYLLABUS

16.   Existing students who are persuing AMIETE(CS) will be shifted to new syllabus if they do not complete the course by June 2011 examination. 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 DiplETE as per **Bye law 15**, or as Student (SG) as per **Bye law 16**, which are reproduced below

Bye law 15-Student (DiplETE)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 (DiplETE) 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 12th 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 is 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	1800.00	360.00
(e) Lab Infrastructure Fee	500 00	100 00
(f) Development Fee	500 00	100.00
(g) Establishment Fee	500 00	100.00
	5000 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 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 (ET)**	(Appendix-'A')
(b)	**Outline Syllabus (ET)**	(Appendix-'B)
(c)	**Course Curriculum (CS)**	(Appendix-'C')
(d)	**Outline Syllabus (CS)**	(Appendix-'D')
(e)	**Course Curriculum (IT)**	(Appendix-'E')
(f)	**Outline Syllabus (IT)**	(Appendix-'F')

25   The detailed syllabus of Electronics & Telecommunication 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 20 theory papers (11 in Section A and 9 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   Five subjects & 1 Lab
(ii) PART-II   Six subjects & 1 Lab

(b)   **SECTION B**

(i) PART-I   Five subjects & 1 Lab
(ii) PART-II   Four subjects & 1 Lab
(Two 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 50% marks individually 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 70 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 30 marks.

EXEMPTIONS

31   Exemption may be granted in various paper (s) 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 500/- 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
F, F+	Fail

(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. 200/-.   For any correction in the examination form after processing an additional amount of Rs 200/- 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	500.00	100.00	To be deposited alongwith exam application form
(b)	Exemption/per subject	500.00	100.00	
(c)	Written test of Communication Skills & Technical Writing	500.00	100 00	
(d)	Project	1400.00	280.00	
(e)	Each Lab Examination	500.00	100 00	To be deposited at respective IETE centres
(f)	Oral Test on communication skills & technical Writing	500 00	100 00	
(g)	Seminar	500 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.**

   (d)   **All payment of fees can also be made on-line. For details refer our website www.iete.org.**

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 500/-)   5 May/5 Nov

   • With late fee (of Rs 750/-)   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/www.iete.info** 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 . -

    (a)   In India:

Centre	Code	Centre	Code	Centre	Code
AHMEDABAD	01	HYDERABAD	08	NOIDA	38
ALIGARH	24	IMPHAL	31	PALAKKAD	41
ALLAHABAD	25	JABALPUR	23	PATNA	46
AMRAVATI	53	JAIPUR	09	PILANI	30
AURANGABAD	43	JAMMU	35	PUNE	14
BANGALORE	02	KANPUR	10	RAIPUR	51
BHOPAL	36	KOCHI	32	RAJKOT	44
BHUBANESWAR	27	KOLKATA	04	RANCHI	48
CHANDIGARH	05	KOZIKODE	52	SHIMLA	45
CHENNAI	12	LUCKNOW	11	TRIVANDRUM	16
COIMBATORE	47	MANKAPUR	28	VADODARA	42
DEHRADUN	26	MHOW	40	VARANASI	13
DELHI	06	MUMBAI	03	VIJAYAWADA	15
DHARWAD	49	MYSORE	33	VISAKHAPATNAM	34
GUWAHATI	07	NAGPUR	37		
GWALIOR	50	NASHIK	39		

    (b)   Abroad:

Centre	Code
ABU DHABI	17
KATHMANDU	19

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 Website **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 Recounting Form.**

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 500/- (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. Details of awards are listed at **Appendix 'I'.**

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"

AFFILIATION/ACCREDITATION

50.   **The Institution of Electronics & Telecommunication Engineers (IETE) neither recognises 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 authorise 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 six monthly (January – June and July - 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 (Address given in **Appendix-'J'**) 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. Bank drafts should be drawn in favour 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 alongwith application. MONEY ORDER WILL NOT BE ACCEPTED.   All payment of fees can also be made on-line   For details refer our website www.iete.org

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.   More miscellaneous information is given in **Appendix-'K'**

- 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.**

SECTION A

Part - I				
SI No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE51	Engineering Mathematics – I *	4	-
2	AE52	C & Data Structures *	4	-
3	AE53	Electronic Devices & Circuits *	4	-
4	AE54	Linear ICs & Digital Electronics *	4	-
5	AE55	Principles of Electrical Engineering	4	-
6	AE91	Analog Electronics Lab	-	4
		Total Credits	20	4

Part - II				
SI No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE56	Engineering Mathematics – II *	4	-
2	AE57	Signals & Systems *	4	-
3	AE58	Materials & Processes	4	-
4	AE59	Circuit Theory & Design	4	-
5	AE60	Instrumentation & Measurements	4	-
6	AE61	Control Engineering	4	-
7	AE92	Digital Electronics Lab	-	4
		Total Credits	24	4

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

SECTION B

Part - I				
SI No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE62	Operations Research & Engineering Management *	4	-
2	AE63	Electromagnetics & Radiation Systems	4	-
3	AE64	Telecommunication Switching Systems	4	-
4	AE65	Analog Communications	4	-
5	AE66	Microprocessors & Microcontrollers *	4	-
6	AE93	µP & C Programming Lab	-	4
		Total Credits	20	4

Part - II				
SI No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AE67	Digital Communications	4	-
2	AE68	Embedded Systems Design	4	-
3		Elective – I	4	-
4		Elective – II	4	-
5	AE94	Analog & Digital Communications Lab	-	4
6	AE69	Project Work	-	8
7	AE70	Seminar	-	4
		Total Credits	16	16

1	AE99	Communication Skill & Technical Writing

For Electives I & II, students can chose any two of the following elective subjects

SI No	Sub Code	Title
1	AE71	Data Communication & Computer Networks ***
2	AE72	Microwave Theory & Techniques
3	AE73	Information Theory & Coding
4	AE74	VLSI Design
5	AE75	Optoelectronics & Communication
6	AE76	Wireless & Mobile Communications
7	AE77	DSP †
8	AE78	Radar & Navigational Aids

NOTE:
*   Subjects common to ET / CS / IT Streams
***   Syllabus is same as that of the core subject for AMIETE (CS / IT)
†   Elective common to ET / CS streams

OUTLINE SYLLABUS
AMIETE (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

AE51   ENGINEERING MATHEMATICS – I
- Partial differentiation and its application
- Multiple integrals
- Linear algebra
- Numerical Methods
- Solutions of ordinary differential equation
- Linear differential equation of higher order
- Special Functions and Series solutions of Differential equations
- Bessel & Legendre differential equation

AE52   C & DATA STRUCTURES
- Introduction to the C language and data types
- C operators
- Control structures
- The *printf* function, the *scanf* function, address and pointers
- Arrays
- Functions and Recursion
- Strings
- Structures, Unions and files
- Arrays, Searching and Sorting
- Stacks, Queues and linked lists
- Trees
- Graphs

AE53   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

AE54   LINEAR ICs AND DIGITAL ELECTRONICS
- Introduction
- Operational Amplifier
- Operational Amplifier Characteristics
- Operational Amplifier Applications
- Comparator and Waveform Generator
- 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

AE55   PRINCIPLES OF ELECTRICAL ENGINEERING
- Magnetic Circuits
- Transformers
- D.C. Machines
- Synchronous Machines
- Induction Machines
- Fractional kW Motors
- Generation
- Transmission and Distribution

AE91   ANALOG ELECTRONICS LAB

AE56   ENGINEERING MATHEMATICS – II
- Complex Analysis
- Vector Calculus
- Numerical Methods
- Partial differential equation
- Probability and Theoretical distribution

AE57   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

AE58   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

AE59   CIRCUIT THEORY AND DESIGN
- Conventions for Describing Networks
- Network Equations
- Initial Conditions in Networks
- Differential Equations Applications
- General Description of Signals
- 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

AE60   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

AE61   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 Response Analysis
- Compensation
- State Variable Analysis

AE92   DIGITAL ELECTRONICS LAB

AE62   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
- The Organization
- Strategy Formulation
- Decision Making
- Information Presentation
- Forecasting Models for Decision Making
- Markets and Marketing
- Product Management, Sales and Distribution
- Management Skills
- Effective Communications

AE63   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

AE64   TELECOMMUNICATION SWITCHING SYSTEMS
- Switching Systems
- Telecommunications Traffic
- Switching Networks
- Time Division Switching
- Control of Switching Systems
- Signaling
- Packet Switching
- Networks

AE65   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

AE66   MICROPROCESSORS & MICROCONTROLLERS

- Evolution of Microprocessors
- Fundamentals of a Computer
- Number Representation
- Fundamentals of Microprocessor
- First Assembly Language Program
- Instruction set of 8085
- Chip select logic
- Addressing of I/O ports
- Architecture of 8085
- Assembly language programs
- Use of PC in writing and executing 8085 programs
- Interrupts in 8085
- 8255 Programmable peripheral interface chip
- Programs using interface modules
- Interfacing of I/O devices
- Intel 8259A, 8257, 8253, 8251A
- Intel 8051 microcontroller

AE93   µP & C PROGRAMMING LAB

AE67   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

AE68   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

AE71   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

AE72   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

AE73   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

AE74   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

AE75 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 systems
- Digital Transmission Systems
- Advanced systems and techniques

AE76 WIRELESS & MOBILE COMMUNICATIONS
- Introduction
- Probability, Statistics, and Traffic Theories
- Mobile Radio Propagation
- Channel Coding and Error Control
- Cellular Concept
- Multiple Radio Access
- Multiple Division Techniques
- Channel Allocation
- Satellite Systems
- Mobile Communication Systems
- Existing Wireless Systems
- Ad Hoc and Sensor Networks
- Wireless MANs, LANs and PANs
- Recent Advances

AE77 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

AE78 RADAR AND NAVIGATIONAL AIDS
- An Introduction to Radar
- The Radar Equation
- MTI and Pulse Doppler Radar
- Detection of Signals in Noise
- Radar Clutter
- The Radar Antenna
- Radar Receiver
- Tracking Radar
- Navigational Aids

AE94 ANALOG & DIGITAL COMMUNICATIONS LAB

AE69 PROJECT WORK

AE70 SEMINAR

AE99 COMMUNICATION SKILLS AND TECHNICAL WRITING
- Communication: Its Types and Significance
- Grammar
- Syntax
- Reading Skills
- Writing Skills
- Listening Skills
- Speaking Skills
- Technical Report
- Self Development

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 text books.

Salient Features

4.   Some salient features of the syllabus are:-
- Each subject has a code preceding it (viz AE51, AC51 and AT51 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 text books 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 text book-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 text books for each subject, we welcome suggestions on availability of better and cheaper text books.

AE51   **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), 5.7 (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.

II (6.1 to 6.9 except 6.6)

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 Method 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), 2.14 (1), 2.15, 28.6 (1)); II (3.39)

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), 31.1, 31.3, 31.4, 31.5, 31.7, 28.7 (2), 28.9)

UNIT V

SOLUTIONS OF FIRST ORDER AND FIRST DEGREE ORDINARY DIFFERENTIAL EQUATION
     07 hrs

Definition and Practical approach to differential equation; solutions of differential equation and geometrical meaning of differential equation; Solution by the Method of variable separable; Homogeneous differential equation; Equation reducible to homogenous differential equation; Linear equations; Bernoulli's equation; Exact equation; To find orthogonal trajectories of the given family of curves; Physical applications.

I (11.1, 11.2, 11.4 (1), 11.4 (2), 11.5, 11.6, 11.7, 11.8, 11.9, 11.10, 11.11)
II (12.3, 12.4 (a), 12.4 (b), 12.5)

UNIT VI

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 VII
SPECIAL FUNCTIONS AND SERIES SOLUTIONS OF DIFFERENTIAL EQUATIONS
08 hrs

Gamma functions; Recurrence formula for Γ (n); value of Γ (½); Beta Function; Symmetry of Beta Function; Relation between Gamma and Beta Function; Illustrative examples; 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.
II (15.1 to 15.7 and 15.11 to 15.14)

UNIT VIII
BESSEL AND LEGENDRE DIFFERENTIAL EQUATION   **08 hrs**

Bessel equation-Bessel functions Recurrence formula for $J_n(x)$; Generating Function for $J_n(x)$; Equations Reducible to Bessel's equation Orthogonality of Bessel functions; Legendre's differential equation; Legendre Polynomials; Rodrigue's formula; Orthogonality of Legendre polynomials.
I (16.5 to 16.11, 16.13, 16.14 (1), 16.14 (2), 16.17)

Text Books:
 I. Higher Engineering Mathematics, Dr. B.S.Grewal, 40th edition 2007, Khanna publishers, Delhi.
II. Text book of Engineering Mathematics, N.P. Bali and Manish Goyal, 7th Edition 2007, Laxmi Publication (P) Ltd.

Reference book:
1. Advanced Engineering Mathematics, H.K. Dass, 17th Revised Edition 2007, S.Chand & Company Ltd, New Delhi.

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

AE52   **C & DATA STRUCTURES**

PART A: C PROGRAMMING

UNIT I

INTRODUCTION TO THE C LANGUAGE AND DATA TYPES   **07 hrs**
The first program in C, Inputting the data, The control statement, The iteration loop, The *do…while* loop, The *switch* statement, Various data types in C, The integer data type family, Overflow in *char* and *unsigned char* data types, The *char* type, Octal numbers, Hexadecimal numbers, Representation of floating-point numbers, Type conversion, Forced conversion, Type casting.

C OPERATORS
Arithmetic operator, Relational operator, Logical operator, Ternary operator, Increment operator, Comma operator, Bitwise operator, Operator precedence.
I (1, 2, 3)

UNIT II

CONTROL STRUCTURES   **08 hrs**
Control structures, The *if* statement, Scope of an *if* clause, The *if…else* statement, The *if…else…if* statement, The *switch* statement, The *while* loop, The *do…while* loop, The *for* loop, The *for* loop with a comma operator, The *break* statement, The *continue* statement.

THE *printf* FUNCTION, THE *scanf* FUNCTION, ADDRESS AND POINTERS
printf, *scanf*, Placeholders in *printf* and *scanf*, Address, Pointers
I (4, 5, 6, 7)

UNIT III

ARRAYS   **08 hrs**
Arrays, Address of each element in an array, Accessing an array using pointers, Manipulating arrays using pointers, Two-dimensional arrays, Three-dimensional arrays, Pointer arrays.

FUNCTIONS   AND RECURSION
Functions, The concept of (system) stack, The sequence of execution during function call, Parameter passing, Call by reference, The concept of Global variables, Resolving variable references, Syntax of function definition, Calling function, Dynamic memory allocations, Recursion, Stack overheads in recursion, Writing a recursive function.
I (9, 10, 12, 13)

UNIT IV

STRINGS   **07 hrs**
Strings as an array of characters, String definition, Strings as parameters.

STRUCTURES, UNIONS AND FILES
Structures, Complex structure definitions, Memory allocation to structure, Programming with structures, Structure pointers, Union, The concept of files, Direct access files.
I (14, 15, 16, 17)

PART B: DATA STRUCTURES

UNIT V

ARRAYS, SEARCHING AND SORTING   **07 hrs**
Arrays, Application of arrays, Manipulations on the list implemented using an array, Transpose of a matrix, Bubble sort, Binary search, Merging of two sorted lists, Merge sort, Implementation of heaps, Heap sort, Quick sort.
I (18)

UNIT VI

STACKS, QUEUES   AND LINKED LISTS   **08 hrs**
The concept of stack and queues, Stacks, Applications of stacks, Queues, Circular queues, Applications of queues, The concept of linked lists, Inserting a node using recursive programs, Deleting the specified node in a singly linked list, Inserting a node after the specified node in a singly linked list, Circular linked lists, Doubly linked lists, Insertion of a node in a doubly linked list, Deleting a node from a doubly linked list, Polynomial representation, Sorting and reversing a linked list, Merging two sorted lists, Merging of two circular lists.
I (19, 20)

UNIT VII

TREES   **07 hrs**
The concept of tree, Binary tree and its representation, Binary tree traversal, Binary search tree, Counting the number of nodes in a binary search tree, Searching for a target key in a binary search tree, deletion of a node from a binary search tree.
I (21)

UNIT VIII

GRAPHS   **08 hrs**
Graphs, Representations of graphs, Computing in-degree and out-degree of a node of a graph using adjacency matrix representation, Depth first traversal, Breadth first traversal, Connected component of a graph, Depth first spanning tree, Breadth first spanning tree, Minimum cost spanning tree, Directed acyclic graph (DAG).
I (22)

Text Book:
I.   C & Data Structures, P.S. Deshpande and O.G. Kakde, Dreamtech Press, 2005.

Reference Books:
1.   Data Structures – A Pseudocode Approach with C, 2nd Edition, Richard F. Gilberg and Behrouz A. Forouzan, Thomson Course Technology, 2005.
2.   C Programming and Data Structures, 3rd Edition, E. Balagurusamy, Tata McGraw Hill, 2007.

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

AE53   **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; Feedback 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, 3.10, 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, I. J. Nagrath, PHI (2007).

Reference Books:

1.   Millman's Electronic Devices and Circuits, Jacob Millman, Christos C Halkias and Satyabrata Jit, Second Edition, 2007 First reprint, Tata-McGraw Hill Publication.
2.   Electronic Devices and Circuits, David A Bell ,Fourth Edition, PHI (2006).

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

AE54   **INEAR ICs AND DIGITAL ELECTRONICS**

PART A: LINEAR ICs
UNIT I
INTEGRATED CIRCUIT FABRICATION & OPERATIONAL AMPLIFIER   **07hrs**
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; Monolithic Power Amplifiers.
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; A-D Converters
 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; Putting it all together; The Byte; Nibble and Word; Alphanumeric Codes; Parity Method for Error Detection.
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   **04hrs**

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; Asynchronous Inputs.
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; 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, 7.5, 7.6, 7.15, 7.16, 7.17, 7.18, 7.19, 7.21)

Text Books:

I. Linear Integrated Circuits, Revised Second Edition, D Roy Choudhury, Shail B. Jain, New Age International Publishers.
II. Digital Systems – Principles and Applications, Ninth Edition, Ronald J Tocci, Neal S Widmer and Gregory L. Moss, Pearson Education, 2008.

Reference Books:

1. Operational Amplifiers and Linear IC's, , David A Bell, Second Edition, 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 atleast **TWO** questions from each part.

AE55   **PRINCIPLES OF ELECTRICAL ENGINEERING**
UNIT I
MAGNETIC CIRCUITS   **07 hrs**
Magnetic Effects of Electric Current; Magnetic Circuits; Magnetic Materials and Magnetization Characteristics; Electromagnetic Induction and Force; Lorentz Force Equation; Self and Mutual Inductance; Energy Stored In Magnetic Systems; AC Operation of Magnetic Circuits; Hysteresis and Eddy Current Losses.
I (8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9)
UNIT II
TRANSFORMERS   **08 hrs**
Construction - Core and Shell Types; Ideal Transformer – Under No-Load and Loading Conditions; Impedance Transformation; Magnetizing Current and Core Loss; Circuit Model of Transformer; Voltage Regulation; Efficiency.
I (9.1, 9.2, 9.3, 9.4, 9.7, 9.8)
UNIT III
D.C. MACHINES   **08 hrs**
Construction; EMF Equation; Torque Equation; Circuit Model – Generating and Motoring Modes; Armature Reaction; Commutation; Methods of Excitation; Characteristics of DC Motors; Speed Control of Shunt Motor (Field and Armature Control); DC Motor Starting; Efficiency of DC Motors; Application of DC Motors
I (10.2, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10)
UNIT IV
SYNCHRONOUS MACHINES   **08 hrs**
Construction; EMF Expression (with Winding Factor); Circuit Model; Power-Angle Characteristic; Operation at Constant Load Variable Excitation.
I (10.2, 10.3, 10.4, 12.2)
UNIT V
INDUCTION MACHINES   **08 hrs**
Construction; Rotating Magnetic Field; Torque Expression; Circuit Model; Torque-Slip Characteristic; Efficiency; Starting; Speed Control; Application of Induction Motors; Induction Machine; Induction Generator.
I (10.6, 10.7, 12.3, 12.4)
UNIT VI
FRACTIONAL kW MOTORS   **07 hrs**
Single Phase Induction Motor; Split-Phase Motor; Two-Value Capacitor Motor; Shaded-Pole Motor; Reluctance Motor; Hysteresis Motor; Universal Motor.
I (13.1, 13.2, 13.3, 13.4)
UNIT VII
GENERATION   **07hrs**
Energy Conversion; Thermal Power; Nuclear Power; Hydro Power; Magneto Hydrodynamic; Geothermal Energy; Environmental Aspects; Renewable Energy Resources; Solar Power; Wind Power; Biofuels.
I (15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 15.10, 15.11, 15.12)
UNIT VIII
TRANSMISSION, DISTRIBUTION AND ENERGY STORAGE   **07 hrs**
Transmission and Distribution Systems; Purpose of Interconnection; HVDC Transmission-Principle, Economics, Advantages and Disadvantages; Energy Storage-Compressed Air Storage; Heat Storage; Batteries; Hydrogen Energy Systems; Fuel Cell.
I (15.14, 15.15, 15.16)
Text Book:
 I. Basic Electrical Engineering, D.P. Kothari and I.J. Nagrath, Tata McGraw-Hill Publishing Company Limited, 2nd Edition, 13th Reprint 2006.
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.

AE91   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. **Schmitt Trigger:** Design, testing, and display of waveforms.
14. **Op-Amp Wein Bridge Oscillator:** Design and test the performance for the given frequency.
15. **Study of 555 Timer:** Design and test the performance of Astable multivibrator circuit for a given frequency.
16. **Study of Voltage Regulator:** Design and study of IC7805 voltage regulator, calculation of line and load regulation.

Note: Minimum of 14 experiments to be conducted.

AE56 **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.
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)

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; residue theorem; calculation of residues.
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**

Forward difference operator Δ; backward difference operator ∇; central difference operator δ; shifting operator E (only the definition); Interpolation; Newton Gregory forward and backward interpolation for equal intervals; Lagrange's formula for unequal intervals; Divided differences; Newton's divided difference formula; Inverse interpolation; Numerical differentiation using Newton Gregory forward and backward interpolation formula; Numerical integration; Newton–Cote's quadrature formula; trapezoidal rule; Simpson's 1/3rd & Simpson's 3/8th rule; Weddle's rule
I (29.8(1), 29.8(2), 29.8(3), 29.9)
II (22.1, 22.3, 22.4, 22.6, 22.7, 22.10, 22.11, 22.11(a), 22.11(b), 22.11(c), 22.11(d), 22.11(e))

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);   II (21.48)

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; Applications Binomial distribution; Poisson's distribution; constants of the Poisson distribution; Applications 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 Books:

 I. Higher Engineering Mathematics –Dr. B.S.Grewal, 40th Edition 2007, Khanna Publishers, Delhi.
II. A Text book of engineering Mathematics – N.P. Bali and Manish Goyal , 7th Edition 2007, Laxmi Publication(P) Ltd.

Reference book:

1. Advanced Engineering Mathematics- H.K. Dass- 17th Revised Edition 2007, S.Chand & Company Ltd, New Delhi.

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

AE57   **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; Fourier Series and LTI Systems; Filtering; Examples of Continuous-Time Filters Described by Differential Equations; Examples of Discrete-Time Filters Described by Difference Equations.
I (3.0, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11)

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; Systems Characterized by Linear Constant-Coefficient Differential Equations.
I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)

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; Systems Characterized by Linear Constant-Coefficient Difference Equations.
I (5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8)

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; First-Order and Second-Order Discrete-Time Systems.
I (6.0, 6.1, 6.2, 6.3, 6.4, 6.6)

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.

AE58   **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; Introduction; Resistivity and Factors Affecting Resistivity of conducting materials; 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-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 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 of growing single crystal semiconductor, Zone-refining. Grown Junction and Alloyed junction processes – Alloyed junction diode and Gold-bonded diode. Diffused Junction Technique and Epitaxial diffused Junction diode. Fabrication of Junction Transistors – Grown junction, alloyed junction, Surface barrier alloyed junction, Diffused mesa. Planar diffused and Epitaxial planar diffused Transistors. Field-effect Devices – General properties and types. Drain and Transfer Characteristics of JFET.

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-Fourth Print, April 2007 Edition, Prentice-Hall Of India Pvt Ltd.
 II. Introduction to Electrical Engineering Materials by C.S. Indulkar and S. Thiruvengadam, 4th Edition, Reprint 2006, 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.

AE59   **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)

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

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

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 Behaviour 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)

UNIT VI
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)

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)

UNIT VIII
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)

Text Books:
I   Network Analysis, M.E.Van Valkenberg, 3rd Edition, Prentice-Hall India, EEE 2006.
II   Network Analysis and Synthesis, Franklin F Kuo, 2nd Edition, Wiley India Student Edition 2006.

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.

AE60   **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 Quantity 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.
I (1.1 to 1.6, 2.1 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, 4.33)

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; Measurement of Low resistance - Kelvin double bridge; Measurement of High resistance – Difficulties; Earth resistance measurement using Megger.
Measurement of Inductance – 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, 14.2.8, 14.3.2, 14.4, 14.4.1, 14.5, 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; 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; Use of Lissajous figures for phase measurement.
II (5.3, 5.4, 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; Deflecting system; Triggered CRO; Triggered Pulse Circuits; Delay Line in Triggered Sweep; Storage and Sampling Oscilloscope.
II (8.1, 8.4 to 8.9, 8.20, 7.1 to 7.10, 7.17, 7.18)

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, 9.4, 9.5, 9.6, 20.3 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 (12.2 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; 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 13.14, 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, 18th Edition 2007.
 II. Electronic Instrumentation, H.S Kalsi, Tata McGraw Hill, Second Edition 2004.

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.

AE61   **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 FOOT LOCI; SYSTEMS with Transportation Lag; Sensitivity of Roots of Characteristic Equation.
I (7.1, 7.2, 7.3, 7.5, 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,), I.J. Nagrath and M. Gopal, Fifth Edition (2007 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.

AE92   **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. **Half Adder / Full Adder:** Realization using basic and XOR gates.
3. **Half Subtractor / Full Subtractor:** Realization using NAND gates.
4. **Parallel Adder / Subtractor:** Perform adder and subtractor operation using IC7483 chip.
5. **4-Bit Binary-to-Gray & Gray-to-Binary Code Converter:** Realization using XOR gates.
6. **4-Bit and 8-Bit Comparator:** Implementation using IC7485 magnitude comparator chips.
7. **Multiplexer:** Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
8. **Demultiplexer:** Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
9. **LED Display:** Use of BCD to 7 Segment decoder / driver chip to drive LED display.
10. **Flip Flops:** Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
11. **Asynchronous Counter:** Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
12. **Synchronous Counter:** Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
13. **Shift Register:** Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
14. **Ring counter and Twisted Ring Counter**: Realization using IC7495 chip.
15. **RAM:** Study of RAM (2K x 8 RAM) operation.
16. **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.
- Minimum of 14 experiments to be conducted.

AE62   **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, 3.5.1, 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 (13.4.1, 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   **03 hrs**

What is Management; The History of Management; Types of Manager; Management Responsibilities; Management Tasks; The Engineering Manager.
II (2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

THE ORGANIZATION   **04 hrs**

Defining the Organization; Organization Structures; The Quality Organization; Organizational Change; Managing Change.
II (3.1, 3.2, 3.3, 3.4, 3.5)

UNIT VII

STRATEGY FORMULATION   **02 hrs**

The Elements of Corporate Strategy; Strategy Formulation Process; Alliances and Acquisitions; Strategy Formulation Tools and Techniques.
II (5.1, 5.2, 5.3, 5.4)

DECISION MAKING   **02 hrs**

The Nature of Management Decision; Decision Making Process; Decision Making Techniques.
II (6.1, 6.2, 6.3)

INFORMATION PRESENTATION   **01 hrs**

Statistical Analysis; Presentation of Data.
II (7.1, 7.2)

FORECASTING MODELS FOR DECISION MAKING   **03 hrs**

Forecasting the Future; Qualitative Methods; The Time Series; Causal Models
II (9.1, 9.2, 9.3, 9.4)

UNIT VIII

MARKETS AND MARKETING   **02 hrs**

The Market; Marketing Information; Market Segmentation; Consumer and Industrial Markets.
II (15.1, 15.2, 15.3, 15.4)

PRODUCT MANAGEMENT, SALES AND DISTRIBUTION   **02 hrs**

Product Management; Pricing; Marketing Communications; Sales; Physical Distribution.
II (16.1, 16.2, 16.3, 16.4, 16.5)

MANAGEMENT SKILLS   **02 hrs**

The Nature of Leadership; Leadership Theories; Delegation; Defining Motivation; Motivational Theories; Defining Needs; Motivation Techniques.
II (17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7)

EFFECTIVE COMMUNICATIONS   **01 hrs**

Communication Process; Establish Communications; Presentation.
II (19.1, 19.2, 19.3)

Text Books:
 I. Operations Research, An Introduction, Hamdy A. Taha, Eight Edition, PHI, 2007
 II. Engineering Management, Fraidoon Mazda, Low Price Indian Edition, Addison-Wesley.

Reference Books:
1. Introduction to Operation Research, Hiller and Liberman, Fifth Edition, McGraw Hill Publications.
2. Operations Research, S.D. Sharma, Kedarnath, Ramnath & Co
3. Managing Engineering & Technology, Babcock & Morse, Pearson Education.
4. Management – A Competency Based Approach, Helriegel / Jackson / Slocum, 9th Edition, 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.

AE63   **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; Product Solution of Laplace's Equation.
I (7.1 to 7.5)

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, Special Indian Edition 2006.
II. Electronic Communication Systems, George Kennedy and Bernard Davis, Fourth Edition (1999), 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.

AE64   **TELECOMMUNICATION SWITCHING SYSTEMS**

UNIT I
SWITCHING SYSTEMS   **08 hrs**
Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Strowger Switching Components; Step by step switching; Design parameters;100 Line Switching system;1000 line Blocking exchange;10,000 line exchange; 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 (3.5, 3.10, 3.11, 3.12, 3.13); II (1.1, 1.3, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 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; Three Stage Non-Blocking Networks.
I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6); II (4.8)

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

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- 2006.
II. Telecommunication Switching Systems and Networks, Thiagarajan Viswanathan, Prentice Hall of India Pvt. Ltd, 2007.

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.

AE65   **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 (1999), Tata
    McGraw Hill Publishing Company Ltd.
Reference Books:
1. Communication Systems, 3rd 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.

AE66   **MICROPROCESSORS & MICROCONTROLLERS**

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)

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)

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)

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)

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)

UNIT VI
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)

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)

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, Fourth Edition, R. S. Gaonkar, Penram International Publishing (India), 2000
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Second Edition, Pearson Education, 2008

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

AE93   **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. 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.

10. Write a C program to read *n* numbers into an array, and compute the mean, variance and standard deviation of these numbers.

11. Write a C program using recursive calls to evaluate $f(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots$

12. Write a C program to read in an array of names and to sort them in alphabetical order.

13. Write a C program to sort a sequence of *n* integers using Quick sort technique and then search for a key in the sorted array using Binary search technique.

14. Write an interactive C program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.

15. Write a C program to implement a queue in which insertions, deletions and display can be performed.

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.
- Minimum of 13 experiments to be conducted.

AE67   **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 (3.2, 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

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.

AE68   **EMBEDDED SYSTEMS DESIGN**
UNIT I
INTRODUCTION TO EMBEDDED SYSTEMS   04 hrs
Embedded Systems Overview; Design Challenge; Processor Technology; IC Technology; Design Technology; Trade-Offs.
I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

CUSTOM SINGLE PURPOSE PROCESSORS: HARDWARE   04 hrs
Introduction; Combinational Logic; Sequential Logic; Custom Single Purpose Processor Design; Rt-Level Custom Single Purpose Processor Design; Optimizing Custom Single Purpose Processors.
I (2.1, 2.2, 2.3, 2.4, 2.5, 2.6)
UNIT II
GENERAL PURPOSE PROCESSORS: SOFTWARE   07 hrs
Introduction; Basic Architecture; Operation; Programmer's View; Development Environment; ASIPs; 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 Timer; UART; Pulse Width Modulators; LCD Controllers; Keypad Controllers; Stepper Motor Controllers; Analog to Digital Converters; Real Time Clock.
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; Common Memory Types; Composing Memory; Memory Hierarchy and Cache; Advanced RAM.
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; Tasks and Data; Semaphores and Shared Data.
II (6.1, 6.2, 6.3)
UNIT VII
MORE OPERATING SYSTEMS SERVICES   08 hrs
Message Queues, Mail Boxes and Pipes; Timer Functions; Events; Memory Management; Interrupt Routines in An RTOS Environment.
II (7.1, 7.2, 7.3, 7.4, 7.5)
UNIT VIII
BASIC DESIGN USING REAL TIME OPERATING SYSTEMS   07 hrs
Overview; Principles; An Example; Encapsulating Semaphores and Queues; Hard Real Time Scheduling Consideration; 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, 2006 reprint, John Wiley Student Edition.
II.   An Embedded Software Primer, David .E. Simon, Fourth Impression 2007, Pearson Education.
Reference Books:
1   Embedded Systems, Raj Kamal, 13th reprint 2007, Tata-McGrawHill Publications.
      Embedded Microcomputer Systems, Valvano, Thomson.
Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AE71   **DATA COMMUNICATION AND COMPUTER NETWORKS**

<div align="center">UNIT I</div>

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)

<div align="center">UNIT II</div>

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   **03 hrs**
Guided Transmission Media; Wireless Transmission.
I (4.1, 4.2)

<div align="center">UNIT III</div>

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)

<div align="center">UNIT IV</div>

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)

<div align="center">UNIT V</div>

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   **2 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   **02 hrs**
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 (2007), William Stallings, Pearson Education Low Price Edition.

Reference Book:
1   Data Communications and Networking, Fourth Edition (2006), Behrouz A. Forouzan, Tata McGraw-Hill Special Indian Edition.

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

AE72   **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, Microwave co-axial connectors.
I (0.1, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

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
Microwave Tunnel Diodes – Principle of operation and Characteristics. 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 (5.3, 5.3.1, 5.3.2, 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), Backward-Wave Cross-field Oscillator (Carcinotron)- Linear and circular M-Carcinotrons
l (10.0, 10.1.1, 10.1.2, 10.1.3, 10.2, 10.2.1, 10.2.2, 10.3, 10.4)

UNIT VII
STRIP LINES AND MICROSTRIP LINES   **07 hrs**
Introduction, 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
l (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
l (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:
l   Microwave Devices and Circuits, Samuel Y. Liao, 3rd Edition, Prentice-Hall of India, New Delhi, 2006.

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.

AE73 **NFORMATION THEORY AND CODING**

UNIT I
RANDOM SIGNAL THEORY **7 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); II (8.4, 8.5, 8.6)

Text Books:
I   Digital and Analog Communication Systems by K. Sam Shanmugam, John Wiley India Edition, 2007 reprint.
II   Digital Communications by Simon Haykin, John Wiley & Sons, Student Edition.

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.

AE74   **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 3.8)

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; Propagation Delays; Wiring Capacitances; Choice of Layers.
I (4.1 to 4.11)

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)

SUBSYSTEM DESIGN AND LAYOUT   **05 hrs**
Some Architectural Issues; Switch Logic; Gate (Restoring) Logic; Examples of Structured Design (Combinational Logic).
I (6.1 to 6.4)
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; Input/Output (I/O) Pads; 'Real Estate'; Further Thoughts on System Delays; Ground Rules for Successful Design.
I (10.1 to 10.7)

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, 2007.

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.

AE75   **OPTOELECTRONICS & COMMUNICATION**

UNIT I

OPTICAL FIBERS: STRUCTURES, WAVEGUIDING AND FABRICATION   **07 hrs**
The Evolution of Fiber Optic Systems; Elements of an Optical Fiber Transmission Link; The Nature of Light; Basic Optical Laws and Definitions; Optical Fiber Modes & Configurations; Single Mode Fibers; Graded Index Fiber Structures; Fiber Materials; Fiber Fabrication; Mechanical Properties of Fibers; Fiber Optic Cables.
I (1.2, 1.3, 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10)

UNIT II

SIGNAL DEGRADATION IN OPTICAL FIBERS   **07 hrs**
Attenuation; Signal Distortion in Optical Waveguides; Pulse Broadening in Graded Index Waveguides; Mode Coupling; Design Optimization of Single Mode Fibers.
I (3.1, 3.2, 3.3, 3.4, 3.5)

UNIT III

OPTICAL SOURCES AND DETECTORS   **08 hrs**
Topics from Semiconductor Physics; Light Emitting Diodes; LASER Diodes; Physical Principles of Photo diodes; Photo Detector Noise; Detector Response Time.
I (4.1, 4.2, 4.3, 6.1, 6.2, 6.3)

UNIT IV

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)

UNIT V

OPTICAL RECEIVER OPERATION   **08 hrs**
Fundamental Receiver Operation; Digital Receiver Performance; Performance Calculations; Pre-Amplifier Types; Analog Receiver.
I (7.1, 7.2, 7.3, 7.4, 7.5)

UNIT VI

ANALOG SYSTEMS   **07 hrs**
Overview of Analog Links; Carrier to Noise Ratio; Multi-Channel Transmission Techniques.
I (9.1, 9.2, 9.3)

UNIT VII

DIGITAL TRANSMISSION SYSTEMS   **08 hrs**
Point-to-Point Links; Line Coding; Error Correction.
I (8.1, 8.2, 8.3)

UNIT VIII

ADVANCED SYSTEMS AND TECHNIQUES   **07 hrs**
Operational Principles of WDM; Passive Components; Basic Applications and Types of Optical amplifiers; Semiconductor Optical Amplifier; Basic Networks; SONET / SDH; Optical CDMA; Ultrahigh Capacity Networks.
I (10.1, 10.2, 11.1, 11.2, 12.1, 12.2, 12.8, 12.9)

Text Book:
I   Optical Fiber Communications, Gerd Keiser, 3rd Edition, McGraw Hill Publications, 2000.

Reference Book:
1   Optical Communication Systems, John Gowar, PHI.

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

AE76   **WIRELESS & MOBILE COMMUNICATIONS**

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   **03 hrs**
Introduction; Basic Probability and Statistics Theories.
I (2.1, 2.2)

UNIT II
MOBILE RADIO PROPAGATION   **05 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   **04 hrs**
Introduction; Concepts and Models for Multiple Divisions; Modulation Techniques.
I (7.1, 7.2, 7.3)

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

MOBILE COMMUNICATION SYSTEMS   **04 hrs**
Introduction; Cellular System Infrastructure; Registration; Handoff Parameters and Underlying Support; Roaming Support; Multicasting.
I (9.1, 9.2, 9.3, 9.4, 9.5, 9.6)

UNIT VI

EXISTING WIRELESS SYSTEMS   **08 hrs**
Introduction; AMPS; IS-41; GSM; PCS; IS-95; IMT-2000.
I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

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, 13.8, 13.9)

UNIT VIII

WIRELESS MANs, LANs AND PANs   **06 hrs**
Introduction; Wireless Metropolitan Area Networks (WMANs); Wireless Local Area Networks (WLANs); Wireless Personal Area Networks (WPANs).
I (14.1, 14.2, 14.3, 14.4)

RECENT ADVANCES   **02 hrs**
Introduction; Ultra-Wideband Technology; Directional and Smart Antennas; Threats and Security Issues.
I (15.1, 15.2, 15.8, 15.13)

Text Book:
I   Introduction to Wireless and Mobile Systems, Second Edition (2007), Dharma Prakash Agrawal and Qing-An Zeng, Thomson India Edition.

Reference Books:
1   Wireless Communications-Principles and Practice, Second Edition (2007), Theodore S. Rappaport, Prentice Hall of India Pvt Ltd.
2   Modern Wireless Communications (2007), 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.

AE77   **DIGITAL SIGNAL PROCESSING**

UNIT I
SAMPLING OF CONTINUOUS-TIME SIGNALS   **07 hrs**
Periodic Sampling; Frequency Domain Representation of Sampling; Reconstruction of a Bandlimited Signal from its Samples; Discrete-Time Processing of Continuous-Time Signals; Continuous-Time Processing of Discrete-Time Signals; Digital Processing of Analog Signals; Oversampling and Noise Shaping in A/D and D/A Conversion
I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.8, 4.9)

UNIT II
TRANSFORM ANALYSIS OF LINEAR TIME-INVARIANT SYSTEMS   **07 hrs**
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
STRUCTURES FOR DISCRETE-TIME SYSTEMS   **07 hrs**
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
FILTER DESIGN TECHNIQUES   **08 hrs**
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; FIR Equiripple Approximation; IIR and FIR Discrete-Time Filters
I (7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6)

UNIT V
THE DISCRETE FOURIER TRANSFORM   **08 hrs**
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**
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
I (9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6)

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; Spectrum Analysis of Random Signals using Estimates of the Autocorrelation Sequence
I (10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

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)

Text Book:

I   Discrete-Time Signal Processing (1999)*,* Oppenheim, A. V., and Schafer, R. W., with J. II   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.

AE78   **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
DETECTION OF SIGNALS IN NOISE   **07 hrs**
Introduction; Matched Filter Receiver; Detection Criteria; Detectors; Automatic Detection.
I (5.1 to 5.5)

UNIT V
RADAR CLUTTER   **07 hrs**
Introduction to Radar Clutter; Surface Clutter to 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 Illumination; Reflectors Antennas; 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
TRACKING RADAR   **04 hrs**
Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing; Tracking in Range.
I (4.1 to 4.3, 4.6)

NAVIGATIONAL AIDS   **04 hrs**
Radar Beacons, LORAN, Radio Range, Instrument Landing System, Radio Direction Finding.
II (26.10, 26.11, 26.12, 26.13, 26.14)

Text Books:
I   Introduction to Radar Systems, Merrill I. Skolnik, 3e, TMH, 2001
II   Electronic and Radio Engineering, F.E. Terman, McGraw Hill Publications.

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.

AE94   ANALOG & DIGITAL COMMUNICATIONS LAB

List of Experiments

Passive Attenuators: T and π type – Design and study of attenuators for the given attenuation, source and load impedances.
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.
Class C Tuned Amplifier: Design for a particular tuned frequency, plot of Efficiency Vs Load and to obtain optimum load.
Collector Amplitude Modulation: Display of AM output, calculation of modulation index.
AM Detector using Envelope Detector: To study the variation of output signal amplitude and AVC output with variations in AF input.
DSBSC generation using Diodes: Study of output waveforms for variations in the input.
FM Modulation: Study and display of waveforms.
FM Detection: Study and display of waveforms.
PAM: Generation and demodulation – Observe input and output waveforms.
PWM: Generation for the given analog frequency and study of PWM output.
OPAMP preemphasis and deemphasis: Design for a given time constant and plot of Gain Vs Frequency.
Transistor Mixer: Demonstration of mixing action of RF and oscillator frequency to produce IF. To obtain conversion trans-conductance of the mixer.
Verification of sampling theorem using natural / flat top sampling.
Generation and Detection of ASK: Study and display of waveforms.
Generation and Detection of PSK: Study and display of waveforms.
TDM: Study of TDM and recovery of two band limited signals.

Demonstration Experiments
Study of optical fiber characteristics.
Study of DPSK and QPSK.
Use of microwave bench.
Antenna Measurements.

Note: Minimum of 14 experiments to be conducted.

AE69   **PROJECT WORK**

The Project will consist of hardware/software, design/development, experimental/ theoretical work or a critical in-depth literature survey of a contemporary topic or a combination of these. A student is expected to put in about six hours/week spread over a period of three to four months. There will be no joint project work.

The students may work for their project in any industry, in any educational institution, in R&D Labroratory or in a library depending upon the nature of the project. The student will be required to have a supervisor from one of these places who can supervise and guide the project work. In case of difficulties, the students may contact the local centre.

On completion of the project, the student will submit two bound copies of the project report to IETE Local Centre as per the dates intimated by the Centre. The project work will be assessed by an Assessment Board. The students will be intimated by the local centers of the venue, date & time for presentation of their project report & appearing before the Assessment Board. The result of the project will be finalized at IETE HQ and declared along with the main IETE examination result. 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.

AE70   **SEMINAR**

1. Eligibility :
To become eligible for seminar, the student should have cleared 16 subjects including the labs of Sec A & Sec B with GPA of 5 or more. In addition, the student should have completed three and half years from the date of enrolment.

2. Registration :
Eligible students are required to submit their applications for the registration of seminar to the respective local 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. Applications for the seminar must be submitted at the concerned Centre/ Sub-Centre within one week after declaration of result but not later than 05 April / 05 October.

3. 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.

4. Seminar Fees :
Each student is required to pay Rs 400/ & US $80 for foreign students as Seminar fee to the respective IETE Centre / Sub-Centre.

5. Examination / Evaluation :
The local 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.

AE99   **COMMUNICATION SKILLS AND TECHNICAL WRITING**

UNIT I
COMMUNICATION: ITS TYPES AND SIGNIFICANCE   05 hrs
Basic Concepts of Communication; Process of Communication; Types of Formal communication; The Media of Communication; Channels of Communication; Barriers in Communication; How to Overcome Barriers to Communication.
I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

UNIT II
GRAMMAR   06 hrs
Synonyms; Antonyms; Words used as different parts of speech; Spotting errors; Concord; Principle of proximity between subject and verb.
I (4.1 to 4.3, 4.6, 4.7, 4.8)

UNIT III
SYNTAX   07 hrs
Sentence Structure; Combination and Transformation of sentences; Verb Patterns in English.
I (5.1 to 5.4)

UNIT IV
READING SKILLS   05 hrs
Purpose and Process of Reading; Reading Tactics; Reading Strategies; Reading Comprehension; Paraphrase; Preparing outlines of paragraph/text.
I (2.1 to 2.3, 2.5, 2.6, 2.10, 2.11)

UNIT V
WRITING SKILLS   07 hrs
Elements of Effective Writing; Job Application, Bio-data, Personal Resume and Curriculum Vitae; Preparing Agenda and Minutes of a Meeting; Back office job for organizing a conference/seminar; Writing Styles; Scientific and Technical Writing; Summary Writing; Writing paragraphs; Writing Essays.
I (3.1 to 3.6, 3.8, 3.9, 3.11)

UNIT VI
LISTENING SKILLS   06 hrs
Process of listening; Hard and Soft Skills; Feedback Skills; Essentials of Good Communications; Types of Listening; Barriers to Listening; Note taking and Note making.
I (8.1 to 8.4, 8.6 to 8.10)

SPEAKING SKILLS
Skills of Effective Speaking; Component of an Effective Talk; Tone of Voice; Accent, Body Language; Timing and Duration of Speech; Audio-Visual Aids in Speech.
I (9.1, 9.2, 9.4 to 9.7)

UNIT VII
TECHNICAL REPORT   06 hrs
Main considerations in writing a good report; Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports.
I (12.1 to 12.5, 12.8, 12.9)

UNIT VIII
SELF DEVELOPMENT   06 hrs
Know yourself; Tips for giving an Interview; Body language for Interviews; Group Discussion; Skills of participating in meeting; Attending Calls; Soft Skills & Leadership.
I (10.1 to 10.4, 10.6, Chap 13)

Text Book

I   The Functional Aspects of Communication Skills, Prajapati Prasad and Rajendra K. Sharma, S. K Kataria & Sons, New Delhi, Reprint 2007.

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: Examination procedure.

Theory - consists of written examination for 70 marks

AE98

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 30 marks.

Annexure-I

आरम भाषादीय

GOVERNMENT OF INDIA
DEPARTMENT OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH
TECHNOLOGY BHAWAN NEW MEHRAULI ROAD
NEW DELHI 110 016

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TEL	26962819 26567071
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	26562134, 26562127
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	26529730 26516019

No. 11/274/92-TU-V   (Registered)   Dated: 5ᵗ March, 2009

The Secretary General
The Institution of Electronics and
Telecommunication Engineers
2 Institutional Area
Lodi Road
New Delhi - 110 003

Subject: Renewal of recognition of Scientific and Industrial Research Organisations (SIROs).

Dear Sir,

This has reference to your application for renewal of recognition of **The Institution of Electronics and Telecommunication Engineers, New Delhi,** beyond 31.3.2009 by the Department of Scientific & Industrial Research under the Scheme on Recognition of Scientific and Industrial Research Organisations (SIROs) - 1988

2   This is to inform you that it has been decided to accord renewal of recognition to The **Institution of Electronics and Telecommunication Engineers, New Delhi,** from **01.04.2009** to **31.03.2012** The recognition is subject to terms & conditions mentioned overleaf.

3   Receipt of this letter may kindly be acknowledged.

Yours faithfully

(R. R. Abhyankar)
Scientist 'G'

Annexure-II

No.F.18-13/73-T-2.
Government of India
Ministry of Education & Social Welfare
Department of Education
. . . . .

New Delhi-110001, dated the 29th 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 Assesment 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 Advisor(T)

To

        All Ministries/Departments of the
        Government of India/State Governments. etc..

-II
Annexure-III

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

The Shri K. Thomas Kora,
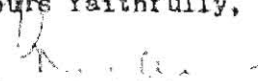President,
The Institution of Electronics and
Tele-communication Engineers,
2, Institutional Area, Lodi Road,
New Delhi - 110003.

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-IV

No.F.17/2/76-E.I(B).
UNION PUBLIC SERVICE COMMISSION
DHOLPUR HOUSE
* * * *

New Delhi-110011, the

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.
* * * *

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V

Annexure-V

भारतीय विश्वविद्यालय संघ

ए आई यू हाउस, 16, कॉम्प्ले ऽ्खीन ।न ण
(कोत्ला मार्ग) नई दिल्ली-110002

Association of Indian Universities

AIU House, 16 Comrade Indira ऽ े े े ऽ े े
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)

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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 Karnataka	-	No. DPA 1388/SR – B/76 Mysore Government Secretariat
3	Govt. of Uttar Pradesh	-	Pravidhik Shiksha Vibhag, Lucknow (UP) No. 2031 – F/89-18 dt. 01 April 1989. Office Memorandum.
4	Govt of Haryana	-	1297- Edu –II-4E-76/34226 dt. 20.10.1976
5	Govt. of Nepal	-	Nepal Public Service Commission letter dated 10.05.1990.
6	Govt. of Madras	-	G O No. 1970/Education dt. 6.11.1971.

Universities

1	Association of Indian Universities	-	No. EV/II (515)/2010/1308 dated 30 Sept 2010
2	Aligarh University	-	D No 147 dt. 04.02.1991 Dean, faculty of Engg., AMU, Aligarh (item No. 4 Minutes Equivalent Committee)
3	Anna University, Madras	-	Letter No 26869/AA1/88 dt. 4.02 89 from the Registrar
4	Andhra University, Waltair	-	Letter No. LII(3)/19 15/90 dt. 08.07.1992
5	Amaravati University	-	Gazette Notification No. 46/1992 dt. 14th May, 1992
6.	Banaras Hindu University, Varanasi	-	No. IT/ACD/GEN/VI – 7/689 dt. 21.09.1994.
7	Bharatidasan University, Tiruchirapali	-	No. 10656/D2/93 dt. 28.10.1993
8	Bombay University, Mumbai	-	Letter no. E1/C/8155 dt. 22 November, 1988 from the Registrar.
9	Calcutta University	-	Resolution No 319/75 Secy dt 10 06.1991
10	Cochin University of Science and Technology	-	University Order No. AC, A3/213559/84 dt 05 09.1984
11.	University of Indore (Now Devi Ahilya Viswavidyalaya)	-	No. ACM-II (195)/79 dt 11.01.1980

12	Goa University, Goa	-	No GU/1/Recog/Engg/130/94 18259 dt. 09.12 1994
13	Gulbarga University, Gulbarga	-	Notification No. UOG/ACA/92-93/2569 dt. 17.10.1992
14	Gurunanak Dev University Amritsar	-	D.O. No 3688 dt. 11.02.1986
15	HNB Garhwal University	-	No. UOG/Acad/92/2657 dt 11.02 1992
16	Hyderabad University	-	Acad/U2/Recog/3941(1) dt. 23.08.1990
17	Indira Gandhi Nation Open University	-	No B.IV/6/(8)/93/1155 dt. 6.06 1993
18	Kakatiya University Warangal (AP)	-	No. 868/81/1985 dt. 26 07.1985.
19.	Kerala University, Trivandrum	-	No. Acad AIII/3/3 300/94 dt. 12.08.1994
20	Kurukshetra University Kurukshetra	-	No ACM II/267/92/32413 dt. 26.12 1992
21	Kuvempu University	-	No. KU/AC/BOS-I/2929/93-94 dt. 28/29.07/1993.
22.	University of Madras	-	No. CR III/Recog/2029 dt. 23rd March 1978
23	Mother Teresa Women's University, Chennai	-	No. 2/EC/WU/R/1992. Dt 18.11.92 (Resolution No. 1992-113)
24	Mysore University	-	No AC5/R5/407/87-88 dt 28.05.91
25	Maharshi Dayanand University Rohtak	-	Resolution. No. 50 of 25.09 1989
26	Marathwada University	-	Ex/EQUI-Misc-41/89-90/50660-92 dt 18.09 1989
27	Nagpur University	-	Exam/Recog/4276 dt. 05.09 1984
28	Nirma University, Ahmedabad	-	No. NU/AC/Equivalence/IT/10-1078 dt. 30.07.2010
29.	Pondicherry University	-	No. PU/Aca-2/3/5681 dt. 26.02.1993
30.	Punjab University	-	No. 2724/GM dt. 03.12.1991 ST 996 dt18 02 1986
31.	Rani Durgavati Viswa Vidyalaya, Jabalpur	-	Notifications No. GS/89/66
32.	University of Roorkee (Now IIT, Roorkee)	-	No. Acd/1160/R-122 (Recog.) dt. 10.06.92
33	Sardar Patel University	-	DB/38 dt. 25.04.1994.
34	Shivaji University, Kolhapur	-	Letter No. SU/Eligi/340 dt. 30 May 1989
35.	Tribhuvan University Kathmandu, Nepal	-	Letter No. 107/041 dt. 31st July 1984.
36	Sri Venkateswara (Tirupati) University	-	Letter No 27-826-C 1 (2)/89 dt. 16.11.1989.
37	Visva Bharati	-	No G/D 43/163 dt. 13 11.1992

38.	Bharathiar University, Coimbatore	-	No. 1603/B/2/95/Recog. Dt. 18 09.1995
39.	Bangalore University	-	No ACA-I/R2/Prof. Course/ AMIETE/96-97 dt 28.01 1997.
40.	Sambalpur University	-	Notification No 10420/Acad I dt. 10.07.1978
41	Bengal Engg College, Howrah (Deemed University)	-	Notification – Admission to Post Graduate Programme 1999-2000.
42.	GGS Indraprastha University, Delhi	-	No. F IPV-3/10(1)/99/6246 dt 23/24-10-2000.
43	University of Jammu	-	Letter No F Acad/V/122/2001/8548-49 dt
44.	Gujarat University	-	No. Exam / 3A / Eli / 6370 / 2002 dt. 12.09.2002
45.	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.

IETE ACADEMIC AWARDS

IETE has instituted the following academic awards for excellence for all the streams of AMIETE students to be awarded every year. Awardees are intimated sufficiently in advance and are invited to receive these prestigious awards at serials (a) to (e) during students' session of the Annual Technical Convention of IETE and at serials (f) & (g) during the Annual Convocation of IETE The award consists of a medal and a citation. Details of awards are given below:

(a)   **Subramanian Thyagaraja Award** for securing the highest percentage with 6 5 CGPA and the above marks and completing Part-1 of Section A in one attempt without exemptions.

(b)   **AMIETE Council Award-I** for securing the highest percentage with 6.5 CGPA and above grade and completing Part-II of Section A in one attempt without exemptions.

(c)   **AMIETE Council Award-II** for securing the highest percentage with 6.5 CGPA and above grade and completing Part-I of Section B in one attempt without exemptions.

(d)   **AMIETE Council Award-III** for securing the highest percentage with 6.5 CGPA and above grade and completing Part-II of Section B (except project & seminar) in two attempts without exemptions.

(e)   **Hari Mohan Memorial Award** to a girl student for securing the highest percentage with 9 CGPA in both the mathematics papers of the AMIETE examinations conducted in the very first year of her registration with IETE.

(f)   **Smt Radhabai Kapre Gold Medal Award** for securing the highest percentage with 6.5 CGPA and above grade and completing AMIETE in 4 years without exemptions.

(g)   **IETE – Gopal M Dandekar Memorial Award** to a girl student securing the highest percentage with 6.5 CGPA and above grade and completing AMIETE (considering ET, CS & IT streams of current Jun and previous Dec exams together) in four years without any exemptions.

IETE CENTRES

AHMEDABAD 206, Umiya Vijay Shopping Centre, Satellite Road, AHMEDABAD – 380 015 Ph · 079-26753938 Fax 079-26733931 Email . ahmedabad@iete.org

ALIGARH Flat No 1&2, 1st Floor Shah Residency, Medical Road, ALIGARH-202 002 Ph : 0571-270190 Email . aligarh@iete.org

ALLAHABAD C/o J K Institute of Applied Physics, & Technology, University of Allahabad, ALLAHABAD – 211 002. Ph : 0532-2460442 Fax 0532-2460443 Email : allahabad@iete org

AMRAVATI IETE Amravati Centre Bldg C/o /Sipna's College of Engg and Technology,Nimbhora, Opp Namani Godown, Bandnera Road, AMRAVATI – 444 701 Ph · 0721-2663908 Email . amravati@iete.org

AURANGABAD C/o Deptt. of Computer Science & Information Technology, Dr B A M University Campus, AURANGABAD – 431 004 Ph : 0240-2403317 Fax 0240-2403317 Email . aurangabad@iete.org

BANGALORE IETE Building, Bellary Road, Opp Ganganagar Bus stop BANGALORE – 560 032 Ph : 080-23331133 Fax : 080-23337231 Email : bangalore@iete.org Website · www ieteblr org

BHOPAL Office Hall No. 3, Gamantika Parisar, Jawahar Chowk, TT Nagar, BHOPAL – 462 003. (M P) Ph : 0755-2775597 M : 09425301024 Email : Bhopal@iete.org

BHUBANESWAR Room No. 4,5 & 6 IInd Floor, Barabhuja Commercial Complex, Khandgiri Square, BHUBANESWAR – 751 030 Ph: 0674 2384612 Email : bhubaneswar@iete org

BURDWAN C/o Dept of physics Burdwan University,

Gopalbag (North), BURDWAN – 713 104. Ph · 0342-2657800 Ext. 37 Email : burdwan@iete.org

CHANDIGARH IETE Building, Sector 30-B (Opp. CSIO) CHANDIGARH – 160 030 Ph : 0172-2651061 Fax : 0172-2657333 Email : chandigarh@iete.org

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COIMBATORE Amrita Vishwa Vidyapeetham Amrita University, Ettimadai, COIMBATORE – 641 105 Ph : 0422-2656422 Fax : 0422-2656274 Email : coimbatore@iete org

DEHRADUN C/o DEAL Campus, Riapur Road, DEHRADUN – 248 001. Ph : 0135-2787257. 2787083 Fax : 0135-2787265, 2787290 Email : dehradun@iete org

DELHI 16/1-2, Institutional Area, Pankha Road, Janakpuri (Opp Vashisht Park), NEW DELHI – 110 058 Ph : 28521618 Tele-fax : 011-28520912 Email : delhi@iete.org

DHARWAD C/o Dept of E & CE S D M College of Enng & Tech., DHARWAD – 580 002 Ph · 0836-2447465 Fax : 0836-2464638 Email : dharwad@iete org Website www. sdmcet.ac.in

GOA C/o ETC Deptt , Govt Engg College, Farmagudi, Ponda, GOA-403401. Ph: 0832 2326341 Fax: 2335021 Email : goa@iete.org

GULBARGA Guru Nanak Dev Engg College Mailoor Road, Bidar 585403 Ph : 08482-226949 Fax : 08472-228273 Email : gulbarga@iete.org

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GUWAHATI	3rd Floor, Eureka Tower, Chandmari, GUWAHATI - 781 003. Ph : 0361-2656166, 2571117 Email : guwahati@iete.org		Kathmandu, Nepal Ph 00977-1-4784213 Fax : 00977-1-4784220 Email : kathmandu@iete.org

GWALIOR — NAND Bhawan
133-Panchwati Vastra Nagar,
(inside water works) Roshani Ghar Road,
GWALIOR – 474 009.
Ph 0751-2370093
Email : gwalior@iete.org

HYDERABAD — Near Jama-I-Osmania Post Office
Osmania University Campus,
HYDERABAD – 500 007
Ph : 040-27098025
Telefax : 040-27097175
Email : hyderabad@iete.org
Website : www.ietehyd.org

IMPHAL — IETE Building
Lamphel Langol Road,
IMPHAL And
C/O Manipur Police Wireless
Jail Road, 1st MR Complex
Imphal 795 001.
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Fax: 0385 2449738
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JABALPUR — Raj Kumari Bhawan Complex,
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South Civil Lines,
JABALPUR – 482 001.
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JAIPUR — 'D' Block Shopping Centre,
1st Floor, Malaviya Nagar,
JAIPUR – 302 017
Ph : 0141-2545924
Email : jaipur@iete.org

Jammu — 7C/C Gandhi Nagar,
(Near Triveni Hospital)
JAMMU – 180 004.
Ph : 01991-285699 Ext. 2010
Email : jammu@iete.org

KAKINADA — Kakinada Sub Centre
C/o ECE Department
Jawaharlal Nehru Technological Univ
Kakinada 533003 (AP)
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KANPUR — 111/457 1st Floor,
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Opp Swagat Hotel, Near Brahm
Nagar Crossing, 80 Feet Road,
KANPUR – 208 012.
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KATHMANDU — C/o Nepal Telecom Training Centre
Babar Mahal, PB No 5662,   97

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Email : mankapur@iete.org

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Near Hanuman Madhi,
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Website : ietetum.com

TIRUPATI 4th Floor, AVR Complex,
Balaji Colony, Tirupati-517 502
Ph : 09247007122
Email : tirupati@iete.org

VADODARA 501-506, Fifth Floor, Vraj Siddhi Tower,
Khanderao Market Char Rasta,
Rajmahal Road,
VADODARA – 390 001.
Tele Fax : 0265-2422475
Email : vadodara@iete.org
Website · ietevadodara.org

VARANASI 36, Nand Nagar Colony
ITI Road, Karaundi
VARANASI 211005
Ph: 09235440911
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VIJAYAWADA Flat No 107 & 108
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High School Road Cross, Patamata,
M.G. Road,
VIJAYAWADA – 520 010.
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Email : vijayawada@iete.org

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 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.

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.
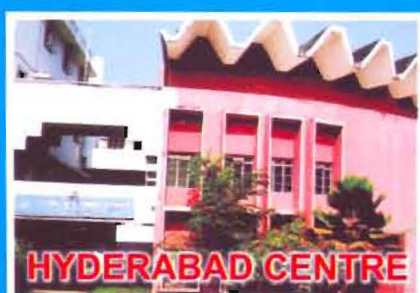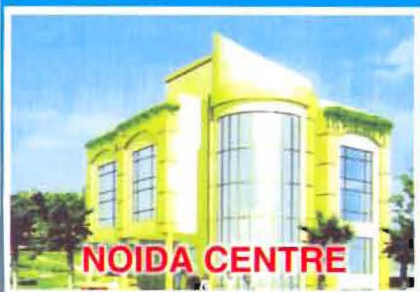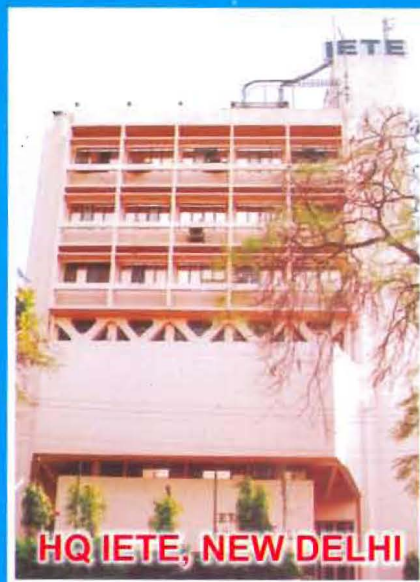   (d)   Any other document.

4.   Email address :...

5.   Phone No.......................................

                                                              (Signature of Student)

Note :
1.   Fee for exemption for AMIETE is Rs 500/- where as for DipIETE, it is Rs 400/-
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.

IETE BUILDINGS

DELHI CENTRE

THIRUVANANTHAPURAM CENTRE

NOIDA CENTRE

HQ IETE, NEW DELHI

BANGALORE CENTRE

ALLAHABAD CENTRE

VISAKHAPATNAM CENTRE

NAGPUR CENTRE

KOLKATA CENTRE

HYDERABAD CENTRE

CHANDIGARH CENTRE

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 IAS 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 A and 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 IAS 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)/2010/1308 dated Sept 30, 2010)

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 forsee any difficulty in acceptance of the qualifications at Indian Universities, on merits of admission to higher courses.

Thanking you,

Yours faithfully,
Sd/
Sambhav Srivastava
Section Officer (EV)