ABOUT THE UNIVERSITY

The University:

Rajshahi University of Engineering & Technology is one of the prestigious universities of Bangladesh offering engineering and technological education effectively. It was founded in 1964 as a faculty of Engineering under the University of Rajshahi providing four years Bachelor degree in Civil, Electrical and Electronic, and Mechanical Engineering. The Engineering College, Rajshahi was converted to Bangladesh Institute of Technology (BIT), Rajshahi in the year 1986. Finally BIT, Rajshahi was upgraded to Rajshahi University of Engineering & Technology (RUET) in 2003 with a view to meet the increasing demand for engineering and technological education in the country.

The university is aimed in promoting technological developments and management of the nation by strengthening engineering and technological education and research.

Location:

RUET campus spreading over 152 acres of land is located at about 4 kilometers east of Rajshahi city center by the side of the mighty river the Padma and adjacent to Rajshahi University. The average temperature of the city varies from 15^0C to 40^0C. Rickshaw, human hauler, taxi and bus facilities are available to reach the campus from any place of the city.

Campus:

The Campus presents spectacle of harmony in architecture and natural beauty. The campus area has been divided into different functional zones: (i) Residence for students, (ii) Residential zones of faculty and other supporting staff, (iii) Academic zone for academic buildings and laboratories/workshops, and (iv) Cultural cum social and recreational zones for students. A branch of Rupali Bank, a post office, an auditorium and a medical center are located on the campus. For the education of the children of the University employees, there is one school cum college. The shopping center includes a branch of general stores, barber shop, photo copying facilities and restaurant.

Faculties and Departments:

RUET has three faculties and ten teaching departments. At present undergraduate programs leading to Bachelor of Science in Engineering (B.Sc. Engg.) degrees are offered in six departments and postgraduate degrees (M.Sc./ M.Engg, M.Phil, and Ph.D) are being conferred by five departments. Presently, RUET has three faculties.

Faculty of Civil Engineering consists of the following departments:

(i) Department of Civil Engineering (CE)
(ii) Department of Mathematics
(iii) Department of Physics
(iv) Department of Chemistry
(v) Department of Humanities

Faculty of Electrical and Computer Engineering consists of the following departments:

(i) Department of Electrical and Electronic Engineering (EEE)
(ii) Department of Computer Science and Engineering (CSE)
(ii) Department of Electronics and Telecommunication Engineering (ETE)

Faculty of Mechanical Engineering consists of the following departments:

(i) Department of Mechanical Engineering (ME)
(ii) Department of Industrial and Production Engineering (IPE)

Post graduate programs leading to Master of Science in Engineering (M.Sc. Engg.), Master of Engineering (M.Engg.) and Ph.D degrees are offered in the following departments.

(i) Department of Civil Engineering (CE)
(ii) Department of Electrical and Electronic Engineering (EEE)
(iii) Department of Mechanical Engineering (ME)

M.Phil and Ph.D degrees are offered in the departments of Mathematics and Chemistry.

Facilities:

The University provides various educational and research related facilities to build students with the ability to plan, administer and manage the latest technologies to decrease the gap between developed and developing countries. A brief description of them is given below.

Library:

a) Central Library

The central library building is within the walking distance from the academic buildings and students residences. It is a compact building with limited built-in facilities to provide teaching aides such as reading facility, borrowing of books, journals etc. to the students and teachers of RUET. In consistent with the academic curricula, the contents of the central library are being updated consistently to keep up with modern technological trends.

b) Rental Library

Apart from the central library facility, each degree-awarding department has its own

rental library that provides books on rent to the students.

Computer Center:
The university has a central computer center providing computing and limited Internet facilities to the students and faculty members. It is equipped with Pentium based PCs and Network Servers, and Printing and Data storage facilities. The center often offers short training courses and presently with the department of CSE the central computer center is arranging CISCO local academic program.
Due to the financial inadequacy, expected facilities are not being provided. However, constant attention is given to increase its resources consistently.

Directorate of Student Welfare:
The Directorate of Student Welfare is responsible for the various activities related to the physical, social and other aspects of welfare of the students. These include arrangement of supervision for halls of residence, programs for physical education, games and sports, supervision of the programs of co-curricular activities of students through the Central Student Union and through the students union of the various halls of residence. It is also responsible for providing health services through the student's health center,
The Central Students Union, most of its members are elected by the students, oversees the socio-cultural activities of the students and looks after the problems of the students.
The student unions of the various residential halls also arrange their individual co-curricular activities, literary competitions etc and help the hall administration for its proper management.

Auditorium Complex and Seminar Hall:
The University has an Auditorium Complex with modern facilities having a seating capacity of about 700, which is capable of holding conferences, seminars and other cultural programs. Besides this there are seminar and conference rooms with limited capacity in engineering degree awarding departments.

Students Hall of Residences:
There are six halls of residence at RUET campus. The total capacity of these halls is about 1500. Name of the halls with their respective capacities are depicted in Table I. Some of the halls are named after the national heroes who sacrificed their lives in the liberation war of Bangladesh in 1971.
The existing capacity is around 80% of the total number of students of RUET. Non-residential students are to be attached with a hall so that the administrative

control on the students becomes hall based.

Table: Residential Halls of RUET.

Serial No.	Name of the halls	Residential
1.	Shahid Lt. Selim Hall	350
2.	Shahid Shahidul Islam Hall	225
3.	Shahid Abdul Hamid Hall	225
4.	Tin Shed Hall (Extension)	100
5.	Ladies Hall	120
6.	Shahid President Ziaur Rahman Hall	480

All halls are set in gardens and frontal green plantations and lawns. The students live in these halls on community basis, while 2, 3 or 4 students share a single room, depending on its size. Each hall has a common room facility. A provost and few assistant provosts administrate each hall.

Students Health Service:

An on campus medical center provides primary and basic health care facilities to the students (residential and non-residential) free of charges. Two full-time MBBS doctors and other staffs provide these facilities to the students. For specialized consultation on complicated cases, the center refers the patients to specialist consultants.

Games and Sports Facilities:

The sports center of the RUET provides excellent facilities to students for acquiring physical fitness that is indispensable for a healthy mind and body. The University maintains a beautiful playground, tennis lawn and basketball court. The sports center arranges a colorful athletic competition every year in the form of annual sports meet.

For improvement of the standard of games and spots, regular coaching by experts is arranged. The University arranges inter-year, interdepartmental football, cricket, and basketball and volleyball competition. Teacher student friendly games are also arranged at times.

Transportation

For the convenience of the students, faculty members, officers and staffs, RUET operates its own Shuttle Bus Service between Rajshahi city and the campus. In weekends special services are also provided to meet the weekend recreational and other needs.

Food and Stationeries

Each residential hall has its own cafeteria, which serves two meals per day. Each

hall authority maintains the cafeteria. Students are also involved for their daily menu. Special menus are provided in different occasions in the hall cafeteria. Besides these a large central cafeteria and a fast food shop offers breakfast, meals and snacks etc. Moreover, in Rajshahi city, there are number of nice restaurants which serve a wide variety of food including oriental and western flavor. Any sorts of alcohol or alcoholic drinks are strictly prohibited in the campus. A departmental store is also housed in the campus for the benefit of all.

RUET Administration

RUET administration is governed by the rules and statues framed in the University ordinance 2002. On the recommendation of Academic Council and various committees as mentioned in the ordinance, the Syndicate approves the policies and operational procedures of the University. The Vice-Chancellor is the administrative head of the University.

Chancellor: Honorable President Md. Zillur Rahman
Vice-Chancellor: Professor Dr. Muhammad Fazlul Bari
Registrar: Professor Dr. Md. Mortuza Ali (In-Charge)

Electronics and Telecommunication Engineering Association

To facilitate academic and extra-academic activities of the students and teachers of the department there is an 'Electronics and Telecommunication Engineering Association' consisting of class representatives who are elected by the students themselves. The Association works under the direct supervision and guidance of the Head of the Department. The major source of the Association fund is contribution made by the department students and the teachers. The head of the department nominates one faculty member to act as honorary treasurer of the association.

Research/Laboratory Facilities:

1. Electronic Circuit, Device & Design Laboratory (Proposed)
2. Microwave & Antenna Laboratory (Proposed)
3. Communication System Laboratory (Proposed)
4. Computer & Network Laboratory (Proposed)
5. Digital System Design & Signal Processing Laboratory (Proposed)
6. Project Laboratory

Students in first year have to undertake laboratory/sessional classes in Physics and Mechanical Engineering. Currently, students are using all the laboratory facilities of Electrical and Electronic Engineering Department.

Faculty Members:

Mr. Md. Delwar Hossain, Lecturer
B.Sc. Engg. (RUET)
Field of Interest: Photonics, Electronics.
E-mail: ronnie_ruet@yahoo.com

Mr. Md. Kamal Hosain, Lecturer
B.Sc. Engg. (KUET)
Field of Interest: Photonics, Wireless Communication.
E-mail: kamal14_kuet@yahoo.com

Mr. Tushar Kanti Roy, Lecturer
B.Sc. Engg. (RUET)
Field of Interest: Fibre Optic Communication, Mobile Communication.
E-mail: roy_kanti @yahoo.com

Teachers from the Electrical and Electronic Engineering, Computer Science and Engineering, Mathematics, Humanities, Physics and Mechanical Engineering departments of this university as well as a few part-time teachers from different universities are actively teaching in different classes.

Academic Ordinance for Undergraduate Studies for the Award of Bachelor of Science in Engineering Degree

1. Definitions:

1.1 **"University"** means the Rajshahi University of Engineering & Technology abbreviated as RUET

1.2 **"Syndicate"** means the Syndicate of the University.

1.3 **"Academic Council" means the Academic Council of** the University

1.4 **"The Committee of Courses and Studies"** means the Committee for Under graduate Courses and Studies (CUGCS) of a Degree Awarding Department of the University.

2. Departments:

2.1 **Degree Awarding Departments:**

The University has the following Degree Awarding Departments:

i) Department of Civil Engineering
ii) Department of Computer Science and Engineering
iii) Department of Electrical and Electronic Engineering
iv) Department of Electronics and Telecommunication Engineering
v) Department of Industrial and Production Engineering
vi) Department of Mechanical Engineering
vii) Any other department to be instituted by the syndicate on the recommendation of the Academic Council.

2.2 **Teaching Departments:**

The University has the following teaching departments as defined in the statutes:

i) Department of Chemistry
ii) Department of Civil Engineering
iii) Department of Electrical and Electronic Engineering
iii) Department of Humanities
iv) Department of Mathematics
v) Department of Mechanical Engineering
vi) Department of Physics
vii) Department of Computer Science and Engineering
ix) Department of Electronics and Telecommunication Engineering
x) Department of Industrial and Production Engineering
xi) Any other department to be instituted by the Syndicate on the recommendation of the Academic Council.

3. Degrees Offered:

The University offers courses leading to the award of the following degrees

i) Bachelor of Science in Civil Engineering abbreviated as B.Sc. Engg. (Civil);
ii) Bachelor of Science in Computer Science and Engineering abbreviated as B.Sc. Engg. (Computer Science and Engineering);
iii) Bachelor of Science in Electrical and Electronic Engineering abbreviated as B.Sc. Engg. (Electrical and Electronic);
iv) Bachelor of Science in Electronics and Telecommunication Engineering abbreviated as B.Sc. Engg. (Electronics and Telecommunication);
v) Bachelor of Science in Industrial and Production Engineering abbreviated as B.Sc. Engg. (Industrial and Production);
vi) Bachelor of Science in Mechanical Engineering abbreviated as B. Sc. Engg. (Mechanical);
vi) Any other degree that may be awarded by a department on the approval of the Syndicate on the recommendation of the Academic Council.

4. Student Admission and Equivalence Committee:

4.1 The four academic years of study for the degree of B. Sc. Engineering shall be designated as first year class, second year class, third year class and fourth year class in succeeding higher levels of study. Students shall generally be admitted into the first year class. In special cases, students may be admitted in to a higher year class on the recommendation of the appropriate Equivalence Committee and Department concerned.

4.2 The Academic Council for admission forms an Admission Committee in each academic session into first year B.Sc. Engineering class.

4.3 A candidate for admission into the first year class must have passed the H.S.C. Examination at least in the Second Division from a Higher Secondary Education Board in Bangladesh (after 12 years of schooling) with Physics, Chemistry and Mathematics as his/her subjects of examination in higher secondary examination or examination recognized as equivalent to, and must also fulfill all other requirements as may be prescribed by the Admission Committee.

4.4 The rules and conditions for admission into various courses of studies or departments shall be framed by the Academic Council

on the recommendation of the Admission Committee.

4.5 All candidates for admission into the courses of B. Sc. Engg. must be citizens of Bangladesh unless the candidature is against the seats that are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected on the basis of merit. The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.

4.6 No student shall ordinarily be admitted in the first year class after the corresponding classes start or after the call goes out for admission into the next session, which ever is earlier. Newly admitted students should be notified the date of commencement of classes.

4.7 Admission on of a newly admitted student in the first year class will be canceled if for first two consecutive weeks after the start of class he/she remains absent without prior permission. If any student fails to report due to unavoidable circumstances within stipulated first two weeks time, he/she may appeal within next four weeks to the Academic Council. The Council's decision will be final.

4.8 An Equivalence Committee consisting of at least five members for a period of 3 years shall be formed by the Academic Council to consider the equivalence of different public examinations.

4.9 A candidate seeking admission on transfer from other Institute or University should apply to the Registrar of the University. The Registrar will refer the case to the Head of the Department concerned and also to the Equivalence Committee. On receiving the opinions of the Head of the Department and of the Equivalence Committee, the matter will be placed before the Academic Council. The Academic Council's decision will be communicated to the Head of the Department and the candidate.

4.10 There shall be no transfer in the first year class.

4.11 Every student being admitted to the University shall be examined by a competent medical officer as may be provided in the admission rules.

5. Method of Course Offering and Instruction:

The undergraduate curricula at RUET are based on course system. The salient features of course system are:

i) Number of theoretical course and examination papers will not exceed five in each semester,

ii) The absence of passes of fail on an annual basis,
iii) iii) Continuous evaluation of student's performance,
iv) Evaluation by using Letter Grades and Grade Points instead of numerical grades.
v) Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible.
vi) Opportunity for students to choose fewer or more courses than the normal courses load depending on his/her capabilities and needs.
vii) The flexibility to allow the student to progress at his/her own pace depending on his/her ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements and
viii) Promotion of the teacher-student contact:
In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a strong emphasis on acquiring a thorough knowledge in basic sciences of mathematics, physics and chemistry and subject in humanities and social sciences. Emphasis has been given to introduce courses dealing with professional practices, project planning and management, socio-economic and environmental aspects of development projects, communication skills etc. This will help the students to interact more positively with society.

6. Academic Calendar:

6.1 The academic year shall ordinary be divided into two semesters.
6.2 There are final examinations at the end of each semester conducted by the respective degree awarding departments of the University.
6.3 On the approval of the Academic Council an academic schedule for the year is announced for general notification before the start of the academic year.

The schedule for an academic year may be prepared according to the following guidelines:

Semester-I	**No. of weeks**
Classes	13
Mid-semester recess	1
Recess before examination	2
Semester Final examination*	2.1^{+}
Publication of results	1.6
	20
Inter-semester Recess	1

Semester-II	No. of weeks
Classes	13
Mid-semester recess	1
Recess before examination	2
Semester Final examination*	2.1^{+}
Publication of results	1.6
	20
Intersession break, Ramjan and other vacations throughout the session	11
Total =	52

* There shall be at least two examination dates in a week
+ The digit after the decimal indicates number of days

7. Duration of Course and Course Structure:

7.1 The B.Sc. Engineering courses extend over a period of four academic years (8 semesters) each of a normal duration of one calendar year, which is divided as necessary for the purpose of academic program and conduct of examinations.

7.2 The curricula of the B.Sc. Engineering degree in the different departments are as proposed by the committee of courses and approved by the board of Governors on the recommendation of the Academic Council.

7.3 The Committee of courses and studies review the curricula at least once every academic year and put forward suggestions to the Academic council.

7.4 Teaching for the courses is reckoned in credits and the credits allotted to various courses are determined by the committee of courses and studies with the following guidelines:

Nature of Course	Contact hour	No. of Credit
i) Theory Lecture	1 hour/week	1
ii) Tutorial	1 hour/week	1
iii) Independent Lab/Sessional/ design	3/2 hour/week 2 hour/week 3 hour/week	0.75 1 1.50
iv) Combined theory and Lab/ Sessional	Credits may be calculated on the basic of number of credits assigned to i), and ii)	
v) Project/ thesis	6 hour/ week	3
vii) Field work	2 week of field	1

7.5 In the case of combined theory and lab/sessional course, theory and related sessional course should be considered together for grading and assigning credits for example, a course requiring three lectures per week, one hour tutorial and three hours laboratory/sessional instruction per week may be assigned (3+1 + 1.5)= 5.5 credits.

7.6 The total number of credits that a student has to complete successfully for the award of B.Sc. Engineering degree is between 150-162. The maximum period of candidature is seven years i.e., 3 years (6 semesters) more than the normal time required to complete the course.

7.7 The total number of credits per week in a semester. However, a student may be allowed to register for less than 15 credits in a semester if

i) He is considered academically weak.
ii) Number of credits required for graduation is less than 15 in that semester and
iii) Student can not find appropriate courses for registration subject to the approval of the adviser.

7.8 The Total contact hours for students including lecture, tutorial and lab/sessional is around 25 periods per week, each period being of 50 to 55 minutes duration with a break of 5 minutes.

7.9. There should be an empty slot in the class routine to accommodate back logged courses if necessary.

7.10 In each degree awarding department, one of the senior teachers nominated by the Head of the Department acts as Course Coordinator who acts as Member Secretary to the committee of Courses and Studies.

7.11 A course plan for each course, approved by the Course Coordinator, showing details of lectures may be announced at the start of each semester.

7.12 Project & Thesis should preferably be of 3 credits. Credit in any theory subject does not exceed 4 and in sessional subject does not exceed 1.50.

8. Course Designation and Numbering System:

Each course is designated by a three to four letter word identifying the department, which offers it following, by a three-digit number with the following criteria:

a) The first digit corresponds to the year in which the course is normally taken by the students.

b) The 2nd and 3rd digits are reserved for departmental use indicating major area.

The course designation system is illustrated by one example as shown below:

Course No. **ETE 101**
Course Title: Introduction to Solid State Devices
ETE for Electronics and Telecommunication Engineering
1 for 1st year
01 for Solid State Devices

9. Type of Courses:

The courses included in undergraduate curricula are divided into several groups as follows.

9.1 **Core Courses:** In each discipline a number of courses are identified as core courses which form the nucleus of the respective bachelor's degree program. A student has to complete all of the designated core courses for his discipline.

9.2 **Pre-requisite Course:** Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one, which is required to be completed before some other course(s) can be taken. Any such course, on which one or more subsequent courses build up, may be offered in each of the two regular semesters.

9.3 **Optional Courses:** Apart from the core courses, Students have to complete a number of courses which are optional in nature. In that, students have some choice to choose the required number of courses from a specified group/number of courses.

10. Departmental Monitoring Committee and Student Adviser:

10.1 Each department constitutes a Departmental Monitoring Committee with two teachers of the Department as members nominated by the Committee of Courses studies and Head of the Department as chairman. This committee monitors and evaluates the performance of the course system within the Department. The committee may also propose from time to time to the Committee of courses and Studies any changes and modifications needed for upgrading/changing the Undergraduate Curriculum and the Course System.

10.2 **Student Adviser:** An advisory board will be appointed for a batch of students of each department to advise each student on the courses to be taken by the student. The advisory board or one of its members as decided by the board will discuss with the student his/her academic

program and then decide the number and nature of courses for which he/she can register. However, it is the student's responsibility to keep contact with his/her adviser who will review and eventually approve the student's specific plan of study and check on subsequent progress.

11. Registration Requirements:

Each and every student must register for the courses he/she intends to take during a given semester on the basis of the advice and consent of his/her adviser.

11.1 **Registration Procedure:** Student will fill up his/her Course Registration Form in consultation with and under the guidance of his/her adviser and must submit to the Registrar's Office within one week from the commencement of the class. Late registration after this date will not be accepted unless the student submits a written appeal to the Registrar through the concerned Head and can document extenuating circumstances such as medical problems or some other academic commitments which precluded enrolling prior to the last date of registration. Moreover, students who fail to register during the designated dates for registration will be charged a late registration fee. However, no registration will be accepted after two weeks from the commencement of the class.

11.2 **Limits on the Credit Hours to be registered:** The total number of credit hours for which a student should register shall be between 15 to 22 credits per week in a semester. However, a student may be allowed to register for less than 15 credits in a semester if

i) he/she is considered academically weak
ii) number of credits required for graduation is less than 15 in that semester and
iii) student can not find appropriate courses for registration subject to the approval of the adviser.

11.3 **Pre-Condition for Registration:** A student will be allowed to register in those courses subject to the capacity constrains and satisfaction of pre-requisite courses. If a student fails in a pre requisite course in any semester, the concerned Department Monitoring Committee may allow him/her to register for a course which builds on the pre-requisite course provided his/her attendance and grades in continuous assessment in the said pre-requisite course is found to be satisfactory.

Registration will be done at the beginning of each semester. Late registration is however, permitted during the first week on payment of a late registration fee. Students having out standing dues to the

University or a hall of residence shall not be permitted to register. All students have therefore, to clear their dues and get a clearance or no dues certificate, on the production of which, they will be given necessary Course Registration Forms and complete the course registration procedure. Registration Forms are normally availably in the Register's office. An orientation program will be conducted for only the first year students at the beginning of the first semester when they will be handed over the registration package on producing enrollment slip/proof of admission.

11.4 **Pre-Registration:** Pre-registration for course to be offered in a particular semester will be done on the specified date before the end of the previous semester. All students in consultation with the advisor are required to complete pre-requisition formalities, failing which a fine may be decided by the authority will have to be paid before registration in the next term. Further a student who does not pre-register may not get the courses desired by him subsequently.

11.5 **Registration Deadline:** Student must register for the courses to be taken before the commencement of each semester and no late registration will be accepted after one week of classes which may be relaxed up to maximum of two weeks for the newly admitted first year students. Late registration after this date will not be accepted unless the student submits a written appeal to the Registrar through the concerned head and can document extenuating circumstances such as medical problems (physically incapacitated and not able to be presented) or some other academic commitments which precluded enrolling prior to the last date of registration.

11.6 **Penalty for Late Registration:** Students who fail to register during the designated dates for registration are charged a late registration fee decided by the authority. This extra fee will not be waived whatever be the reason for late registration.

11.7 **Course Adjustment Procedure:** A student would have some limited options to add or delete courses from his/her registration list within the first two weeks from the beginning of the semester. Adjustment of initially registered courses in any semester can be done by duly completing the Course Adjustment Form. These forms are normally available in the Registrar's office. For first year students such forms can be included in the registration packet at the time of orientation.
Any student willing to add or drop courses will have to fill up a Course Adjustment From in consultation with and under the guidance of his/her adviser. The original copy of the course Adjustment From will be submitted to the Registrar's Office and then the requisite number of

photo copies will be made by the Registrar's Office for distribution to the concerned Adviser, Head and the student. All changes in courses must be approved by the adviser and the Head of the department concerned. The Course Adjustment From will have to be submitted to the Registrar's Office after duly filled in and signed by the concerned persons. To add/drop a course respective teacher's consent will be required.

11.8 **Withdrawal from a Semester:** If a student is unable to complete the semester Final Examination due to illness, accident or any other valid reason etc. he/she may apply to the Head of the degree awarding department for total withdrawal from the semester within a week after the end of the semester final examination. However, he/she may choose not to withdraw any laboratory/sessional/design course if the grade obtained in such a course is 'D' or better. The application must be supported by a medical certificate any authorized Medical Officer.

11.9 **Registration Fee**: Each student will pay a **registration fee of Tk. 20/= per credit** and must submit the document of payment along with the registration form to the Registrar's office. It must be noted here that, any fraction in credit will be considered as a next higher integer credit for calculating registration fee.

12. Striking off the Names and Readmission:

12.1 The name of the students shall be struck off and removed from the rolls on the following grounds:

i) Non-payment of University fees and dues within the prescribed period.

ii) Forced to discontinue his/her studies under disciplinary rules.

iii) Withdrawal of names from the rolls of the University on grounds acceptable to the Vice-Chancellor of the University after having cleared all dues.

iv) Could not earn required credits for graduation as outlined in the respective curriculum and/or fulfill CGPA requirement within the maximum allowed time of 7 academic years.

12.2 Every student whose name has been struck off the rolls by exercise of the clauses (ii) of Article 12.1 seeking readmission after expiry of the period for which he/she was forced to discontinue his/her studies, shall submit an application to the Head of the Department in the prescribed form before the commencement of the session to which he/she seeks readmission. The Head of the Department shall forward the application to the Vice-Chancellor of the University with his remarks. In case the

readmission is allowed the student will be required on payment of all dues to get him/her-self admitted not later than one week from the date of permission given by the Vice-Chancellor. All readmission should preferably be completed before the session start. The percentage of attendance of the readmitted students shall be counted from the date of readmission.

12.3 No student has withdrawn his/her name under clause (iii) of Article 12.1 shall be given readmission.

12.4 In case a student whose name has been struck off rolls under clause (i) of Article 12.1 seeks readmission within the session in which his/her name was struck off, he/she shall be readmitted on payment of all the arrears fees and dues. But if he/she seeks readmission in any subsequent session, the procedure for his/her readmission will be the same as described under Article 12.2.

12.5 The application of a student for readmission will be considered if he/she applies within two academic sessions from the semester of discontinuance of his/her studies in the University. Other than Department as punishment under ordinance if the University relation to discipline, a student of any kind failing for any other reason whatsoever to become a candidate for a semester final examination in which he/she ought to have had in the usual process of his/her progressive academic activities, shall be considered to have discontinued his/her studies for the relevant semester together with striking the name off from current roll and two such discontinuance periods will be considered equivalent to that for one academic session. The maximum period of discontinuance under no circumstances is to exceed two academic sessions during a student's period of studies for the degree.

12.6 In case any application for readmission is rejected, the student may appeal to the Academic Council. The decision of the Academic Council shall be final.

12.7 A student, whose name has been struck off the rolls by exercise of clause (iv) of Article 12.1, is not eligible to seek readmission.

13. Grading System: The letter grade system shall be used to assess the performance of the student and shall be as follows:

Numerical Grade	Letter Grade	Grade Point
80% or above	A+	4.0
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.5
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.0
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.5
45% to less than 50%	C	2.25
40% to less than 45%	D	2.0
Less than 40%	F	0

A grade 'X' shall be awarded for courses (like project & thesis, design, etc.) in the odd semester which continue through to the even semester.

13.1 Calculation of GPA and CGPA: Grade point average (GPA) is the weighted average in a semester. 'F' grades do not count for GPA calculation. GPA of a semester will be calculated as follows.

$$\text{Grade Point Average} = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

where n is the total number of courses passed by the student in the semester, Q is the number of credits allotted to a particular course i and Gj is the grade point corresponding to the grade awarded for i-th course. The overall or Cumulative grade point average (CGPA) gives the cumulative performance of the student from first semester up to any other semester to which it refers and is computed by dividing the total grade points (LQ gi) accumulated up to the date by the total credit (£Q). Both GPA and CGPA will be rounded off to the second place of decimal for reporting.

14. Distribution of Marks:

14.1 The distribution of marks for a given course will be as follows

i) **Theory courses:**

Class participation and performance	10%
Quizzes/Class tests	20%
Semester final exam (3 hours duration)	70%
Total	100%

ii) **Independent laboratory/sessional/design/fieldwork courses**

Class participation and attendance	10%
Quizzes	15%
Performance/reports	50%
Viva voce (conducted by the department)	25%
Total	100%

iii) **Project and thesis:**

Viva voce (conducted by a viva voce committee)	20%
Supervisor (internal examiner)	50%
External examiner	30%
Total	100%

iv) **Combined theory & laboratory/sessional courses:**

Assessment for the theory part of the course will be done as per guideline i) and that for the laboratory/sessional part as per guideline ii) above. Total marks in a combined course will then be calculated on the basis of theory to laboratory/Sessional credit ratio.

14.2 It is desirable that weightage on continuous assessment as described in Article 14.1 such as quizzes and class tests, class participation and attendance etc. should be increased up to 50% and weightage on semester final examination should be reduced to above 50% gradually.

14.3 Basis for awarding marks for class participation and attendance will be as follows:

Attendance	**Marks**
90% and above	10
85% to less than 90%	9
80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
Less than 60%	0

14.4 The students whose percentage of attendance will fall short of 75% in any of the theory, lab/sessional courses for which he/she has registered in one academic year shall not be eligible for the award of any type of scholarship/stipend /grant for the following academic session.

15. Class Tests/Quizzes

i) For 2 credit courses 3 best out of 4, for 3 credit courses 4 best out of 5 and 4 credit courses 5 best of 6 quizzes/class tests may be taken for awarding grade. These may be considered as the minimum as the minimum recommended number of quizzes/class tests for any course. If the number of quizzes/class tests administered in a course exceeds these suggested minimum numbers, then two thirds best of all may be considered.

ii) Duration of quizzes/class tests should not exceed 15 minutes and materials covered should be what were taught in 2 to 3 previous class or most recent classes.

iii) For convenience of conduction the class tests/quizzes a half an hour time slot should be kept at the beginning of each working day.

iv) The dates for the quizzes/class tests shall be fixed by the Head or Course Coordinator and shall be announced accordingly.

v) All class shall ordinarily be of equal value. The result of each individual class test shall be posted for information of the students preferably before the next class test is held.

16. Earned Credits:

The courses in which a student has obtained 'D' or a higher grade will only be counted as credits earned by him/her. A student, who obtains an 'F' grade in any Core Course in any semester, he/she will have to repeat the course. If a student obtains an 'F' in an Optional Course, he/she may choose to repeat the course. If a student obtains an 'F' in an Optional Course, he/she may choose to repeat the course or take a substitute course if available. 'F' grades will not be counted for GPA calculation but will stay permanently on the Grade sheet and Transcript.

A student obtaining 'D' grade in a course will be allowed to repeat the course for the purpose of grade improvement if CGPA of the student falls below 2.20. In such case he/she will be awarded the new grade thus he/she obtains or retains his/her previous grade if he/she fails.

17. Performance Evaluation:

The minimum CGPA requirement for obtaining a B.Sc. Engineering degree is 2.20. The performance of a student will be evaluated in terms of two indices, viz. semester grade point average and cumulative grade point average. Student will be considered to be making normal progress toward a degree if their CGPA for all courses attended is 2.20 or more. Students who regularly maintain semester GPA or 2.20 or better are making good progress toward their degrees

and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing. This can happen when one or more of the following conditions exist:

i) Semester GPA falls below 2.20 or

ii) Cumulative GPA falls below 2.20

iii) Earned credits fall below 15 times the number of Semester attended/studied.

All such students can make up deficiencies in GPA and credit requirements by completing courses of next semester(s) and backlog courses, if there be any, with better grades. When GPA and credit requirements are achieved, the student is returned to good standing. Students whose GPA will fall below 2.20 will have to be notified so that the necessary remedial measures can be taken.

18. Honors, Vice-Chancellor's List and Syndicate Gold Medal

Candidates for Bachelor's degree in engineering will be awarded the degree with honors if their CGPA is 3.75 or better.

In recognition of excellent performance, the names of students who maintains good standing with the University obtaining SGPA of 3.75 or above in two regular semesters in each academic year may be published in the Vice-Chancellor's List in each department. Students who have received 'F' grade in any course during any of the two regular semesters will not be considered for Vice-Chancellor's List in that year.

If a student can show extraordinary brilliance and obtains all A or better grades in all the courses he/she attended and fulfills the credit requirement for graduation will be honored by awarding President gold medal in a special function/convocation.

19. Student Classification:

For a number of reasons it is necessary to have a definite system by which to classify students as First year, Second year, Third year and Fourth year. At the university regular students are classified according to the number of credit hours earned towards a degree. The following classification applies to the students.

Year	**Earned credits**
First year	0 to 35
Second year	36 to 70
Third year	71 to 105
Fourth year	106 and above

20. Registration for the Second & Subsequent Semesters:

A student is normally required to earn at least 15 credits in a semester. At the end of each semester, the students will be categorized as follows:

Category-1:

Consisting of students who have passed all the courses prescribed for the semester and have no backlog of courses. A student belonging to Category 1 will be eligible to register for all courses prescribed for the next semester.

Category-2:

Consisting of students who have earned at least 15 credits in the semester but do not belong to category 1. A student belonging to Category 2 is advised to take at least one course less in the next semester subject to the condition that he/she has to register for such backlog courses as may be prescribed by the adviser.

Category-3:

Consisting of students who have failed to earn 15 credits in the semester. A students belonging to Category 3 is advised to take at least two courses less subject for registration for minimum of 15 credits. However, he/she will be required to register for such backlog courses as may be prescribed by the adviser.

21. Probation and Suspension:

Undergraduate students who regularly maintain semester GPA of 2.20 or better satisfying the minimum credit requirements are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress may be placed on academic probation. The status of academic probation is a reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exists:

i) The Semester GPA falls below 2.20 or

ii) The cumulative GPA falls below 2.20

Students on probation are subject to such restriction with respect to courses and extracurricular activities as may be imposed by the respective Head of the Department.

The minimum period of probation is one semester, but the usual period is for one academic year. This allows student and opportunity to improve the GPA through the completion of additional course work during the period that the student is on probation. The probation is extended for additional semester until the student achieves an overall GPA if 2.20 or better. When that condition is achieved, the student is returned to

good standing. Academic probation is not to be taken lightly- it is a very serious matter. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from this University. A student who has been suspended may apply for consideration to the Vice-Chancellor, but this application will not be considered until the student has been suspended at least one full semester.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each such petition is considered individually on its own merits. After consideration of the petition and perhaps after consultation with the student, adviser and the respective Head of the Department, Vice-Chancellor in some cases; reinstate the student if this is the first suspension. However, a second suspension will be regarded as final and absolute.

22. Measures for Helping Academically Weak Students:

The following provisions are made as far as possible to help academically weak students to enable them to complete their studies within the maximum period of seven years.

a) All such students whose Cumulative Grade Point Average (CGPA) is less than 2.20 at the end of a semester may be given a load not exceeding four theory/combined courses in the next semester.

b) For other academic deficiencies, some basic and core courses may be offered during the regular semester under special arrangement in order to enable the student to partially make-up for the reduced load during regular semester.

Following criteria are followed for determining academically weak students.

i) CGPA falling below 2.20

ii) Semester grade point average (SGPA) falling below 2.20 points below that of the previous semester,

iii) Earned credit falling below 15 times the number of semester attended.

23. Minimum Earned Credit and GPA Requirements for Obtaining Degree:

Minimum credit requirements for the awarded of Bachelor of Engineering Degree will be decided by the respective committee of courses and

studies. The minimum CGPA requirements for obtaining a Bachelor of Engineering Degree are 2.20. A student may take additional courses with the consent of his/her adviser in order to raise CGPA, but he/she may take a maximum of 15 such additional credits beyond respective credit requirements for bachelor's degree during his/her entire period of study.

24. Time Limits of Completion of Bachelor's Degree:

A student must complete his/her studies within a maximum period of seven years for engineering.

25. Industrial/ Professional Training Requirements:

Depending on each Department's own requirement a student may have to complete a prescribed number of days of industrial/ professional training in addition of minimum credit and other requirements, to the satisfaction of the concerned department.

26. Application for Graduation and Award of Degree:

A student who has fulfilled all the academic requirements for bachelor's degree will have to apply to the Register/Vice-Chancellor through his/her Adviser for graduation. Provisional degree will be awarded in completion of credit and GPA requirements. Such provisional degree will be confirmed by the academic council.

27. Inclusion of Repeaters from Present System to the New Courses System

Repeater students will be included in the courses system of curricula as and when such situation will arise.

27.1 **Equivalence of Courses and Grades:** Equivalence of courses passed previously by any repeater student shall be determined by the respective Committee of Courses & Studies for the purpose of:

a) Allowing course exemption and

b) Conversion of present grades into proposed grades in exempted courses.

27.2 **Time Limit for Completion of Bachelor's Degree:** Time allowed for a student included in Course System from Previous System to complete studies leading to a bachelor's degree will be proportional to the remaining credits to be completed by him/her. A student in engineering for example, having earned 40 credit hours through equivalence and exemption (for previously completed courses) out of a total requirement of 162 credits for bachelor's degree will get.

(7 yr. X 122/162 = 5.25) = 5-1/2 years (rounded to next higher half-a year) or 11 (eleven) Regular semester to fulfill all requirements for bachelor's degree.

27.3 **Relaxation of Course Registration for Repeaters:** Relaxation of course Registration for a student transferred to course system from Previous system: - the requirement of registration of minimum 15 credit hours in a semester shall waived for only the semester of the year where he/she has been transferred in course system provided that he/she has been granted exemption in some of the courses offered in those terms.

28. Absence during Semester:

A Student should not be absent quizzes tests etc. during the semester. Such absence will naturally lead to reduction in points/marks, which count towards the final grade. Absence in semester final examination will result in 'F' grade. A Student who has been absent for short periods, up to a maximum of three week due to illness, should approach the course teacher(s) or the course coordinators(s) for a make-up quizzes or assignments immediately on returning to the classes. Such request should be supported by medical certificate from University medical officer. The medical certificate issued by a registered medical practitioner (with the registration number shown explicitly or the certificates) will also be acceptable only in those cases where the students has valid reason for his/her absence from the University.

SYLLABUS

Summary of Undergraduate Course Plan

Sl. No	Year/ Semester	Theory		Sessional		Total Credits
		No of Course	Credits	No of Course	Credits	
1.	$1^{st}/1^{st}$	5	14	4	4.50	18.50
2.	$1^{st}/2^{nd}$	5	16	2	3.00	19.00
3.	$2^{nd}/3^{rd}$	5	15	4	4.50	19.50
4.	$2^{nd}/4^{th}$	5	15	4	3.75	18.75
5.	$3^{rd}/5^{th}$	5	15	5	4.50	19.50
6.	$3^{rd}/6^{th}$	5	15	5	5.25	20.25
7.	$4^{th}/7^{th}$	5	14	5	4.50	18.50
8.	$4^{th}/8^{th}$	5	15	4	3.75	18.75
Total		**40**	**119**	**33**	**33.75**	**152.75**

Courses offered to the undergraduate students of Electronics and Telecommunication Engineering Department

SUMMARY OF COURSES

First Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 101	Introduction to Solid State Devices	3.00	3.00			3.00
2	ETE 102	Sessional Based on ETE 101			1.50	0.75	0.75
3	EEE 107	Electrical Circuit Theory	3.00	3.00			3.00
4	EEE 108	Sessional Based on EEE 107			3.00	1.50	1.50
5	ETE 190	Engineering Graphics			3.00	1.50	1.50
6	Phy 111	Physics	3.00	3.00			3.00
7	Phy 112	Sessional Based on Phy 111			1.50	0.75	0.75
8	Math 151	Engg. Mathematics-I	3.00	3.00			3.00
9	Hum 111	Technical English Communication & Report Writing	2.00	2.00			2.00
		Total =>	**14.00**	**14.00**	**9.00**	**4.50**	**18.50**

No. of Theory Courses : 5 Total contact Hrs/week : 23
No. of Lab/Sessional Courses : 4 Total Credits : 18.50

Second Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 103	Analog Electronics-I	3.00	3.00			3.00
2	ETE 104	Sessional Based on ETE 103			3.00	1.50	1.50
3	CSE 141	Computer Fundamentals and Programming	3.00	3.00			3.00
4	CSE 142	Sessional Based on CSE 141			3.00	1.50	1.50
5	EEE 109	Network Analysis & Synthesis	3.00	3.00			3.00
6	Math 153	Engg. Mathematics-II	3.00	3.00			3.00
7	Hum 113	Financial Accounts & Economic Analysis	4.00	4.00			4.00
		Total =>	**16.00**	**16.00**	**6.00**	**3.00**	**19.00**

No. of Theory Courses : 5 Total contact Hrs/week : 22
No. of Lab/Sessional Courses : 2 Total Credits : 19.00

Third Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 200	Electronic Circuit Design Lab.			3.00	1.50	1.50
2	ETE 201	Digital Electronics	3.00	3.00			3.00
3	ETE 202	Sessional Based on ETE 201			3.00	1.50	1.50
4	ETE 203	Analog Electronics-II	3.00	3.00			3.00
5	ETE 204	Sessional Based on ETE 203			1.50	0.75	0.75
6	CSE 241	Data Structure and Algorithm	3.00	3.00			3.00
7	CSE 242	Sessional Based on CSE 241			1.50	0.75	0.75
8	EEE 223	Electrical Machines	3.00	3.00			3.00
9	Math 251	Engg. Mathematics-III	3.00	3.00			3.00
		Total =>	**15.00**	**15.00**	**9.00**	**4.50**	**19.50**

No. of Theory Courses : 5 Total contact Hrs/week : 24
No. of Lab/Sessional Courses : 4 Total Credits : 19.50

Fourth Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	EEE 224	Sessional Based on EEE 223			1.50	0.75	0.75
2	ETE 209	Design and Analysis of Signal and Systems using MATLAB	3.00	3.00			3.00
3	ETE 210	Sessional Based on ETE 209			1.50	0.75	0.75
4	EEE 271	Instrumentation	3.00	3.00			3.00
5	EEE 272	Sessional Based on EEE 271			3.00	1.50	1.50
6	ETE 211	Communication Theory	3.00	3.00			3.00
7	ETE 212	Sessional Based on ETE 211			1.50	0.75	0.75
8	ETE 221	EM Fields and Waves	3.00	3.00			3.00
9	Math 253	Engg. Mathematics-IV	3.00	3.00			3.00
		Total =>	**15.00**	**15.00**	**7.50**	**3.75**	**18.75**

No. of Theory Courses : 5 Total contact Hrs/week : 22.50
No. of Lab/Sessional Courses : 4 Total Credits : 18.75

Fifth Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	EEE 301	Control System	3.00	3.00			3.00
2	EEE 302	Sessional Based on EEE 301			1.50	0.75	0.75
3	ETE 303	VLSI Design	3.00	3.00			3.00
4	ETE 304	Sessional Based on ETE 303			1.50	0.75	0.75
5	EEE 313	Industrial Electronics	3.00	3.00			3.00
6	EEE 314	Sessional Based on EEE 313			1.50	0.75	0.75
7	ETE 321	Microwave Engineering	3.00	3.00			3.00
8	ETE 322	Sessional based on ETE 321			1.50	0.75	0.75
9	ETE 333	Numerical Methods in Engineering	3.00	3.00			3.00
10	ETE 334	Sessional Based on ETE 333			3.00	1.50	1.50
		Total =>	**15.00**	**15.00**	**9.00**	**4.50**	**19.50**

No. of Theory Courses : 5 Total contact Hrs/week : 24
No. of Lab/Sessional Courses : 5 Total Credits : 19.50

Sixth Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 300	Electronic Project Design and Development			3.00	1.50	1.50
2	ETE 315	Information Theory	3.00	3.00			3.00
3	ETE 309	Digital Signal Processing	3.00	3.00			3.00
4	ETE 310	Sessional Based on ETE 309			1.50	0.75	0.75
5	ETE 311	Digital Communication	3.00	3.00			3.00
6	ETE 312	Sessional Based on ETE 311			1.50	0.75	0.75
7	ETE 323	Antennas and Propagation	3.00	3.00			3.00
8	ETE 324	Sessional Based on ETE 323			1.50	0.75	0.75
9	EEE 351	Microprocessor and Microcomputer	3.00	3.00			3.00
10	EEE 352	Sessional based on EEE 351			3.00	1.50	1.50
		Total =>	**15.00**	**15.00**	**10.50**	**5.25**	**20.25**

No. of Theory Courses : 5 Total contact Hrs/week : 25.50
No. of Lab/Sessional Courses : 5 Total Credits : 20.25

Seventh Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 400	Project and Thesis			3.00	1.50	1.50
2	ETE 401	Computer Network and Data Communication	3.00	3.00			3.00
3	ETE 402	Sessional Based on ETE 401			1.50	0.75	0.75
4	Hum 411	Project Planning Management & Engineering	2.00	2.00			2.00
5	ETE 411	Wireless and Mobile Communication	3.00	3.00			3.00
6	ETE 412	Sessional Based on ETE 411			1.50	0.75	0.75
7	ETE 413	Telecommunication Engineering	3.00	3.00			3.00
8	ETE 414	Sessional Based on ETE 413			1.50	0.75	0.75
9	ETE ***	Elective-II	3.00	3.00			3.00
10	ETE ###	Sessional Based on ETE ***			1.50	0.75	0.75
		Total =>	**14.00**	**14.00**	**9.00**	**4.50**	**18.50**

No. of Theory Courses : 5 Total contact Hrs/week : 23
No. of Lab/Sessional Courses : 5 Total Credits : 18.50

Eighth Semester

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 400	Project and Thesis			3.00	1.50	1.50
2	ETE 415	Radio and TV Engg.	3.00	3.00			3.00
3	ETE 416	Sessional Based on ETE 415			1.50	0.75	0.75
4	ETE 417	Fiber Optic Communication	3.00	3.00			3.00
5	ETE 418	Sessional Based on ETE 417			15.0	0.75	0.75
6	ETE 419	Satellite Communication and Radar	3.00	3.00			3.00
7	ETE **	Elective-I	3.00	3.00			3.00
8	ETE ***	Elective-III	3.00	3.00			3.00
9	ETE ###	Sessional Based on ETE ***			1.50	0.75	0.75
		Total =>	**15.00**	**15.00**	**7.50**	**3.75**	**18.75**

No. of Theory Courses : 5 Total contact Hrs/week : 22.50
No. of Lab/Sessional Courses : 4 Total Credits : 18.75

ELECTIVE COURSES

Table 2

Category	Course No.	Title	Credit (s)
Elective-I	ETE 407	Adaptive Filters	3.00
	ETE 409	Random Signal Processing	3.00
	ETE 423	Radio Wave Propagation	3.00
	ETE 427	Neural and Fuzzy Systems in Communications	3.00
	ETE 429	Spread Spectrum and CDMA Technology	3.00
	ETE 435	Discrete Mathematics	3.00
	ETE 441	Graph Theory	3.00
	ETE 431	Statistical Theory of Communication	3.00

Category	Course No.	Title	Credit (s)
Elective-II (Subjects Contain Sessional)	ETE 421,422	Microwave Devices	3.75
	ETE 425,426	Solid State Microwave Devices	3.75
	ETE 433,434	Numerical Techniques in Electromagnetics	3.75
	ETE 443,444	Multimedia Communication	3.75
	ETE 445,446	Digital Filter Design	3.75
	ETE 447,448	Digital Image Processing	3.75
	ETE 449,450	Digital Speech Processing	3.75
	ETE 451,452	Voice Communication Techniques	3.75
Elective-III (Subjects Contain Sessional)	ETE 453,454	Microprocessor Based System Design	3.75
	ETE 455,456	Industrial Drives	3.75
	ETE 457,458	Electronic Instrumentation	3.75
	ETE 459,460	Optoelectronics	3.75

COURSES FOR THE FIRST SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 101	Introduction to Solid State Devices	3.00	3.00			3.00
2	ETE 102	Sessional Based on ETE 101			1.50	0.75	0.75
3	EEE 107	Electrical Circuit Theory	3.00	3.00			3.00
4	EEE 108	Sessional Based on EEE 107			3.00	1.50	1.50
5	ETE 190	Engineering Graphics			3.00	1.50	1.50
6	Phy 111	Physics	3.00	3.00			3.00
7	Phy 112	Sessional Based on Phy 111			1.50	0.75	0.75
8	Math 151	Engg. Mathematics-1	3.00	3.00			3.00
9	Hum 111	Technical English Communication & Report Writing	2.00	2.00			2.00
		Total =>	**14.00**	**14.00**	**9.00**	**4.50**	**18.50**

No. of Theory Courses : 5 Total contact Hrs/week : 23
No. of Lab/Sessional Courses : 4 Total Credits : 18.50

DETAIL SYLLABUS

ETE 101: Introduction to Solid State Devices

Credits: 3.00 Contact Hours: 3 Hours/Week

Theory of Semiconductor: Electronic structure of elements, energy band diagram of conductor, insulator and semiconductor, covalent bonding in semiconductors, intrinsic and extrinsic semiconductor, effects of temperature on extrinsic semiconductors.

Semiconductor Diodes: The P-N junction, biasing conditions, V-I characteristics, effects of temperature on diode characteristics, half wave and full wave rectification with filtering, zener diode, tunnel diode, varactor diode.

Bipolar Junction Transistor (BJT): PNP and NPN transistors, principles of operation, biasing and thermal stability, characteristics in different configurations, transistor switching time.

Field Effect Transistor (FET): Construction of JFET and MOSFET, characteristics and principles of operation, FET biasing, introduction to CMOS and its application.

Industrial Semiconductor Device: Structure and basic operation of SCR, UJT, DIAC, TRIAC, photo diodes, phototransistor, solar cells, LED and LCD.

ETE 102: Sessional Based on ETE 101

Credit: 0.75 Contact Hours: 3/2 Hours/Week

Laboratory based on Solid State Device (ETE 101)

EEE 107: Electrical Circuit Theory

Credits: 3 Contact Hours: 3 Hours/Week

Electrical units and Standards. Electrical power sources. Electrical circuit elements and models. RMS and average value, form factor and peak factor of sinusoidal waveforms. Introduction to phasor algebra. DC & Steady state AC circuit solutions: Series, Parallel, Series-Parallel networks. Loop and Nodal methods, Delta-Wye transformations. Electrical resonance of series and parallel circuits.

Circuit theorems and their application to circuit solution. Introduction to three-phase balanced and unbalanced circuits.

Magnetic Circuit and concepts: flux, fields, permeability, reluctance, analysis of magnetic circuits.

EEE 108: Sessional Based on EEE 107

Credit: 1.50 Contact Hours: 3 Hours/Week

Laboratory based on Electrical Circuit Theory (EEE-107)

ETE 190: Engineering Graphics

Credit: 1.50 Contact Hours: 3 Hours/Week

Drawing equipment and the use of instruments, Basic drafting techniques and standards, Sectional and isometric views of solid geometric figures, Interpenetrating of surfaces, Development of surfaces, Freehand sketch of machine and engine components, Introduction to computer-aided drawing.

Phy 111: Physics

Credits: 3.00 Contact Hours: 3 Hours/Week

Atomic Structure: Thompsons, Rutherford and Bhor's atomic model. Atomic arrangement in solid. Different types of bonds in solid-metallic, Vander Walls and ionic bond.

Electronic Structure of Materials: Free electron theory, Metallic conduction. Energy bands, Brillouin zones, Temperature dependence of metallic conductivity. Semiconductors: Band theory, intrinsic and extrinsic

semiconductors, Fermi levels, mobility and electrical conductivity, carrier diffusion and life time. Magnetic materials: Properties, Dia-, Para- and Ferro-magnetism. Hysteressis loop, B-H curve, Energy losses in magnetic materials and their measurements. Soft and hard magnetic materials, ferrities.

Thermal electricity: thermocouple, Seebeck effect, Peltier and Thompson effect, Thermo-emf.

Photoelectricity: Laws of photoemission and Einstein's equation. Photoelectric cell and its use.

Sound: Simple harmonic motion, wave equation, Principle of superposition. Beats, Dispersion, Phase and group velocities, Doppler's effect, Free and force vibrations.

Physical Optics: Theories of light; Hyugen's principle and construction. Interference of light: Young's double slit experiment, Fresnel bi-prism, Newton's ring, interferometers. Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single and double slit diffraction gratings. Polarization, production and analysis of polarized light, optical activity, optics of crystals.

Phy 112: Sessional Based on Phy 111

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Physics (Phy-111)

Math 151: Engg. Mathematics-I

Credits: 3.00 Contact Hours: 3 Hours/Week

Differential Calculus: Review of differentiation of various types of functions. Rolle’s theorem, Mean value theorem. Taylor’s and Maclaurin’s theorems in finite and infinite forms. Divergency and Convergency of series. Partial differentiation, Euler’s theorem. Tangent, normal and curvature. Determination of maximum and minimum values of functions and their application.

Integral Calculus: Review of indefinite and definite integration of various types of functions. Use of definite integration in summing series. Walli’s formulae. Improper integrals. Beta function and Gamma functions. Area under a plane curve and area of a region enclosed by two curves in cartesian and polar coordinates. Volume and surface areas of solids of revolution.

Matrix: Definition of matrix, Different types of matrix, Algebra of matrix, Adjoin and inverse of a matrix, Elementary transformations of matrix, Matrix polynomials, Calay-Hamilton theory with uses of rank and nullity, Normal and canonical forms, Solution of linear equations, Eigenvalues and eigenvectors.

Hum 111: Technical English Communication & Report Writing

Credits: 2.00 Contact Hours: 2 Hours/Week

Construction of sentences. Transformation of sentences. Use of Prepositions, Question words, Phrases and Idioms. Comprehension. Composition of current affairs. Precise writing. Reporting technical information. Commercial correspondence and tenders.

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COURSES FOR THE SECOND SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 103	Analog Electronics-1	3.00	3.00			3.00
2	ETE 104	Sessional Based on ETE 103			3.00	1.50	1.50
3	CSE 141	Computer Fundamentals and Programming	3.00	3.00			3.00
4	CSE 142	Sessional Based on CSE 141			3.00	1.50	1.50
5	EEE 109	Network Analysis & Synthesis	3.00	3.00			3.00
6	Math 153	Engg. Mathematics-II	3.00	3.00			3.00
7	Hum 113	Financial Accounts & Economic Analysis	4.00	4.00			4.00
		Total =>	**16.00**	**16.00**	**6.00**	**3.00**	**19.00**

No. of Theory Courses : 5 Total contact Hrs/week : 22
No. of Lab/Sessional Courses : 2 Total Credits : 19.00

DETAIL SYLLABUS

ETE 103: Analog Electronics-I

Credits: 3.00 Contact Hours: 3 Hours/Week

Application of BJT and FETs as amplifier and switches, load line analysis, equivalent circuits using transconductance parameter for low, medium and high frequency operation of BJT and FETs, Ebers-Moll model view; design and analysis of single/multistage amplifiers, power amplifiers- class AB/class B push-pull/class C, differential amplifiers.
Operational amplifiers (Op-Amp): Properties of an ideal Op-Amp, non-inverting and inverting amplifiers, integrator, differentiator, weighted summer and other applications of Op-Amp circuits, frequency response and bandwidth, feedback amplifiers, oscillators and waveform generators.

ETE 104: Sessional Based on ETE 103

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Analog Electronics-I (ETE 103)

CSE 141: Computer Fundamentals and Programming

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Brief history and types of computers, application areas. Working principle of a computer system. Single and multi-user systems.
Hardware: Organization and architecture, CPU, Motherboards & Microprocessors, Memory units: Primary memory, Secondary memory, Input & output (I/O) Devices, peripheral devices, AT/XT, ISA, FISA, PCI Bus Architecture.
Introduction to Computer Programming, Problem solving techniques, algorithm specification and development. Programming style, debugging and testing, documentation. Program design methodologies, structured and modular program design. Programming Language in C/C_{++}: Data types, operators and conversions, Statements. Control structures, array of pointers, Structure, union and bit-field, External files.

CSE 142: Sessional Based on CSE 141

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Computer Fundamental and Programming (CSE 141)

EEE 109: Network Analysis & Synthesis

Credits: 3.00 Contact Hours: 3 Hours/Week

Network functions- The concept of complex frequency- driving point and transfer functions- Impulse response- Poles and Zeros of network functions and their locations and effects on the time and frequency domain. Restriction of poles and zeros in the driving point and transfer function. Magnitude and phase plots from s-plane phasors, Bode plots. The dominant pole approximation- The time constant method of obtaining the response. Parameters of two-port network: Definition of z, y, ABCD & h-parameters and their determination for given network, conversion formulae.
Coupled circuit, single tuned and double tuned circuit effect of coefficient and coupling, Selectivity, Image impedance, Characteristic impedance and propagation constant. Wave filters- L. P. F., H. P. F., B. P. F., B. R. F., Constant-k and m-derived, terminating half sections- Attenuators and equalizers. Positive real function, synthesis of passive one port LC, RL, and RC network.

Hum 113: Financial Accounts & Economic Analysis

Credit: 4.00 Contact Hours: 4 Hours/Week

Accountancy: Basic accounting principles, Transactions, Journal, Ledger and Accounts. Cash book, Bank Reconciliation statement. Preparation of financial statement. Cost accounts and its objects. Cost classification. Elements of cost, preparation of cost sheet. Overhead allocation. Use of relevant costs in decision-making. Standard costing. Material cost variance. Break even analysis. **Economics:** Nature of the economics theory- applicability of the economic theories to the problem of developing countries. Some basic concepts- supply, demand and their elasticity. The relationship among average, margin and total and their derivation. Equilibrium- stable, straight and dynamic equilibrium. Consumer's equilibrium- difference curve, Producer's equilibrium-isoquant. Production-factors of production, production possibility curve equilibrium of firm, fixed cost and variable cost, the short run and the long run. The cost curves and supply curves, law of returns and external economics and diseconomies. Economics of development and planning basic concept- saving, investment, GNP, NNP, per-capita income, growth rate, policy instruments of development. Fiscal policy, monetary policy and trade policy, their relative applicability in Bangladesh, some planning tools-capital output ratio, input analysis, planning in Bangladesh-five year plans of Bangladesh, development problems related to agriculture, industry and population of Bangladesh.

Math 153: Engg. Mathematics-II

Credits: 3.00 Contact Hours: 3 Hours/Week

Ordinary differential equations: Degree and order of ODE, Formation of differential equations, Solution of first order Differential equations by various methods, Solution of first order but higher degree ODE, Solution of general linear equations of second and higher order with constant coefficients, Solution of homogeneous linear equations and its applications, Solutions of Differential equations of higher order when dependent and independent variable are absent, Solution of differential equation by the method based on factorization of operators.

Partial differential equations: Four rules for solving simultaneous equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{r}$; Lagrange's method of solving PDE of order one, Integral surfaces passing through a given curve, Non linear PDE of order one (Complete, Particular, Singular and general integrals) ; Standard forms $f(p,q)=0$, $z=px+qy+f(p,q)$, $f(p,q,z) = 0$, $f_1(x,p)= f_2(y,q)$, Charpit's method, Second order PDE; Its nomenclature and classifications to canonical (Standard) parabolic, elliptic, hyperbolic, Solution by separations of variables, Linear PDE with constant coefficients.

Series solution: Solution of differential equations in series by the method of Frobenius, Bessel's functions, Legendre's Polynomials and their properties.

Co-ordinate Geometry: Co-ordinate geometry of three dimension- System of co-ordinates, transformation of co-ordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines.

COURSES FOR THE THIRD SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 200	Electronic Circuit Design Lab.			3.00	1.50	1.50
2	ETE 201	Digital Electronics	3.00	3.00			3.00
3	ETE 202	Sessional Based on ETE 201			3.00	1.50	1.50
4	ETE 203	Analog Electronics-II	3.00	3.00			3.00
5	ETE 204	Sessional Based on ETE 203			1.50	0.75	0.75
6	CSE 241	Data Structure and Algorithm	3.00	3.00			3.00
7	CSE 242	Sessional Based on CSE 241			1.50	0.75	0.75
8	EEE 223	Electrical Machines	3.00	3.00			3.00
9	Math 251	Engg. Mathematics-III	3.00	3.00			3.00
		Total =>	**15.00**	**15.00**	**9.00**	**4.50**	**19.50**

No. of Theory Courses : 5 Total contact Hrs/week : 24
No. of Lab/Sessional Courses : 4 Total Credits : 19.50

DETAIL SYLLABUS

ETE 200: Electronic Circuit Design Lab

Credit: 1.50 Contact Hours: 3 Hours/Week

Filters, Amplifier, Oscillator, Audio Transformer, Power Supply from both Mains and Batteries and other Electronic Circuit Design and Analysis using Electronic Work Bench and SPICE. Digital Circuit Design, Electronic Circuit Design using Operational Amplifiers and Programmable Timers.

ETE 201: Digital Electronics

Credits: 3.00 Contact Hours: 3 Hours/Week

Number systems, Boolean algebra and reduction techniques, logic gates, combinational logic design, multiplexers, decoders, encoders, code converters, flip-flops, synchronous sequential logic, counters, registers and buses. Design of data handling and arithmetic circuits. Semiconductor memories: RAM, ROM, PROM, EPROM, EEPROM etc. Digital to Analog (D/A), Analog to Digital (A/D) Converters and their Applications.

ETE 202: Sessional Based on ETE 201

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Digital Electronics (ETE 201)

ETE 203: Analog Electronics-II

Credits: 3.00 Contact Hours: 3 Hours/Week

Linear and non-linear wave shaping. Diode Wave Shaping Techniques, Clipping and Clamping circuits. Non-linear function circuits. Negative resistance switching circuits. Timing Circuits: Bi-stable, monostable and astable multivibrators, sweep and staircase generator, IC 555 and its application. Application of Op-Amp in timing circuits. Comparators, Schimtt's trigger. Pulse generator, VCO, PLL, blocking oscillators. Active filters.

ETE 204: Sessional Based on ETE 203

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Analog Electronics-II (ETE 203)

CSE 241: Data Structure and Algorithm

Credits: 3.00 Contact Hours: 3 Hours/Week

Concepts and examples of Elementary Data objects, Elementary Data Structures, Arrays, Stacks, Queues, Lists, Trees, Graphs, Memory Management , Sorting and Searching , Hash techniques.

CSE 242: Sessional Based on CSE 241

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Data Structure and Algorithm (CSE 241)

EEE 223: Electrical Machines

Credits: 3.00 Contact Hours: 3 Hours/Week

DC Machines: Construction, classification, elementary concept of armature reaction and commutation. DC Generators: Principle of operation, Emf equation. Motors: Principle of operation, Back EMF, Torque, speed and speed regulation. Losses and efficiency calculation of dc machines.

AC Synchronous Machines: Construction, stator single layer, double layer and concentric windings, damping windings. Coil span factor, distribution factor, leakage and armature reaction, synchronous impedance. Alternators: emf equation, speed and frequency, alternator on load and voltage regulation. Synchronous Motors: principle of working, Vector diagram on load and its analysis for stator current, power factor, torque and mechanical output, Effect of Variation and excitation. Losses and efficiency of Synchronous machines.

Transformers: Single Phase Transformers: Construction, principle of working, Emf equation, No load working and vector diagram, Vector diagram on load, Equivalent circuit, Open circuit and short circuit tests, losses, efficiency and all day efficiency, Voltage regulation. Three phase operation of single phase transformers.

AC Induction Machines: Three Induction Motors: Construction, Types, Rotating field theory, principle of working, slip and its effect on motor current quantities. Losses, efficiency and performance curves. Starting, full load and maximum torque relations, torque slip characteristics. Introduction to single phase induction motors.

Math 251: Engg. Mathematics-III

Credits: 3.00 Contact Hours: 3 Hours/Week

Vector Analysis: Review of vector algebra: Addition and subtraction of vectors, Scalar and vector product of two vectors and their geometrical interpretation, Triple products and multiple products, Linear dependents and independents of vectors. Vector Calculus: Differentiation and Integration of Vectors together with elementary applications, Definition of line, Surface and volume Integrals, Gradient, Divergence and curl of point functions, various formulae, Gauss's theorem, Stoke's theorem, Green's theorem.

Fourier Analysis: Real and complex form of Fourier series, Finite transform, Fourier Integral, Fourier transforms and their uses in solving boundary value problems of wave equations.

Laplce Transforms: Definition Laplace transforms of some elementary functions, Sufficient conditions for existence of Laplace Transforms, Inverse Laplace Transforms, Laplace Transforms of derivatives. The unit step function, Periodic function, Some special theorems on Laplace Transforms, Partial fractions, Solutions of differential equations by Laplace Transforms, Evaluation of improper integrals.

COURSES FOR THE FOURTH SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	EEE 224	Sessional Based on EEE 223			1.50	0.75	0.75
2	ETE 209	Design and Analysis of Signal and Systems using MATLAB	3.00	3.00			3.00
3	ETE 210	Sessional Based on ETE 209			1.50	0.75	0.75
4	EEE 271	Instrumentation	3.00	3.00			3.00
5	EEE 272	Sessional Based on EEE 271			3.00	1.50	1.50
6	ETE 211	Communication Theory	3.00	3.00			3.00
7	ETE 212	Sessional Based on ETE 211			1.50	0.75	0.75
8	ETE 221	EM Fields and Waves	3.00	3.00			3.00
9	Math 253	Engg. Mathematics-IV	3.00	3.00			3.00
		Total =>	**15.00**	**15.00**	**7.50**	**3.75**	**18.75**

No. of Theory Courses : 5 Total contact Hrs/week : 22.50
No. of Lab/Sessional Courses : 4 Total Credits : 18.75

DETAIL SYLLABUS

EEE 224: Sessional Based on EEE 223

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Electrical Machines (EEE 223)

ETE 209: Design and Analysis of Signal and Systems using MATLAB

Credits: 3.00 Contact Hours: 3 Hours/Week

Basic system representation and use of MATLAB. System properties and system modeling. Difference equations. Convolution (discrete- and continuous-time). Fourier series and Fourier transforms. Frequency response, sampling and signal reconstruction. Discrete-time Fourier transforms and discrete Fourier transform.

ETE 210: Sessional Based on ETE 209

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Design and Analysis of Signal and Systems using MATLAB (ETE 209)

EEE 271: Instrumentation

Credits: 3.00 Contact Hours: 3 Hours/Week

Measuring Instruments: Electromechanical and electronic meters, their uses. Panel metering. Extension of Instrument range.
Transducers: Different types of transducers and their principle of operations: Position and displacement Transducers, Potentiometer, Linear variable differential transformers (LVDT), Pressure transducer, Temperature transducer, Optical transducer, Flow transducer, Strain gauge transducer, Ultrasonic transducer; Humidity transducer, Hall Effect transducer, and Speed transducer.

EEE 272: Sessional Based on EEE 271

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Instrumentation (EEE 271)

ETE 211: Communication Theory

Credits: 3.00 Contact Hours: 3.00 Hours/Week

Overview of communication system: Basic principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity. Noise: Source, characteristics of various types of noise and signal to noise ratio. Communication systems: Analog and digital. Continuous wave modulation: Transmission types- base-band transmission, carrier transmission; amplitude modulation- introduction, double side band, single side band, vestigial side band, quadrature; spectral analysis of each type, envelop and synchronous detection; angle modulation- instantaneous frequency, frequency modulation (FM) and phase modulation (PM), spectral analysis, demodulation of FM and PM. Pulse modulation: Sampling- sampling theorem, Nyquist criterion, aliasing, instantaneous and natural sampling; pulse amplitude modulation- principle, bandwidth requirements; pulse code modulation (PCM)- quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, differential PCM, demodulation of PCM; delta modulation (DM)- principle, adaptive DM; line coding- formats and bandwidths. Digital modulation: Amplitude-shift keying- principle, ON-OFF keying, bandwidth requirements, detection, noise performance; phase-shift keying (PSK)- principle, bandwidth requirements, detection, differential PSK, quadrature PSK, noise performance; frequency-shift keying (FSK)- principle, continuous and discontinuous phase FSK, minimum-shift keying, bandwidth requirements, detection of FSK. Multiplexing: Time division multiplexing (TDM)- principle,

receiver synchronization, frame synchronization, TDM of multiple bit rate systems; frequency-division multiplexing (FDM)- principle, de-multiplexing; wavelength-division multiplexing multiple-access network- time-division multiple-access (TDMA), frequency-division multiple access (FDMA); code-division multiple-access (CDMA) - spread spectrum multiplexing, coding techniques and constraints of CDMA. Communication system design: design parameters, channel selection criteria and performance simulation.

ETE 212: Sessional Based on ETE 211

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Communication Theory (ETE 211)

ETE 221: EM fields and Waves

Credits: 3.00 Contact Hours: 3 Hours/Week

Coordinate System: Introduction to coordinate systems, transformations between coordinate systems.

Electrostatic Field: Coulomb's force law, Electric fields due to various charge distribution. Electric flux density, Gauss's law, application of Guass's law, divergence theorem. Definition of potential difference and potential, the potential field due to various charge distribution, conservative property, potential gradient, the dipole, Energy density in the electrostatic field. Current and current density, continuity of current, metallic conductors, conductor properties and bounded conditions, the nature of dielectric materials, capacitance. Boundary condition. Poison's and Laplace's Equations, Uniqueness theorem, Examples of the solution of Laplace's equation, examples of the solution of poison, product solution of Laplace's equation.

Magnetostatic Field: Biot Savart's Law, Amperes circuit law, curl, stoke's theorem, Magnetic flux and magnetic flux density, the scalar and vector magnetic potentials, derivation of steady magnetic field laws. Force on a moving charge, force on a differential current element, force between differential current element, force and torque on a closed circuit, the nature of magnetic materials, Magnetisation and permeability, magnetic boundary conditions, the magnetic circuit, potential energy and forces on magnetic materials, inductance and mutual inductance.

Time Varying Fields and Maxwell's Equations: Faraday's Law, displacement current, Maxwell's equation in point form, Maxwell's equation in integral form, the related potentials.

The Uniform Plane Wave: Wave motion in free space, wave motion in perfect dielectric, plane waves in loose dielectrics. The Pointing vector and power

considerations, propagation in good conductors, skin effect, reflection of uniform plane waves standing wave ratio.

Math 253: Engg. Mathematics-IV

Credits: 3.00 Contact Hours: 3 Hours/Week

Complex Variable: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorems; Complex differentiation and the Cauchy-Riemann equations, Mapping by elementary functions, Line Integral of a complex function, Cauchy's Integral theorem, Cauchy's Integral formula, Liouville's theorem, Taylor's theorem and Laurent's theorem. Singular points, Residue, Cauchy's Residue theorem. Evaluation of residues, Contour integration, Conformal mapping.

Statistical Analysis: Frequency distribution; Mean, Median, Mode and other measures of central tendency; Standard deviation and other measures of dispersion; Moments skewness and kurtosis; Elementary probability theory and discontinuous probability distributions (Binomial, Poisson and negative binomial); Characteristics of distributions; Elementary sampling theory; Estimation; Hypothesis testing and regression analysis.

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COURSES FOR THE FIFTH SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	EEE 301	Control System	3.00	3.00			3.00
2	EEE 302	Sessional Based on EEE 301			1.50	0.75	0.75
3	ETE 303	VLSI Design	3.00	3.00			3.00
4	ETE 304	Sessional Based on ETE 303			1.50	0.75	0.75
5	EEE 313	Industrial Electronics	3.00	3.00			3.00
6	EEE 314	Sessional Based on EEE 313			1.50	0.75	0.75
7	ETE 321	Microwave Engineering	3.00	3.00			3.00
8	ETE 322	Sessional based on ETE 321			1.50	0.75	0.75
9	ETE 333	Numerical Methods in Engineering	3.00	3.00			3.00
10	ETE 334	Sessional Based on ETE 333			3.00	1.50	1.50
		Total =>	**15.00**	**15.00**	**9.00**	**4.50**	**19.50**

No. of Theory Courses : 5 Total contact Hrs/week : 24
No. of Lab/Sessional Courses : 5 Total Credits : 19.50

DETAIL SYLLABUS

EEE 301: Control System

Credits: 3.00 Contact Hours: 3 Hours/Week

Introductory Concepts: Open loop versus closed loop feed system. Input output relationship. Transfer function. DC machine dynamics, performance criteria, sensitivity and accuracy. Analysis of control systems, time and frequency domain error constants.

Stability of Control System: Routh-Harwith criterion, bode plot. Nyquist method. Root locus techniques. Frequency response analysis. Nicholes chart, compensation. Introduction to non-linear control system. State variable characterization of systems, transition matrix, canonical forms. Controllability and observability.

EEE 302: Sessional Based on EEE 301

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Control System (EEE 301)

ETE 303: VLSI Design

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to Microelectronics and MOS Technology, Basic Electrical Properties and Circuit Design Processes of MOS and Bi CMOS Circuits, Inverter Circuits, Sub-System Design Processes and Layout, Scaling of MOS Circuits: Scaling Models and Scaling Factors, Limitation of Scaling.
Computational Elements: Design of an ALU Sub-System, Adder, Multipliers, Memory Registers, Dynamic & Static Flip-Flops, Bus Arbitration and Aspects of System Timing. CMOS Fabrication, Practical Aspects of Design Tools and Test-Ability CMOS Design, Behavioral Description, Structural Description, Physical Description and Design Verification. Introduction to Ga-As Technology: Ultra-Fast Circuits and Systems.

ETE 304: Sessional Based on ETE 303

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on VLSI Design (ETE 303)

EEE 313: Industrial Electronics

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to power switching devices and their terminal characteristics. Snubber circuits. Single and three phase line frequency diode rectifiers and line frequency phase controlled rectifiers. Thyristor circuits and its control with commutation techniques. Cycloconverters, dc-dc switch mode converters, UPS, DC choppers: classification. Step up, step down choppers. Single phase PWM inverters. Introduction to three phase inverters. Voltage controlled inverters. Advanced modulation techniques. Introduction to induction, dielectric and microwave heating.

EEE 314: Sessional Based on EEE 313

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Industrial Electronics (EEE 313)

ETE 321: Microwave Engineering

Credits: 3.00 Contact Hours: 3 Hours/Week

UHF Transmission Lines: Voltage and current in ideal transmission lines, reflection, transmission, standing wave, impedance transformation, Smith chart,

impedance matching and lossy transmission lines.
Waveguides: general formulation, modes of propagation in parallel, rectangular and cylindrical waveguides.
Microstrips: Structures and characteristics.
Resonant Cavities: Energy storage, losses and Q. Filters, hybrids. Isolators etc. Detection and measurements of microwave signals.

ETE 322: Sessional Based on ETE 321

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Microwave Engineering (ETE 321)

ETE 333: Numerical Methods in Engineering

Credits: 3.00 Contact Hours: 3 Hours/Week

Computer algorithm. Mathematical modeling of physical system. Solution of equation in one variable, Solution of simultaneous equations, Interpolation, Curve fitting, Differentiation and Integration, Solution of ordinary and partial differential equations. Application of the above techniques in Electronics & Telecommunication Engineering through computer programming.

ETE 334: Sessional Based on ETE 333

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Numerical Methods in Engineering (ETE 333)

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COURSES FOR THE SIXTH SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 300	Electronic Project Design and Development			3.00	1.50	1.50
2	ETE 315	Information Theory	3.00	3.00			3.00
3	ETE 309	Digital Signal Processing	3.00	3.00			3.00
4	ETE 310	Sessional Based on ETE 309			1.50	0.75	0.75
5	ETE 311	Digital Communication	3.00	3.00			3.00
6	ETE 312	Sessional Based on ETE 311			1.50	0.75	0.75
7	ETE 323	Antennas and Propagation	3.00	3.00			3.00
8	ETE 324	Sessional Based on ETE 323			1.50	0.75	0.75
9	EEE 351	Microprocessor and Microcomputer	3.00	3.00			3.00
10	EEE 352	Sessional based on EEE 351			3.00	1.50	1.50
		Total =>	**15.00**	**15.00**	**10.50**	**5.25**	**20.25**

No. of Theory Courses : 5 Total contact Hrs/week : 25.50
No. of Lab/Sessional Courses : 5 Total Credits : 20.25

DETAIL SYLLABUS

ETE 300: Electronic Project Design and Development

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Design and development of electronic project based on the subjects taught in the previous semesters.

ETE 315: Information Theory

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to Information Theory, Information Rate and Shannon's Theory. Application of Information Theory. Codes for Source and Channels. Probability Distribution and Discrete source and Channels. Discrete Noiseless Channels. Capacity of Discrete Noiseless Channels. Codes for Data Translation. Information Content of Discrete Sources. Entropy function. Prefix and Block Codes for Data Compaction. Neyman-Pearson Theorem. Notch Filter. Discrimination Function. Elementary bounds on Performance. Discrete Noisy Channels. Mutual Information Function. Transmission of Information. Capacity of Discrete Noisy Channels. Block Codes for Data Transmission. Random Coding Bound. Transmission at Rates above Capacity. Compression of information. Information Content of Compressed data.

Continuous Amplitude Signals. Information Measures of Gaussian signals. Gaussian Channels and Sources without and with Memory. Gaussian Waveform Channels and Sources. Bit Energy and Bit Error Rate. Signalling with and without Bandwidth Constraint.

ETE 309: Digital Signal Processing

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Digital Signal Processing and its benefits: Key DSP Operations, Real-time signal processing, Applications. Discrete Transform: Fourier series, DFT, FFT and other discrete transforms, Z- transforms and its applications in signal processing, correlation and convolution with examples. Filters: FIR, IIR and adaptive filters. An overview of spectrum estimation and analysis.

ETE 310: Sessional Based on ETE 309

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Digital Signal Processing (ETE 309)

ETE 311: Digital Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Communication channels, mathematical model and characteristics. Probability and stochastic process.
Source Coding: Mathematical models of information, entropy, Huffman code and linear predictive coding.
Digital Transmission System: Base band digital transmission, inter-symbol interference, bandwidth, power efficiency, modulation and coding trade-off.
Receiver for AWGN Channels: Correlation demodulator and maximum likehood receiver.
Channel Capacity and Coding: Channel models and capacities and random selection of codes.
Block Codes and Conventional Codes: Linear block codes, convolution codes and coded modulation. Spread spectrum signals and system.

ETE 312: Sessional Based on ETE 311

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Digital Communication (ETE 311)

ETE 323: Antennas and Propagation

Credits: 3.00 Contact Hours: 3 Hours/Week

Fundamental of Antennas: Radiation Mechanism, Radiation Patterns, Lobes, Power Density and Intensity, Directive Gain and Directivity, Power Gain, Bandwidths, Radiation Efficiency, Input Impedance, Effective Aperture and Antenna Temperature.

Vector Potential Functions, Electric and Magnetic Fields for Electric and Magnetic Current Sources, Solution of Vector Potential Wave Equation, Duality, Reciprocity and Reaction Theorems. Linear Wire and Loop Antennas: Infinitesimal, Small, Finite Length and Half-wave Length Dipoles, Determination of Radiation Fields, Radiation patterns, Radiation Resistance, Directivity and Input Impedance of Dipoles, Mutual Impedance Between Linear Elements near Infinite Planes Conductors and Ground Effects. Circular, Square, Triangular, Rectangular, Rhombic and Ferrite loop antennas. Cylindrical dipole, Folded dipole, Matching techniques, Baluns and transformers.

Antenna Arrays: Two-Element Array, N-element Linear Arrays: Broad-side, End-fire, Phased, Binomial, Dolph- Tchebyschef and Super-directive Arrays, Determination of Array Factor and Patterns, Planar and Circular Arrays.

Travelling-Wave and Broad-band Antennas: Long wire, V, Rhombic and Helical Antennas, Yagi, Uda array, Frequency Independent and Log-periodic Antennas.

Aperture, Reflector and Lens Antennas: Huygens's Principle, Rectangular and Circular Apertures, Microstrip Antennas.

Babinet's Principle, Sectoral, Pyramidal and Conical Horns, Parabolic and Cassegrain Reflector Antennas, Lens Antennas.

ETE 324: Sessional Based on ETE 323

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Antennas and Propagation (ETE 323)

EEE 351: Microprocessor and Microcomputer

Credits: 3.00 Contact Hours: 3 Hours/Week

Microcomputer Architecture: Basic microcomputer blocks, microcomputer bus structure.

Microprocessor Architecture: Generalized microprocessor architecture. Basic concepts of 8085. Details study of 16-bit Intel 8086 microprocessor architecture and pin diagram. Familiarization with Z80, MC 68000, 80286 and

Pentium Series.

Microcomputer Programming: Introduction to machine and assemble language programming. Detail study of 8086 instruction sets with assembly language programming examples.

Memory subsystem: Memory Module design Intel 8086 family memory IC's and interfacing them with microprocessor. Familiarization with different memory technology.

I/O Subsystem: Introduction to parallel and Serial I/O. Detail study of Intel 8086 family chips and interfacing them with microprocessor. Comparison of the architecture based on hardware features such as addressing modes interrupt structures, instruction execution, multiprogramming abilities and memory management.

Microprocessor interfacing: Introduction to some available microprocessor peripheral IC's and their application; Timing diagram, Interrupts, I/O Systems, DMA- based data transfer, memory interfacing, A/D and D/A converter interfacing; introduction to microcomputers.

EEE 352: Sessional Based on EEE 351

Credit: 1.50 Contact Hours: 3.00 Hours/Week

Laboratory based on Microprocessor and Microcomputer (ETE 351)

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COURSES FOR THE SEVENTH SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 400	Project and Thesis			3.00	1.50	1.50
2	ETE 401	Computer Network and Data Communication	3.00	3.00			3.00
3	ETE 402	Sessional Based on ETE 401			1.50	0.75	0.75
4	Hum 411	Project Planning Management & Engineering	2.00	2.00			2.00
5	ETE 411	Wireless and Mobile Communication	3.00	3.00			3.00
6	ETE 412	Sessional Based on ETE 411			1.50	0.75	0.75
7	ETE 413	Telecommunication Engineering	3.00	3.00			3.00
8	ETE 414	Sessional Based on ETE 413			1.50	0.75	0.75
9	ETE ***	Elective-II	3.00	3.00			3.00
10	ETE ###	Sessional Based on ETE ***			1.50	0.75	0.75
		Total =>	**14.00**	**14.00**	**9.00**	**4.50**	**18.50**

No. of Theory Courses : 5 Total contact Hrs/week : 23
No. of Lab/Sessional Courses : 5 Total Credits : 18.50

DETAIL SYLLABUS

ETE 400: Project and Thesis

Credits: 1.50 Contact Hours: 3 Hours/Week

A detailed theoretical study of some problems in Telecommunications. This may be of investigative research nature or it may be laboratory research oriented. The report may be purely economic, technical or both and may include the comparative study of different choices for the solution of the problems.

ETE 401: Computer Network and Data Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Protocol Hierarchies, Data link Control; HLDC, DLL in Internet; DLL of ATM; LAN Protocols; Standards IEEE 802, Switches and Hubs, Bridges, FDDI, Fast Ethernet; Routing algorithm; Congestion Control, Internetworking, WAN, Fragmentation, Firewalls, IPV4, IPV6, ARP, RARP, Mobile IP, Network layer of ATM, Transport Protocols, Transmission Control Protocol, Connection Management, Transmission policy, Congestion Control, Timer

Management, UDP, AAL of ATM, Network Security; Cryptography, DES, IDEA, Public Key Algorithm, Authentication; Digital Signatures, Gigabit Ethernet, Domain Name system, Name Servers; Email and its privacy; SNMP, HTTP, World Wide Web, DSK and Radio link.

ETE 402: Sessional Based on ETE 401

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Computer Network and Data Communication (ETE 401)

Hum 411: Project Planning Management and Engineering

Credits: 2.00 Contact Hours: 2 Hours/Week

Definitions of project and project management in the engineering point of view. Project Initiation: Project selection, project manager, project organization and project planning. Project feasibility study.
Project Implementation: Project management, budgeting and cost estimation, project control and human aspects of project management. Network techniques of project management, PERT, CPM and Gantt Charts.

ETE 411: Wireless and Mobile Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to wireless communication system, The cellular concept-system design fundamentals, Mobile radio propagation, Modulation techniques for mobile radio, Multiple access techniques for wireless communication, wireless networking, Wireless systems and standards, AMPS, GSM, Truncking theory, Wireless Application Protocol (WAP), Wireless Markup Language (WML), Bluetooth-compatible cellular telephone system.

ETE 412: Sessional Based on ETE 411

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Wireless and Mobile Communication (ETE 411)

ETE 413: Telecommunication Engineering

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Principle, evolution, networks, exchange and international regulatory bodies.
Telephone Apparatus: Microphone, speakers, ringer, pulse tone dialing

mechanism, side-tone mechanism, local and central batteries and advanced features.

Switching System: Introduction to analog system, digital switching systems – space division switching, blocking probability and multistage switching, time division switching and two dimensional switching.

Traffic Analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing.

Modern Telephone Services and Network: Internet telephony, facsimile, integrated services digital network, asynchronous transfer mode and intelligent networks. Introduction to cellular telephony and satellite communication.

ETE 414: Sessional Based on ETE 413

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Telecommunication Engineering (ETE 413)

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COURSES FOR THE EIGHTH SEMESTER

Sl. No.	Course No	Course Title	Theory		Sessional		Total Credits
			Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	ETE 400	Project and Thesis			3.00	1.50	1.50
2	ETE 415	Radio and TV Engg.	3.00	3.00			3.00
3	ETE 416	Sessional Based on ETE 415			1.50	0.75	0.75
4	ETE 417	Fiber Optic Communication	3.00	3.00			3.00
5	ETE 418	Sessional Based on ETE 417			15.0	0.75	0.75
6	ETE 419	Satellite Communication and Radar	3.00	3.00			3.00
7	ETE **	Elective-I	3.00	3.00			3.00
8	ETE ***	Elective-III	3.00	3.00			3.00
9	ETE ###	Sessional Based on ETE ***			1.50	0.75	0.75
		Total =>	**15.00**	**15.00**	**7.50**	**3.75**	**18.75**

No. of Theory Courses : 5 Total contact Hrs/week : 22.50
No. of Lab/Sessional Courses : 4 Total Credits : 18.75

DETAIL SYLLABUS

ETE 400: Project and Thesis

Credits: 1.50 Contact Hours: 3 Hours/Week

A detailed theoretical study of some problems in Telecommunications. This may be of investigative research nature or it may be laboratory research oriented. The report may be purely economic, technical or both and may include the comparative study of different choices for the solution of the problems.

ETE 415: Radio and TV Engg.

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to radio communication, History, Frequency management. Design of radio transmitter and receiver circuits using scattering-parameter methods. Circuits include oscillators, radio frequency amplifiers and matching networks, mixers and detectors. Design of amplitude, frequency, and pulse-modulated communication systems, including modulators, detectors, and the effects of noise.

Television: Introduction, principle of operation, transmitter and receiver, Receiving and transmitting antenna. Camera tube, Picture tube, Electron beam scanning, T-lines, balun, duplexer, Vestigial side-band filters. Introduction to

color TV, VCR, CCTV, CATV, MATV, TV Booster.

ETE 416: Sessional Based on ETE 415

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Radio and TV Engg. (ETE 415)

ETE 417: Fiber Optic Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Characteristics of optical transmission media, optical fibres - preparation and transmission characteristics, loss and dispersion mechanisms, optical sources - principles of operation, modulation characteristics and driver circuits, photo detectors – principles of operation, circuits and performance, post detection amplifiers, fibre optic communication systems and link budget using direct detection, fibre optic connectors, couplers, multiplexers and splices, wavelength converters, routers, optical amplifiers, coherent and WDM systems.

ETE 418: Sessional Based on ETE 417

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Fiber Optic Communication (ETE 417)

ETE 419: Satellite Communication and Radar

Credits: 3.00 Contact Hours: 3 Hours/Week

Satellite :

Introduction to Satellite Communication : Overview of Satellite System Engineering.

Spacecraft, Introduction, to Spacecraft Subsystem. (AOCS), Telemetry, Tracking and command (TT&C). Spacecraft Antennas, Basic Antenna Types and Relationships Spacecraft, Antennas in Practice, Frequency Reuse Equipment Reliability and Space Qualification, Reliability redundancy. Multiple Access

Earth station Technology. : Earth Station Design. Earth Station Design for Low System Noise Temperature. Large Earth Station Antennas.

Satellite Television Broadcasting Networks, VSAT technology.

RADAR :

Introduction to Radar, Radar Equation CZ, Operating Principle of Radar with Block Diagram, CW and FM Radar, Tracking Radar, Antennas for Radar, Radar Receivers, Radar Transmitting System, Duplexer, Usable Frequencies for Radar, Radar Applications.

ELECTIVE COURSES

ETE 407: Adaptive Filters

Credits: 3.00 Contact Hours: 3 Hours/Week

Basics of minimum mean-square and least-squares estimation. Lattice orthogonalization. Stochastic gradient adaptive filters: derivations, performance analyses and variations. Recursive least-squares adaptive filters: fast algorithms, least-squares lattice filters, numerical issues, and performance comparisons with stochastic gradient adaptive filters. Adaptive IIR filters. Fundamentals of adaptive nonlinear filtering. Selected applications.

ETE 409: Random Signal Processing

Credits: 3.00 Contact Hours: 3 Hours/Week

Probability and random variables. Distribution and density functions and conditional probability. Expectation: moments and characteristic functions. Transformation of a random variable. Vector random variables. Joint distribution and density. Independence. Sums of random variables. Random Processes. Correlation functions. Process measurements. Gaussian and Poisson random processes. Noise models. Stationary and Ergodicity. Spectral Estimation. Correlation and power spectrum. Cross spectral densities. Response of linear systems to random inputs. Introduction to discrete time processes, Mean-square error estimation, Detection and linear filtering.

ETE 423: Radio Wave Propagation

Credits: 3.00 Contact Hours: 3 Hours/Week

The effects of the earth and its atmosphere on the propagation of electromagnetic waves at radio frequencies: ground waves, sky waves, ducting, reflection, refraction, diffraction, scattering, attenuation, and fading. Determination of the transmission loss between transmitting and receiving antennas.

ETE 427: Neural and Fuzzy Systems in Communications

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Human Brain Mechanism, Neural Machine Intelligence. Neural Dynamics: Activation and Signals, Activation Models, Synaptic Dynamics: Learning Strategies, Single and Multilayer Perception, Kohonen's SOM, Hopfield Network, Associative Memory, Vector Quantization, Adaptive

Resonance Theory (ART), Boltzman Machine. Equilibrium of Learning System. Concept of Neuro-Fuzzy and Neuro-GA Network.
Fuzziness Vs. Probability, Fuzzy Associative Memory, Comparison of Fuzzy and Neural Backerupper Control Systems, Fuzzy Image Transform Coding, Comparison of Fuzzy and Filter, Target Tracking Control Systems. *Genetic* Algorithm: Basic Concepts, Offspring, Encoding, Reproduction, Crossover, Mutation Operator, Application of GA.

ETE 429: Spread Spectrum and CDMA Technology

Credits: 3.00 Contact Hours: 3 Hours/Week

Spread spectrum communication systems including direct-sequence; multicarrier, and frequency hopped spread spectrum, pseudo-random sequences, code acquisition and tracking; CDMA, multi-user detection; RAKE receivers, and CDMA standards.

ETE 435: Discrete Mathematics

Credits: 3.00 Contact Hours: 3 Hours/Week

Sets and its operations, Relations: relations and their properties, n-ary relations, Partial Ordering, lattice. Logic: logic, propositional equivalence, predicate and Quantifiers. Function: function, growth of a function, sequences and summations. Properties of integers: introduction, algorithm of division and multiplication, primes, GCD, LCM, Euclidean algorithm, congruence relation. Mathematical reasoning: proof techniques, induction, recursive definitions and algorithms.
Graph theory: Graph, Paths, Trees .Counting and Advanced counting Techniques: permutations and combinations, pigeonhole principle, generating functions. Algebraic Systems: Introduction, operations, Semi-groups, Groups, Rings and Fields. Introduction to language and grammars.

ETE 441: Graph Theory

Credits: 3.00 Contact Hours: 3 Hours/Week

Fundamental concepts; eulerian graphs; adjacency and incidence matrices; trees; planar graphs; graph embeddings; connectivity; hamiltonian graphs; matchings; factorization; graphs and groups; Cayley color graphs; line graphs; the Reconstruction Problem; spectra of graphs; graph and map colorings; extremal graph theory; ramsey theory.

ETE 431: Statistical Theory of Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Concepts of probability and random process theory necessary for advanced study of communications, stochastic control and other electrical engineering problems involving uncertainty; applications to elementary detection and estimation problems.

ETE 421: Microwave Devices

Credits: 3.00 Contact Hours: 3 Hours/Week

Microwave tubes: Klystron amplifier- two cavity – multi cavity – description – operating characteristics – performance characteristics – pulse modulation – bandwidth, Travelling wave tube amplifier – construction – operation- crossed field amplifier – grid controlled tube, Magnetron oscillator- conventional magnetron –coaxial magnetron – mode jumping- frequency pushing and pulling – performance chart and rieke diagram.

ETE 422: Sessional Based on ETE 421

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Microwave Devices (ETE 421)

ETE 425: Microwave Solid State Devices

Credits: 3.00 Contact Hours: 3 Hours/Week

Microwave transistors, tunnel diodes and FETs.
Transferred electron devices: Gunn effects, RWH theory, LSA diodes, InP diodes CdTe diodes and their applications in microwave generation and amplification.
Avalanche transit time devices: IMPATT diodes, TRAPATT diodes, BARITT diodes and Parametric devices.

ETE 426: Sessional Based on ETE 425

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Microwave Solid State Devices (ETE 425)

ETE 433: Numerical Techniques in Electromagnetics

Credits: 3.00 Contact Hours: 3 Hours/Week

The numerical solution of electromagnetic problems using Method of moments (MoM). Finite Deference (FD) method, Finite Deference Time Domain (FDTD) method, Transmission Line Method (TLM), Finite Element method (FEM). Application of RF CAD software's.

ETE 434: Sessional Based on ETE 433

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Numerical Techniques in Electromagnetic (ETE 433)

ETE 443: Multimedia Communication

Credits: 3.00 Contact Hours: 3 Hours/Week

Media and data streams. Medium properties of multimedia system.
Basic sound concepts, Music, MIDI devices and standards, Speech generation, Speech analysis and transmission. Image manipulation and storage: File formats for BMP, GIF, TIFF, JPEG, MPEG-II etc. Introduction to animation techniques. Multimedia applications: Tele conferencing, Virtual reality and others.

ETE 444: Sessional Based on ETE 443

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Multimedia Communication (ETE 443)

ETE 445: Digital Filter Design

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction to digital signal processing. Discrete time signals, linear systems. Z-transform, H- transform. Frequency domain representation of discrete time systems and signals, discrete Fourier series and discrete Fourier transform (DFT), Convolution and Correlation, computation of the DFT.
Signal flow graph representation of digital networks. Tellegen's theorem. Digital filters: IIR and FIR filters, filter design. Digital signal processors. Probability and stochastic process, a discrete- time random process, spectrum representation of infinite energy signals, response of linear systems to random signal. Adaptation algorithm, all-zero and lattice adaptive filters, application of adaptive filtering. Model-based signal processing.

ETE 446: Sessional Based on ETE 445

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Digital Filter Design (ETE 445)

ETE 447: Digital Image Processing

Credits: 3.00 Contact Hours: 3 Hours/Week

Basic Image Processing Systems: Image Sources, Characteristics, Image Representation, Hardware and Software Requirements.
Two-dimensional systems: Properties of two Dimensional Sequences and Systems, 2D Fourier Transform, 2D Z-Transform, 2D Sampling Theory.
Image Quantization, Image Perception, Quality Measures.
Image Transforms: 2D DFT, 2D DCT, Sine transform, Hadamard, Slant and KL Transforms.
Image Compression Algorithms: Pixel Coding-PCM, Run Length Coding, Predictive Technique DPCM, Transform Coding-DCT, Vector Quantization, VQ in Image Coding, Wavelet Based Compression, Interframe Coding, Standards for Image Compression-JPEG, MPEG.
Image Segmentation: Feature Extraction, Edge Detection, Boundary Extraction, Region Representation, Moment Representation, Shape Features, Scene Matching Image Segmentation, Classification Techniques Supervised and Nonsupervised Learning.
Image Enhancement and Restoration: Point Operations, Histogram Modeling, Spatial Operations, Transform Operations, Image Filtering and Restoration, De blurring Colour Image Processing.
Application in Character Recognition, Biomedical Imaging, Remote Sensing, Digital TV and Multimedia.

ETE 448: Sessional Based on ETE 447

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Digital Image Processing (ETE 447)

ETE 449: Digital Speech Processing

Credits: 3.00 Contact Hours: 3 Hours/Week

Application of digital signal processing to speech signals. Acoustic and aeroacoustic theories of speech production leading to linear and nonlinear time-frequency models. Speech analysis-synthesis based on spectrogram, linear prediction, homomorphic, filter bank, and AM/FM sinusoidal representations.

Extensions to wavelet, auditory-like, and other multiresolution analysis. Waveform and model-based speech coding using scalar and vector quantization. Time-scale and pitch modification; speech restoration; speaker separation; pitch estimation; and speaker recognition. Application to music analysis-synthesis.

ETE 450: Sessional Based on ETE 449

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Digital Speech Processing (ETE 449)

ETE 451: Voice Communication Techniques

Credits: 3.00 Contact Hours: 3 Hours/Week

Fundamentals of speech processing. The acoustic theory of speech signals. Short-time Fourier analysis. Analysis-synthesis systems; the phase and channel vocoder. Homomorphic speech processing; the complex cepstrum of speech; pitch detection; and format estimation. Linear predictive coding of speech. Synthesis of speech from linear predictive parameters. Speech recognition systems. Man-machine communication by voice. Voice entry systems to integrated digital networks.

ETE 452: Sessional Based on ETE 451

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Voice Communication Techniques (ETE 451)

ETE 453: Microprocessor Based System Design

Credits: 3.00 Contact Hours: 3 Hours/Week

Interface design and programming, A speech synthesizer interface, Parallel printer interface, Interfacing Keyboards, Interfacing microcomputer ports to high power devices, LCD interfacing, D/A converter operation and interfacing to microcomputer. A/D converter operation and interfacing. 8086 based process control system. Microcontroller and interfacing. Interfacing with IBM PC bus. Using a logic analyzer to trouble-shoot a microcomputer system.

ETE 454: Sessional Based on ETE 453

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Microprocessor Based System Design (ETE 453)

ETE 455: Industrial Drives

Credits: 3.00 Contact Hours: 3 Hours/Week

Motor load dynamics, starting, braking and speed control of dc and ac motors. DC drives: converter and chopper control. AC Drives: Operation of induction and synchronous motors from voltage and current inverters, slip power recovery, pump drives using ac line controllers and self controlled synchronous motor drives.

ETE 456: Sessional Based on ETE 455

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Industrial Drives (ETE 455)

ETE 457: Electronic Instrumentation

Credits: 3.00 Contact Hours: 3 Hours/Week

Introduction: Classification of variables and analogies- Generalized approach to a measuring system- Performance characteristics of instruments- Analysis of errors- Units.

Passive transducers- Active transducers- Resistive, Inductive, Capacitive types, Electromagnetic, Thermo electric, Photovoltaic and piezoelectric transducers and digital transducers. Theory of LED, LCD, LCD EPID display devices and applications. Transducer bridges- Instrumentation amplifiers.

Signal generators: Block schematics and principles of operation of audio generators- Function generators- Pulse generators- RF generators and Frequency synthesizers. Frequency counters- Periodic counters, counting errors, digital voltmeters, auto ranging, Digital LCR meters. Power meters: Block schematic and principles of operation of AF power meter, RF power meter, Microwave power meter, VSWR meter, measurement using above.

The cathode ray tube deflection amplifier, wave form display, oscilloscope time base, automatic time base, dual trace oscilloscope, dual beam & split beam CRTs. Oscilloscope controls, measurement of voltage, frequency and phase. Lissajous figures. Pulse measurement- Oscilloscope probe. Digital Oscilloscope. A/D Conversion, storage, digital memory, D/A conversion, Recovery from memory and digital oscilloscopes. Principles of operation of spectrum analyzers, logic state analyzers.

ETE 458: Sessional Based on ETE 457

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Electronic Instrumentation (ETE 457)

ETE 459: Optoelectronics

Credits: 3.00 Contact Hours: 3 Hours/Week

Light: Nature of light, Polarization, superposition, interference, diffraction, sources, blackbody radiation.

Modulation of Light: Elliptical polarization, Birefringence, quarter wave plate, optical activity, electro-optic effect, Kerr modulators, scanning and switching, magneto-optic devices, acousto-optical effect, nonlinear optics.

Display Devices: Luminescence, photoluminescence, cathodoluminescent, LED materials, LED construction, response time, plasma displays, LCD, numerical display.

Lasers: Emission and absorption, Einstein relation, optical feedback, laser losses, line shape function, modes, classes of laser, laser applications, distance measurements, holography.

Photo Detectors: Thermal detectors, photon devices, vacuum photodiodes, Noise, Image intensifier, junction detectors, detector arrays.

Optical Communication System: Fiber optic communication, integrated optics.

Non-communication Applications: Optical fiber sensors, Light guiding fiber.

ETE 460: Sessional Based on ETE 459

Credit: 0.75 Contact Hours: 1.50 Hours/Week

Laboratory based on Optoelectronics (ETE 459)