Chapter 1
ABOUT THE UNIVERSITY

1 The University
Rajshahi University of Engineering & Technology (RUET) 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.

2 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°C to 40°C. Rickshaw, human hauler, taxi and bus facilities are available to reach the campus from any place of the city.

3 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.

4 University Authority
The university has the following statutory committees for dealing student related affairs:

i) Syndicate
ii) Academic Council
iii) Dean’s Executive Committee
Students Discipline Committee
Committee for Advanced Studies and Research (CASR)
Postgraduate Academic Committee (PGAC)
Undergraduate Academic Committee (UGAC)

5 Library Facilities

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 facilities to provide the following services to the students and teachers.

i) Acquisition and processing of books and other printed and electronic materials
ii) Issue and receipt of books
iii) Research aid and Journal section
iv) Reading room.

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.

6 Computer Center

The central computer center plays an important role in the teaching and research of the students of different departments and provides useful services in data processing required in various sectors on national development. Each department also has separate computer laboratory where the students and the teachers of the respective departments can use computers for their thesis and research works. These computer centers are equipped with Pentium based machines operated under Windows and LINUX/UNIX operating system.

7 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, arranging career fair, employment for students and to organize and maintain contact with the alumni association of RUET, etc.
The Central Students Union, most of its members are elected by the students, bridges between students and policy making authorities of the university. The student unions of the various residential halls also arrange their individual co-curricular activities, literary competitions etc and help the hall authority in normal functioning of the halls.

8 **Auditorium Complex and Seminar Hall**

The University has an Auditorium Complex with modern facilities having a seating capacity of about 720, 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.

9 **Students Hall of Residences**

There are seven halls of residence at RUET campus. The total capacity of these halls is about 2100. Name of the halls with their respective capacities are depicted in the following table. 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 60% of the total number of students of the university. Non-residential students are to be attached with a hall so that the administrative control on the students becomes easy.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Name of the halls</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shahid President Ziaur Rahman Hall</td>
<td>450</td>
</tr>
<tr>
<td>2.</td>
<td>Bangabandhu Sheikh Mujibur Rahman Hall</td>
<td>450</td>
</tr>
<tr>
<td>3.</td>
<td>Shahid Lt. Selim Hall</td>
<td>350</td>
</tr>
<tr>
<td>4.</td>
<td>Shahid Shahidul Islam Hall</td>
<td>225</td>
</tr>
<tr>
<td>5.</td>
<td>Shahid Abdul Hamid Hall</td>
<td>225</td>
</tr>
<tr>
<td>6.</td>
<td>Tin Shed Hall (Extension)</td>
<td>100</td>
</tr>
<tr>
<td>7.</td>
<td>Deshratna Sheikh Hasina Hall</td>
<td>250</td>
</tr>
</tbody>
</table>

Table 1.1: Residential Halls of RUET

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.

10 **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. Three 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 occasions.

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.

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

The department provides adequate laboratories, library and other facilities to its members and students. The departmental undergraduate courses are augmented by intensive laboratory works in the name of sessional courses based on its theoretical parts and this requirement is catered by the following laboratories:
Students in first year have to undertake laboratory/sessional classes in Physics and Mechanical Engineering. Students are also using all the laboratory facilities of Electrical and Electronic Engineering Department.

16 Faculties and Departments

The teaching departments are grouped in under four faculties. Presently there are 14 departments offering undergraduate degrees and 09 departments offering graduate/post graduate (Master/PhD) degrees. Departments under the faculty of applied science and engineering do not offer undergraduate programs. They only run post graduate programs and teach corresponding courses to undergraduate degree awarding departments.

Faculty of Civil Engineering consists of the following departments:

i) Department of Civil Engineering (CE)  
ii) Department of Architecture (ARCH)  
iii) Department of Urban & Regional Planning (URP)  
iv) Department of Building Engineering & Construction Management (BECM)

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

i) Department of Electrical & Electronic Engineering (EEE)  
ii) Department of Computer Science & Engineering (CSE)  
iii) Department of Electronics & Telecommunication Engineering (ETE)  
iv) Electrical & Computer Engineering (ECE)

Faculty of Mechanical Engineering consists of the following departments:

i) Department of Mechanical Engineering  
ii) Department of Industrial & Production Engineering (IPE)  
iii) Department of Glass & Ceramic Engineering (GCE)  
iv) Department of Mechatronics Engineering (MTE)  
v) Department of Chemical & Food Process Engineering (CFPE)  
vi) Department of Material Science & Engineering (MSE)

Faculty of Applied Science & Engineering consists of the following departments:

i) Department of Mathematics  
ii) Department of Physics  
iii) Department of Chemistry  
iv) Department of Humanities
17  Department of Electronics & Telecommunication Engineering

17.1 The Department

The department buildings is located at 2nd floor of Academic Building-1 which is at the eastern side of the campus. There are about 300 students, 13 teachers, 06 officers and stuffs. The department has undergraduate program and awarding the degree regularly. It has 05 well-established modern equipment enriched laboratories, a rental library for students where various departmental books and journals are available on rent, a seminar room, a hall room, and several multimedia classrooms.

There is an association named Association of Electronics and Telecommunication Engineering in the department. All teachers and students of the department are members of the association. It arranges sports, seminars and other co-curricular activities on behalf of the department. The department plays a vital role in solving/serving the local and national industrial problems/needs by providing testing and consulting facilities.

17.2 Program Educational Objectives

i) To provide students with a strong foundation in mathematical, scientific, and engineering fundamentals to formulate, solve, and analyze real-world problems associated with Electronics & Telecommunication Engineering field. To prepare students with solid engineering background for designing and implementing systems.

ii) To deliver students with adequate knowledge and skills for a successful professional career, to adapt of rapid evolving and innovating technological changes in Electronics & Telecommunication Engineering domain, and to promote awareness of lifelong learning.

iii) To develop ethical attitude, effective communication and leadership dexterity, team building skill, and enhanced managerial and entrepreneurial capability for solving engineering problems in context of global and social issues.

iv) To prepare students to strengthen their knowledge and skills through self-learning abilities throughout their professional career as well as to pursue higher education.

v) To introduce students about new technologies and innovations in electronics & Telecommunication engineering field and to motivate them to accomplish professional competence through lifelong learning process including advanced academic degrees, and professional activities.

vi) To develop skills and interest for competitive research by stating real-life problems, designing systems, mathematical modeling, implementing algorithms, optimizing solutions, analyzing results, and writing international standard technical papers.
17.3 Program Outcomes

Electronics & Telecommunication Engineering Graduates will have:

i) An ability to understand the fundamentals in electronics & Telecommunication engineering and to identify, formulate, and solve complex problems using mathematical principles and engineering sciences.

ii) A skill to solve complex field related problems, using advanced hardware and software tools, and analytical skills to acquire cost effective and appropriate solutions.

iii) A sufficient knowledge in mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

iv) An ability to identify and formulate research topic through comprehensive literature review, and conduct research using knowledge in mathematics, natural sciences, and engineering sciences.

v) A capability to design a system, component, or process and to conduct experiments, as well as to analyze and interpret data for meeting desired needs within some constraints of economic, environmental, social, political, ethical, safety and health, and sustainability.

vi) An aptitude to create, select, and utilize suitable techniques, resources, modern advanced engineering, ICT tools to complex engineering activities with an understanding of the limitation.

17.4 The Mission of ETE Department (Proposed)

To be one of the full- fledged departments to produce the global leaders in the field of Electronics & Telecommunication Engineering by imparting quality education, developing highly skilled man power resources, building the culture of research and development to cater the needs of the public, and staying in tune with technological challenges.

17.5 The Vision of ETE Department (Proposed)

i) To achieve academic excellence through creation of innovative and globally acceptable professionals in the field of Electronics & Telecommunication Engineering.

ii) To promote research culture by infusing scientific temper in the students and guiding them towards research and development activities.

iii) To empower enthusiastic engineers with the state-of-art technology to meet the growing challenges of the industry.

iv) To equip the students with solid foundations to enable them for continuing education through interaction with outside world regarding contemporary issues, technological trends and entrepreneurship.

v) To offer well-balanced curriculum to acquire professional competencies in diverse and competitive career paths.
To provide ethical and value based education by promoting activities addressing the societal needs.

To build the skill sets, attitude and core competence of students and faculty by providing them with the opportunity to organize various technical events which will bring out their inherent talents.

17.6 Present Faculty Members

1. **Dr. Md. Kamal Hossain**  
   Assistant Professor  
   B.Sc. Engg. in ECE (KUET),  
   Ph.D. (Australia)  
   **Field of Specialization:** Biomedical engineering, brain stimulation, miniaturized antenna design, biocompatibility analysis.

2. **Dr. Mst. Fateha Samad**  
   Assistant Professor  
   B.Sc. Engg. in ECE (KUET),  
   Ph.D. (Australia)  
   **Field of Specialization:** Micro-nano fabrication, digital microfluidic, drug delivery device (DDD), Plasma system engineering.

3. **Md. Munjure Mowla**  
   Assistant Professor  
   B.Sc. Engg. in ECE (KUET),  
   M.Sc. Engg. in EEE (RUET),  
   **Field of Interest:** Next Generation Wireless Communication (5G), Green Communication, Software defined radio, Millimeter wave communication.

4. **Md. Rabiul Hasan**  
   Assistant Professor  
   B.Sc. Engg. in ETE (RUET),  
   M.Sc. Engg. in EEE (RUET)  
   **Field of Interest:** Surface Plasmon Resonance Biosensor, Terahertz Guidance.

5. **Jannatul Robaiat Mou**  
   Assistant Professor  
   B.Sc. Engg. in ETE (RUET),  
   M.Sc. Engg. in EEE (KUET)-pursuing  
   **Field of Interest:** Gassensor, Biomedical Imaging.

6. **Sham Datto**  
   Assistant Professor  
   B.Sc. Engg. in EEE (RUET),  
   M.Sc. Engg. in EEE (RUET)-pursuing  
   **Field of Interest:** Antenna and Wave Propagation.
7. Tamanna Rahman Jyoti  
Lecturer  
B.Sc. Engg. in ETE (RUET)  
Field of Interest: Wireless Communication

8. Md. Aslam Mollah  
Lecturer  
B.Sc. Engg. in ETE (RUET),  
M.Sc. Engg. in EEE (RUET)- pursuing  
Field of Interest: Fiber Optics Communication

Lecturer  
B.Sc. Engg. in ETE (RUET)  
Field of Interest: Data and Wireless Communication

10. A. S. M. Badrudduza  
Lecturer  
B.Sc. Engg. in EEE (RUET),  
M.Sc Engg. in EEE (RUET)-pursuing  
Field of Interest: Wireless Communication

17.7 Faculty Members on Leave

1. Tushar Kanti Roy  
Assistant Professor  
Field of Interest: Control System.

2. Abdullah Al Suman  
Assistant Professor  
3. Shah Ariful Hoque Chowdhury  
   Assistant Professor  
   **Field of Interest:** Under Water Communication, Digital Image Processing.

Teachers from the Electrical & Electronic Engineering, Computer Science & Engineering, Mathematics, Humanities, Physics, and Mechanical Engineering departments of this university are actively teaching in different classes.
Chapter 2
ACADEMIC ORDINANCE FOR THE UNDERGRADUATE STUDIES

1 Definitions

1.1 ‘University’ means the Rajshahi University of Engineering & Technology abbreviated as RUET.
1.2 ‘Syndicate’ means Syndicate of RUET.
1.3 ‘Academic Council’ means the Academic Council of the University.
1.4 ‘Deans Committee’ means the Executive Committee of concerned Faculty of the University.
1.5 ‘Academic Committee’ means the Academic Committee for Undergraduate Studies of Department of the University.
1.6 ‘Vice-Chancellor’ means the Vice-Chancellor of the University.
1.7 ‘Dean’ means the Dean of a Faculty of the University.
1.8 ‘Head of the Department’ means the Head of a Department of the University.
1.9 ‘Central Equivalence Committee’ means the Central Equivalence Committee of the University.
1.10 ‘Degree’ means the degree of Bachelor of Science in Engineering or Bachelor of Urban & Regional Planning or Bachelor of Architecture offered by the University.
1.11 ‘Course System’ means pass or fail on course basis.
1.12 ‘Backlog Courses’ means the failed courses after appearing at odd/even semester(s) examination.
1.13 ‘Short Semester’ means a semester for conducting examination of Backlog course(s) at the end of 4th year Backlog examination result.

2. Faculties:

The University has four Faculties:

1) Faculty of Civil Engineering (CE)
2) Faculty of Electrical & Computer Engineering (ECE)
3) Faculty of Mechanical Engineering (ME)
4) Faculty of Applied Science & Engineering (ASE)

2.1 Degree Awarding Departments:
The University has the following Degree Awarding Departments under four Faculties:

i) Department of Civil Engineering (CE)
ii) Department of Electrical & Electronic Engineering (EEE)
iii) Department of Mechanical Engineering (ME)
iv) Department of Computer Science & Engineering (CSE)
v) Department of Electronics & Telecommunication Engineering (ETE)
vi) Department of Industrial & Production Engineering (IPE)  
vi) Department of Glass & Ceramic Engineering (GCE)  
viii) Department of Urban & Regional Planning (URP)  
ix) Department of Mechatronics Engineering (MTE)  
x) Department of Architecture (ARCH)  
xi) Department of Electrical & Computer Engineering (ECE)  
xii) Department of Chemical & Food Process Engineering (CFPE)  
xiii) Department of Building Engineering & Construction Management (BECM)  
xiv) Department of Material Science & Engineering (MSE)  
xv) 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 Civil Engineering (CE)  
ii) Department of Electrical & Electronic Engineering (EEE)  
iii) Department of Mechanical Engineering (ME)  
iv) Department of Computer Science & Engineering (CSE)  
v) Department of Electronics & Telecommunication Engineering (ETE)  
vi) Department of Industrial and Production Engineering (IPE)  
vii) Department of Glass & Ceramic Engineering (GCE)  
viii) Department of Urban & Regional Planning (URP)  
ix) Department of Mechatronics Engineering (MTE)  
xi) Department of Architecture (ARCH)  
xii) Department of Electrical and Computer Engineering (ECE)  
xiii) Department of Chemical & Food Process Engineering (CFPE)  
xiv) Department of Building Engineering & Construction Management (BECM)  
xv) Department of Material Science and Engineering (MSE)  
xvi) Department of Mathematics  
xvii) Department of Physics  
xviii) Department of Chemistry  
xviii) Department of Humanities  
xx) Any other Department to be instituted by the Syndicate on the recommendation of the Academic Council.

3. Degrees Offered:

i) The University offers courses leading to the award of the following degrees:  
ii) Bachelor of Science in Civil Engineering abbreviated as B.Sc. Eng. (CE)  
iii) Bachelor of Science in Computer Science & Engineering abbreviated as B.Sc. Eng. (CSE).  
iv) Bachelor of Science in Electrical & Electronic Engineering abbreviated as B.Sc. Eng. (EEE).
v) Bachelor of Science in Mechanical Engineering abbreviated as B.Sc. Eng. (ME).
vi) Bachelor of Science in Industrial and Production Engineering abbreviated as B.Sc. Eng. (IPE)
vii) Bachelor of Science in Mechatronics Engineering abbreviated as B.Sc. Eng. (MTE)
viii) Bachelor of Science in Electronics & Telecommunication Engineering abbreviated as B.Sc. Eng. (ETE)
ix) Bachelor of Science in Glass and Ceramic Engineering abbreviated as B.Sc. Eng. (GCE)

x) Bachelor of Architecture abbreviated as B. Arch. (Arch.)

xi) Bachelor of Urban and Regional Planning abbreviated as BURP. (URP)
xii) Bachelor of Science in Electrical & Computer Engineering abbreviated as B.Sc. Eng. (ECE)
xiii) Bachelor of Science in Chemical & Food Process Engineering abbreviated as B.Sc. Eng. (CFE)
xiv) Bachelor of Science in Building Engineering & Construction Management abbreviated as B.Sc. Eng. (BECM)
xv) Bachelor of Science in Material Science & Engineering abbreviated as B.Sc. Eng. (MSE)
xvi) 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, Equivalence and Admission Transfer:

4.1 The four academic years of study for the Bachelor degree have been designated as 1st year class, 2nd year class, 3rd year class and 4th year class in succeeding higher levels of study. For Architecture, five years of study for the Bachelor degree have been designated as 1st year class, 2nd year class, 3rd year class, 4th year class and 5th year class in succeeding higher levels of study. Students shall be admitted into the 1st year class.

4.2 The Academic Council will form an Admission Committee in each academic session for admission into 1st year Bachelor Degree class.

4.3 A candidate for admission into the 1st year class must have passed the H.S.C Examination from a Secondary and Higher Secondary Education Board in Bangladesh (after 12 years of schooling) with Physics, Chemistry, Mathematics and English as his/her subjects of Examination in Higher Secondary level or examination recognized as equivalent thereto, and must also fulfill all other requirements as may be prescribed by the Academic Council on the recommendation of the Admission Committee. In case of confusion regarding the equivalence, the case may be referred to Equivalence Committee.
4.4 All candidates for admission into the courses of Bachelor Degree must be the citizens of Bangladesh. Candidates for all seats except the reserved (Tribal) ones, if any, are selected on the basis of merit. However all candidates must pass the required level as set by the admission committee. The Academic Council on the recommendation of the Admission Committee frames the rules for admission into the reserved seats.

4.5 No student ordinarily is admitted in the 1st year class after the corresponding classes start or after the call goes out for admission into the next session, whichever is earlier.

4.6 Admission of a newly admitted student in the 1st year class is canceled if he/she fails to attend any class within the first two consecutive cycles after the start of class without prior permission. The date of commencement of classes for the newly admitted students is announced in advance.

4.7 An Equivalence Committee consisting of at least five members is formed by the Academic Council to consider the equivalence of different public examinations.

4.8 A candidate, seeking admission on transfer from other University, should apply to the Registrar of the University if there is any exchange program with that 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.

4.9 There is no transfer in the 1st year class. In special cases, students may be admitted into a higher class under clause 4.8.

4.10 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 is:

i) Number of theoretical courses and examination papers shall be five in each semester.

ii) Continuous evaluation of student’s performance.

iii) 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.

iv) Promotion of teacher-student contact.

6. **Academic Calendar:**

6.1 The academic year is ordinarily divided into two semesters each having duration of ordinarily not less than 13 cycles.
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 may be prepared according to the following guidelines:

<table>
<thead>
<tr>
<th>Odd Semester</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classes</td>
<td>13 cycles</td>
</tr>
<tr>
<td>Mid-semester recess</td>
<td>1 week</td>
</tr>
<tr>
<td>Recess before examination and Semester Final Examination</td>
<td>29 days</td>
</tr>
<tr>
<td>Inter Semester Recess</td>
<td>1 week</td>
</tr>
</tbody>
</table>

**Even Semester**

| Classes        | 13 cycles |
| Mid-semester recess | 1 week |
| Recess before examination and Semester Final Examination | 29 days |
| Inter-Year Recess, Result publication and Preparation for next semester | 3 weeks |
| Backlog Examination and Result publication | 2 weeks |
| Vacation and others | Rest |

**Total**

| Total         | 52 weeks |

**Short Semester**

| Classes and Examinations | 10 weeks |

7. **Duration of Course and Course Structure**

7.1 Bachelor Degree courses (except Architecture) extend over a period of four academic years (8 semester), each of a normal duration of one calendar year, which is divided as necessary for the purpose of academic program and conduct of examinations. For Bachelor degree of Architecture the period will be five academic years (10 Semester).

7.2 The curricula of the Bachelor degree in the different department is as proposed by the Academic and Dean’s Committee and approved by the syndicate on the recommendation of the Academic Council.

7.3 The Academic Committee reviews the curricula as required and put forward suggestions to the academic Council through Dean’s Committee.

7.4 Teaching for the courses is reckoned in credits and the credits allotted to various course are determined by the Academic Committee with the following guidelines:
<table>
<thead>
<tr>
<th>Nature of Course</th>
<th>Contact hour</th>
<th>No. of Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Theory</td>
<td>1 hour/week</td>
<td>1.00</td>
</tr>
<tr>
<td>ii) Tutorial</td>
<td>1 hour/week</td>
<td>1.00</td>
</tr>
<tr>
<td>iii) Independent</td>
<td>3/2 hours/week</td>
<td>0.75</td>
</tr>
<tr>
<td>sessional/design</td>
<td>2 hours/week</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3 hours/week and similar</td>
<td>1.50</td>
</tr>
<tr>
<td>iv) Project &amp; Thesis</td>
<td>3 hours/week and similar</td>
<td>1.50</td>
</tr>
<tr>
<td>v) Field work</td>
<td>2-4 weeks of field work</td>
<td>1.00</td>
</tr>
</tbody>
</table>

7.5 The total number of credits that a student has to complete successfully for the award of Bachelor Degree is minimum 160 except for Bachelor in Architecture. The maximum period of candidature is seven years, i.e. 3 years (6 semesters) more than the normal time required to complete the courses. For Architecture the minimum credit will be 200.

7.6 The total number of credit per week in a semester shall be as approved curricula.

7.7 The total contact hours for students including lecture, tutorial and sessional is around 25 (35 for Architecture) periods per week, each periods being of minimum 50 minutes duration.

7.8 In each degree-awarding department, one of the senior teachers nominated by the Head of the department act as Course Coordinator who act as member Secretary to the academic Committee.

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

7.10 Credits in any theory subject do not exceed 4.0 and that in sessional subject do not exceed 3.0. For Architecture credits in sessional subject do not exceed 12.0.

8. Course Designation and Numbering System

Details of each course designation and number system are provided as Annexure A.

9. Types 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 from the nucleus from the respective Bachelor’s degree program. A student has to complete all the designated core courses for this 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 two regular semesters (if possible).
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) **Departmental Monitoring Committee:** Each department constitutes a Departmental Monitoring Committee which two teachers of the Department as the members nominated by the Academic Committee 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

10.2) **Student Adviser:** One adviser is appointed for a batch of student (around 30) by the Department Monitoring Committee of the concerned Department(s) who advises each student on the courses to be taken by a student. Adviser discusses with the student on his academic program and then decides the nature of courses for which he can register. However, it is the student’s responsibility to keep contact with his adviser who reviews and eventually approves the student’s specific plan of study and checks on subsequent progress. The advisor generally be of the rank of an Assistant professor or above from the concerned Department(s). However, in case of shortage of teachers, Lecturers may also act as adviser.

For a student of second and subsequent semesters, the nature of courses for which he can register is decided on the basis of his academic performance during the previous semester(s). The adviser advises the students to register the courses during the next semester within the framework of the guidelines in respect of minimum/maximum credit hours limit.

11. **Registration Requirements:**

Any student who wants to study a course is required to register formally. Being admitted to the University, each student is assigned to a student adviser. The student can register for courses he/she intends to take during a given semester only on the basis of the advice and consent of his/her adviser.

11.1) **Registration Procedure:** Students must register for each class in which they will participate. Each student will fill up his/her Course Registration Form in consultation with and under the guidance of his/her adviser. The original copy of the Course Registration Form(s) will be submitted to the Registrar’s Office, and then the requisite number of copies will be distributed to the adviser and Head. The date, time and venue for registration will be announced in advance by the Department’s Office. It is absolutely necessary that all students present themselves for registration at the specified time.
11.2) **Limits on the Credit Hours to be taken:** A student must be enrolled for the requisite number of credits as mentioned in article 7.6. A student must enroll for the prescribed sessional courses in the respective semester within the allowed credit limits.

11.3) **Pre-condition for Registration:** A student will be allowed to register in those courses subject to the 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 to register for a course which builds on the pre-requisite course provided his 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 second week on payment of a late registration fee. Students having outstanding 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 available 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) **Registration Deadline:** Student must register for the courses to be taken within 1 (One) cycle from the commencement of each semester and no late registration will be accepted after 2(Two) cycles of classes. 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 extraordinary 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.

11.5) **Penalty for Late Registration:** Students who fail to register during the designated dates for registration are charged a late registration fee Tk 500/= per cycle. This extra fee will not be waived whatever be the reason for late registration.

11.6) **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 department. Each Department will decide for total withdrawal from the semester before the start of the semester final examination. 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 from any authorized Medical Officer. The Academic Council will take the final decision about such applications. However he/she will not be permitted to the next year class unless he/she complete the required credit for that year.
12. Striking off the Names and Readmission:

12.1) The names 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/nominated authority 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. For Architecture maximum allowed time is 8 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 re-admission 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 re-admission. The Head of the Department shall forward the application to the Registrar 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 Registrar. All readmission should preferably be completed before the session starts. The percentage of attendance of the re-admitted students shall be counted from the date of recommendation of the concerned Head of the department.

12.3) No student who 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 the 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 is 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 and, in this case, 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.

12.8) After Short semester any student fails to complete his/her required courses will take readmission in the final year.

13. Grading System

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

<table>
<thead>
<tr>
<th>Numerical grade</th>
<th>Letter grade</th>
<th>Grade point</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% or above</td>
<td>A+ (A Plus)</td>
<td>4.00</td>
</tr>
<tr>
<td>75% to less than 80%</td>
<td>A (A Regular)</td>
<td>3.75</td>
</tr>
<tr>
<td>70% to less than 75%</td>
<td>A- (A Minus)</td>
<td>3.50</td>
</tr>
<tr>
<td>65% to less than 70%</td>
<td>B+ (B Plus)</td>
<td>3.25</td>
</tr>
<tr>
<td>60% to less than 65%</td>
<td>B (B Regular)</td>
<td>3.00</td>
</tr>
<tr>
<td>55% to less than 60%</td>
<td>B- (B Minus)</td>
<td>2.75</td>
</tr>
<tr>
<td>50% to less than 55%</td>
<td>C+ (C Plus)</td>
<td>2.50</td>
</tr>
<tr>
<td>45% to less than 50%</td>
<td>C (C Regular)</td>
<td>2.25</td>
</tr>
<tr>
<td>40% to less than 45%</td>
<td>D</td>
<td>2.00</td>
</tr>
<tr>
<td>Less than 40%</td>
<td>F</td>
<td>0.00</td>
</tr>
<tr>
<td>Incomplete</td>
<td>I</td>
<td>-</td>
</tr>
</tbody>
</table>

A grade ‘I’ 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 of the grade points obtained in all the courses passed/completed by a student in a semester. ‘F’ grades do not count for GPA calculation. GPA of a semester will be calculated as follows:

\[
GPA = \frac{\sum_{i=1}^{n} CG_i}{\sum_{i=1}^{n} C_i}
\]
where, \( n \) is the total number of courses passed by the student, \( C_i \) is the number of credits allotted to a particular course \( i \) and \( G_i \) 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 (\( \sum C_i G_i \)) accumulated up to the date by the total credit hours (\( \sum C_i \)). Both GPA and CGPA are rounded off to the second place of decimal for reporting.

### 14 Distribution of Marks:

#### 14.1 The distribution of marks for a given course is as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Class participation and attendance</th>
<th>Class tests</th>
<th>Semester Final Examination (3 hours duration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Theory courses</td>
<td>08</td>
<td>20</td>
<td>72</td>
</tr>
<tr>
<td>ii) Independent sessional/design/field work courses:</td>
<td>08</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>iii) Project and thesis (Architecture):</td>
<td>10</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>iv) Project and thesis (Other departments):</td>
<td>30</td>
<td>50</td>
<td>20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% and above</td>
<td>8</td>
</tr>
<tr>
<td>85% to less than 90%</td>
<td>7</td>
</tr>
<tr>
<td>80% to less than 85%</td>
<td>6</td>
</tr>
<tr>
<td>70% to less than 80%</td>
<td>5</td>
</tr>
<tr>
<td>60% to less than 70%</td>
<td>4</td>
</tr>
<tr>
<td>Less than 60%</td>
<td>0</td>
</tr>
</tbody>
</table>

14.3 The students will not be allowed to sit in the semester final examination for failing to attend at least 50% in the classes. The students whose percentage of attendance will fall short of 75% in any of the theory, 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.

### Class tests:

i) 3 best out of 4 class tests may be taken for awarding grade.

ii) Duration of class tests normally should be what were taught in 2 to 3 previous cycles or most recent classes.

iii) The dates for the class test shall be fixed by the Head or Course Coordinator and dates shall be announced accordingly.

iv) All class tests 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.

### Earned Credits:

The courses in which a student has obtained ‘D’ or a higher Grade will be counted as credits earned by him/her. Any course in which a student has obtained ‘F’ grade will not be counted towards his/her earned credits.

A student, who obtains a ‘F’ grade in any Core Course in any semester, he/she will have to repeat the course. If a student obtains a ‘F’ in an Optional Course, he/she may choose to repeat the course or take a substitute course if available.

‘F’ grades will be considered as backlog courses. ‘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:

i) The minimum CGPA requirement for obtaining a B.Sc. Engineering/ Bachelor 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.

ii) Student will be considered to be making normal progress toward a degree if their CGPA for all courses attended is 2.20 or more.

iii) Students will be allowed to sit in Backlog examination for maximum 3 courses in an academic year.

iv) Students must complete minimum 33 credits (Odd, Even semesters and Backlog examination) in each academic year to be promoted to the next academic year.

18. Honors, VC’s List and University gold medal:

18.1 Honors: Candidates for Bachelor’s degree will be awarded the degree with honors if their CGPA is 3.75 or above and will be called as First Class with Honors.

18.2 Class: Candidates having CGPA 3.00 or above and less than 3.75 will be called as First Class and Candidates having CGPA 2.20 or above and less than 3.00 will be called as Second Class.

18.3 VC’s List: 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 VC’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 VC’s List in that year.

18.4 University Gold Medal: 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 University 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 RUET, regular students are classified according to the number of credit hours earned towards a degree. The following classification applies to the students
A student must earn minimum 333 credits in each academic year to admit into the next year class.

20. **Registration for the Second & Subsequent Semester:**
A student is normally required to register courses according to the approved curricula in each semester. After odd semester final examination Students will normally register courses in even semester.

21. **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. Adviser will keep special contact for all such students whose
i) Cumulative grade point average (CGPA) are less than 2.20 at the end of a semester.
ii) Failing to complete 33 credits in an academic year.

22. **Backlog Examination:**
i) There will be Backlog Examination after the publication of result of Even semester examination.
ii) ‘F’ grade(s) obtained after semester examination will be considered as backlog course(s).
iii) Students are allowed to sit for maximum 3 backlog courses in odd and/or even semester(s).
iv) Class test marks of Backlog courses in odd/even semester(s) will be counted for Backlog examination.
v) Maximum B (B regular) grade will be counted in Backlog examination.

**Backlog Courses:** The course(s) which a student registered in a Semester but after Semester examination he/she obtained ‘F’ grade in that course(s).

23. **Short Semester Examination:**
The Short Semester Examination on only backlog courses may be conducted for the students who have participated in their 4(four)/5(Five) year degree course (up to 4th year even semester) and have a shortage of maximum 5 (Five) incomplete courses including sessional, Project and thesis to obtained Bachelor
degree. The short semester examination will be arranged in a convenient time by the Head of the Department within 10 weeks of the publication of results of the final year backlog examination. The evaluation system will be similar as regular semester. The students willing to appear at the short semester examination have to apply to the Head of the Department and with his permission must register within 7(seven) working days of publication of final year Backlog examination results. A student who has failed in the short semester examination will be registering the course(s) in the regular semester. Student will be allowed to register for short semester only one time in his academic life. Maximum grade is B+ (B plus).

24. **Minimum Earned Credit and GPA Requirements for Obtaining Degree:**

   Minimum credit requirements for the award of Bachelor Degree will be recommended by the respective Academic Committee to the Academic Council. The minimum CGPA requirements for obtaining a Bachelor Degree are 2.20.

25. **Time Limits for Completion of Bachelor’s Degree:**

   A student must complete his/her studies within a maximum period of seven years for 4 year bachelor degree and eight years for 5 year bachelor degree.

26. **Industrial/Professional Training Requirements:**

   A student must complete his/her studies within a maximum period of seven years for 4 year bachelor degree and eight years for 5 year bachelor degree.

27. **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 Registrar/VC through his/her Adviser for graduation. Provisional degree will be awarded on completion of Credit and GPA requirements. Such provisional degrees will be confirmed by the academic council.

28. **Inclusion of repeaters from the present system to the new course system:**

   Repeater students will be included in the course system of curricula as and when such situation will arise. Equivalence of Courses and Grades (if required) will be done by Academic Council with recommendation by the respective Academic Committee.

29. **Absence during Semester:**

   A student should not be absent from 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 and that course will not be counted as backlog course.

   A student who has been absent for short periods, up to a maximum of three weeks due to illness, should approach the course teacher(s) or the course coordinator(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 student has valid reason for his/her absence from the University.

**Effectiveness:** This ordinance and Instruction and procedure will be effective for student entry session 2013-2014 and so on. In case of any discrepancy Academic council will take necessary actions.
### Distribution of Undergraduate Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
<th>Credit in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core course</td>
<td>99.25</td>
<td>61.93%</td>
</tr>
<tr>
<td>Related course</td>
<td>39.75</td>
<td>24.77%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>12.00</td>
<td>7.48%</td>
</tr>
<tr>
<td>Humanities</td>
<td>5.75</td>
<td>3.58%</td>
</tr>
<tr>
<td>Physics</td>
<td>3.75</td>
<td>2.34%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>160.50</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### Summary of Undergraduate Course Plan

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Year/Semester</th>
<th>No of Course</th>
<th>Credits</th>
<th>No of Course</th>
<th>Credits</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1(^{st})/Odd</td>
<td>5</td>
<td>14</td>
<td>5</td>
<td>5.25</td>
<td>19.25</td>
</tr>
<tr>
<td>2.</td>
<td>1(^{st})/Even</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>5.25</td>
<td>20.25</td>
</tr>
<tr>
<td>3.</td>
<td>2(^{nd})/Odd</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>5.25</td>
<td>20.25</td>
</tr>
<tr>
<td>4.</td>
<td>2(^{nd})/Even</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>4.50</td>
<td>19.50</td>
</tr>
<tr>
<td>5.</td>
<td>3(^{rd})/Odd</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>4.50</td>
<td>19.50</td>
</tr>
<tr>
<td>6.</td>
<td>3(^{rd})/Even</td>
<td>5</td>
<td>15</td>
<td>5</td>
<td>6.00</td>
<td>21.00</td>
</tr>
<tr>
<td>7.</td>
<td>4(^{th})/Odd</td>
<td>5</td>
<td>15</td>
<td>6</td>
<td>5.25</td>
<td>20.25</td>
</tr>
<tr>
<td>8.</td>
<td>4(^{th})/Even</td>
<td>5</td>
<td>15</td>
<td>5</td>
<td>5.50</td>
<td>20.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>40</strong></td>
<td><strong>119</strong></td>
<td><strong>37</strong></td>
<td><strong>41.50</strong></td>
<td><strong>160.50</strong></td>
</tr>
</tbody>
</table>
Courses offered to the undergraduate students of Electronics & Telecommunication Engineering Department:

**1ST YEAR ODD SEMESTER**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No</th>
<th>Course Title</th>
<th>Theory</th>
<th>Sessional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact Hours/Week</td>
<td>Credits</td>
<td>Contact Hours/Week</td>
</tr>
<tr>
<td>1</td>
<td>ETE 1114</td>
<td>Engineering Graphics and Design</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>2</td>
<td>EEE 1153</td>
<td>Electrical Circuit Theory</td>
<td>3.00</td>
<td></td>
<td>3.00</td>
</tr>
<tr>
<td>3</td>
<td>EEE 1154</td>
<td>Sessional Based on EEE 1153</td>
<td>1.50</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>4</td>
<td>CSE 1153</td>
<td>Computer Fundamentals and Programming</td>
<td>3.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CSE 1154</td>
<td>Sessional Based on CSE 1153</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>6</td>
<td>Phy 1115</td>
<td>Physics</td>
<td>3.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Phy 1116</td>
<td>Sessional Based on Phy 1115</td>
<td>1.50</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>8</td>
<td>Math 1115</td>
<td>Calculus and Differential Equations</td>
<td>3.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Hum 1115</td>
<td>Technical English Communication &amp; Report Writing</td>
<td>2.00</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Hum 1116</td>
<td>English Language Lab</td>
<td></td>
<td></td>
<td>1.50</td>
</tr>
</tbody>
</table>

Total => 14.00 14.00 10.50 5.25 19.25

No. of Theory Courses : 5
Total Contact Hours/Week : 24.50
No. of Lab/Sessional Courses : 5
Total Credits : 19.25

**1ST YEAR EVEN SEMESTER**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No</th>
<th>Course Title</th>
<th>Theory</th>
<th>Sessional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact Hours/Week</td>
<td>Credits</td>
<td>Contact Hours/Week</td>
</tr>
<tr>
<td>1</td>
<td>ETE 1211</td>
<td>Introduction to Solid State Devices</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>2</td>
<td>ETE 1212</td>
<td>Sessional Based on ETE 1211</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>3</td>
<td>ETE 1213</td>
<td>Digital Electronics</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>4</td>
<td>ETE 1214</td>
<td>Sessional Based on ETE 1213</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>5</td>
<td>EEE 1253</td>
<td>Network Analysis &amp; Synthesis</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>6</td>
<td>EEE 1254</td>
<td>Sessional based on EEE 1253</td>
<td>1.50</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>7</td>
<td>EEE 1255</td>
<td>Energy Conversion</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>8</td>
<td>EEE 1256</td>
<td>Sessional Based on EEE 1255</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>9</td>
<td>Math 1215</td>
<td>Linear Algebra &amp; Three Dimensional Geometry</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Total => 15.00 15.00 10.50 5.25 20.25

No. of Theory Courses : 5
Total Contact Hours/Week : 25.50
No. of Lab/Sessional Courses : 4
Total Credits : 20.25

28
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No. of Lab/Sessional Courses: 4  
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No. of Lab/ Sessional Courses : 4  
Total Credits : 19.50

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No. of Lab/ Sessional Courses : 5  
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No. of Lab/Sessional Courses: 5  
Total Credits: 20.50
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No. of Theory Courses : 5
Total Contact Hours/Week : 24.50

No. of Lab/Sessional Courses : 5
Total Credits : 19.25

**ETE 1114: Engineering Graphics and Design**

1.50 Credit
Introduction to computer-aided graphics, Drawing equipment and the use of instruments, Basic drafting techniques and standards, Sectional and isometric views of solid geometric figures, Plane elevation and section of multistoried building, Building services drawing, Detailed drawing of lattice towers using CAD, Sketch of machine and engine components using freehand and CAD.

**EEE 1153: Electrical Circuit Theory**

3.00 Credit

Network Theorems and their Applications (AC and DC): Thevenin’s theorem, Norton’s theorem, Superposition theorem and Maximum power transfer theorem, Reciprocity theorem, and Substitution theorem.

Single phase A.C Circuits: ‘j’ operator and phasor diagram, Peak, Average and Effective values, Form factor and Peak factor, Analysis of RL, RC, RLC series and parallel circuits.

Three Phase A.C. Circuits: Star and Delta connections, Phase sequence and balanced load, Relation between voltages, Currents of line and phase values in
star and delta connection, Measurement of three phase power using two wattmeter method, Effect of unbalanced loads in Star and Delta systems.

**Resonant Circuits:** Series and Parallel resonance circuits, Q factor, Half power frequencies, Resonance frequency and Bandwidth.

**Magnetic Circuits:** Flux, Fields, Permeability, Reluctance, Laws of Magnetism, Magnetic field, Magnetic flux density, Magnetic field strength, Permeability, Series-parallel magnetic circuit, Kirchhoff’s law for magnetic circuit.

**EEE 1154: Sessional Based on EEE 1153**
Laboratory based on Electrical Circuit Theory (EEE 1153)

**CSE 1153: Computer Fundamentals and Programming**

**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 and 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 1154: Sessional Based on CSE 1153**
Laboratory based on Computer Fundamentals and Programming (CSE 1253)

**Phy 1115: Physics**

**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.

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.


Phy 1116: Sessional Based on Phy 1115 0.75 Credit

Laboratory based on Physics (Phy 1115)

Math 1115: Calculus and Differential Equations 3.00 Credit

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.

Differential equations: Introduction and formation of differential equations, Solution of first and higher order ordinary differential equations by various methods, 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.
Hum 1115: Technical English Communication & Report Writing 02 Credit

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.

Hum 1116: English Language Lab 0.75 Credit

**Developing Reading Skill:** Strategies of reading skimming, Scanning, Predicting, Inferencing, Practicing comprehension from literary and non-literary texts.

**Developing Writing Skill:** Sentence variety, Generating sentences, Clarity and correctness of sentences, Linking sentences for paragraphs, Writing paragraphs, Essays, Reports formal and informal letters.

**Developing Listening Skill:** Listening to recorded texts and class lectures and learning to take notes.

**Developing Speaking Skill:** Oral skills including communicative expressions for personal identification, Life at home, Giving advice and opinion, Instruction and directions, Requests, Complains apologies, Describing people and places, Narrating events.

### First Year Even Semester

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No. of Theory Courses : 5

Total Contact Hours/Week : 25.50

No. of Lab/ Sessional Courses : 4

Total Credits : 20.25
ETE 1211: Introduction to Solid State Devices  
3.00 Credit

**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 1212: Sessional Based on ETE 1211  
1.50 Credit

Laboratory Based on Introduction to Solid State Devices (ETE 1211)

ETE 1213: Digital Electronics  
3.00 Credit

**Introduction:** Number systems, Boolean algebra and reduction techniques, logic gates.

**Combinational logic circuit:** Multiplexers, decoders, encoders, code converters.

**Sequential logic circuit:** Counters, Registers and buses, Flip-flops.

**Semiconductor memories:** RAM & ROM Architecture, PROM, EPROM, EEPROM etc.

**Converters:** Digital to Analog (D/A), Analog to Digital (A/D) Converters and their applications.

ETE 1214: Sessional Based on ETE 1213  
1.50 Credit

Laboratory Based on Digital Electronics (ETE 1213)

EEE 1253: Network Analysis & Synthesis  
3.00 Credit

**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.

**EEE 1254: Sessional Based on EEE 1253**

Circuit simulation of dependent and independent sources connecting with passive devices using Pspice.

**EEE 1255: Energy Conversion**


**DC Machines:** Construction, Classification, Elementary concept of armature reaction and commutation, DC Generators: Principle of operation, Emf equation, DC Motors: Principle of operation, Back EMF, Torque, Speed and Speed regulation, Losses and efficiency calculation of dc 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 load, Full load and
maximum torque relations, Torque slips characteristics, Introduction to single phase induction motors.

**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.

**EEE 1256: Sessional Based on EEE 1255**

Laboratory based on Energy Conversion (EEE 1255)

**Math 1215: Linear Algebra & Three Dimensional Geometry**

Vector Analysis: Review of vector algebra, 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. Sub-space, Vector space, Inner-product spaces, Linear maps.

Linear Algebra: Definition of matrix, Different types of matrix, Algebra of matrix, Adjoin and inverse of a matrix, Elementary transformations of matrix, Row operations of Matrix; LU Decomposition, Singular value Decomposition, Polar Decomposition etc. Trace of a Matrix, Factorization of Matrices, Diagonalization of Matrices. Matrix polynomials, Calay-Hamilton theory with uses of rank and nullity, Normal and canonical forms, Solution of linear equations, Eigen values and eigenvectors.

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.
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No. of Theory Courses : 5
Total Contact Hours/Week :25.50
No. of Lab/Sessional Courses : 4
Total Credits : 20.25

**ETE 2110: Electronic Circuit Design and Simulation Lab**
1.50 Credit


**Electronics Circuit Simulation:** Circuit simulation using Pspice, Introduction to MATLAB, Analytical result verification using Mathematica, Basics of Origin software.

**ETE 2111: Analog Electronics-I**
3.00 Credit

**Transistors:** Application of BJT and FETs as amplifier and switches, load line analysis, equivalent circuits using transconductance parameter. Low, medium and high frequency operation of BJT and FETs, Ebers-Moll model view.

**Amplifiers:** Design and analysis of single/multistage amplifiers, power amplifiers- class A, class B/push-pull, class AB, class C, and differential amplifiers.

**Operational Amplifiers:** 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 2112: Sessional Based on ETE 2111**
1.50 Credit

Laboratory based on Analog Electronics-I (ETE 2111)
ETE 2113: Signals and Systems 3.00 Credit

Signals and Systems: Continuous and Discrete Time Signals, Signal parameters, Signals and vectors, Orthogonality in signals, Signal comparison, Special signal types and their applications in Network Analysis, Communication and Signal Processing, Continuous and Discrete Time systems, Basic System Properties, Relation between continuous and Discrete time systems.

Linear Time Invariant System: The convolution sum for discrete time systems, Convolution integral for continuous time systems, Properties of linear time invariant systems, Impulse response, Frequency response, Systems described by differential equation, Homogenous and Particular solution and Difference equations.

Fourier Series: Continuous time Fourier series, Gibbs phenomenon, Discrete time Fourier series, Discrete Fourier Transform, Matrix Transform, Sinusoidal steady state response, Representation of periodic signals by harmonic components, Continuous and discrete time filtering.

Fourier Transform: Continuous time Fourier Transform, Discrete time Fourier transform, Energy and power spectral density, Application of Relation of four Fourier series/transforms, Properties of the transform, Convolution and multiplication theorems.


ETE 2114: Sessional Based on ETE 2113 1.50 Credit

Laboratory based on Signal and Systems (ETE 2113)

CSE 2153: Data Structure and Algorithm 3.00 Credit

Introduction: Concepts and examples of elementary data objects, Necessity of structured data, Types of data structures, Ideas on linear and non linear data structures.

Linear Array: Linear array and its representation in memory, Traversing LA, Insertion and deletion in LA, Bubble sort, Linear search and binary search, Multi dimensional array and its representation in memory, Algebra of matrices, Sparse matrices.

Stack: Stack representation and applications, PUSH and POP operation on stack, Polish notation and reverse polish notation, Evaluation of postfix expression, transforming infix expression into postfix expression.
Queue: Representation of queue, Insertion and deletion in Queue, Priority queues, Recursion.

Linked List: Linked List representation in memory, Traversing, Searching, Insertion and deletion in Linked List, Circular List, Header Linked List and Two way Lists.

Complexity: Algorithm and flow chart, Complexity of algorithms, Rate of growth, Big O notation, Complexity of Linear Search, Binary search & Bubble sort algorithm.

Sorting: Insertion sort, Selection sort, Quick sort, Merge sort, Searching & data modification, Hash function, Collision resolution, Chaining.

Tree and Graphs: Tree terminology, Representation of binary tree in memory, Traversing of binary tree, Binary search tree, Insertion & deletion on binary search tree, Insertion & deletion on heap, Heap sort, B trees, General tree, Graphs theory.

CSE 2154: Sessional Based on CSE 2153 0.75 Credit

Laboratory based on Data Structure and Algorithm (CSE 2153)

Proposed Syllabus

Hum 2115: Financial Accounts & Economic Analysis 3.00 Credit


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 2115: Transform Techniques and Partial Differential Equations**  
3.00 Credit

**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.

**Laplace 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.

**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.

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**Second Year Even Semester**

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No. of Theory Courses : 5  
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No. of Lab/ Sessional Courses : 4  
Total Credits : 19.5
ETE 2200: Electronic Project Design and Development 1.50 Credit

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

ETE 2211: Analog Electronics-II 3.00 Credit


ETE 2212: Sessional Based on ETE 2211 0.75 Credit

Laboratory based on Analog Electronics-II (ETE 2211)

ETE 2213: Communication Theory 3.00 Credit

**Basic Model of Communication System**: Model of Analog communication system, Model of digital communication system, Basic principles, Fundamental elements, System limitations, Message source, Bandwidth requirements, Transmission media types and Bandwidth, Transmission types- base-band transmission and carrier transmission,

**Noise**: Source, Characteristics of various types of noise and signal to noise ratio.

**Modulation**: Introduction of modulation, Modulation types, Analog modulation schemes; Amplitude modulation- Introduction, Double side band, Single side band, Vestigial side band and quadrature modulation, 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, Application of Modem, Introduction to Spread Spectrum System, FH-SS and DS-SS System.

**Pulse Modulation**: Pulse Amplitude Modulation (PAM), Bandwidth Requirements and Reconstruction Methods, Pulse Time Modulation, Generation of PTM Signals and Reconstruction Methods. Pulse Code Modulation (PCM), Quantization Noise in PCM, Companding, Differential PCM, Log PCM, Delta Modulation (DM), Adaptive DM.

**Multiplexing and Multiple Access Techniques**: 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, 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 2214: Sessional Based on ETE 2213**
Laboratory based on Communication Theory (ETE 2213) 1.50 Credit

**ETE 2215: EM fields and Waves** 3.00 Credit
**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.


**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.
EEE 2253: Industrial Electronics 3.00 Credit

Introduction: Introduction to power switching devices and their terminal characteristics, Classification of power electronics circuits and their applications, Snubber circuits, Thyristor circuits and its control with commutation techniques.

Single phase and three phase converter: Half wave and full wave rectifiers, Single phase and three-phase controlled and uncontrolled converters and their applications.

AC Controller: Single phase and three phase AC controller and their applications.

DC choppers: Classification, Step up, Step down choppers, DC-DC switch mode converters, Switching mode regulators classification, Buck regulator, Boost regulator, Buck-boost regulator, Cuk regulator, UPS and IPS.

Inverters: Single phase PWM inverters, Introduction to three phase inverters, Voltage controlled inverters, Pulse width modulated inverter, Advanced modulation techniques etc., Inverter applications.

Industrial Drives: Speed control of different types of DC and AC drives using power electronic devices.

Induction Heating: Introduction to induction, Dielectric and Microwave heating.

EEE 2254: Sessional Based on EEE 2253 0.75 Credit
Laboratory based on Industrial Electronics (EEE 2253)

Math 2215: Complex Variable & Statistical Analysis 3.00 Credit

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.
### Third Year Odd Semester

#### 3RD YEAR ODD SEMESTER

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**Total =>**

- No. of Theory Courses : 5
- No. of Lab/Sessional Courses : 4
- Total Contact Hours/Week : 24.00
- Total Credits : 19.50

**ETE 3111: Random Signal Processing**  
3.00 Credit

**Introduction:** Random variables, Probabilities, Distribution and Density functions.

**Discrete Random Variables:** Probability Mass Function (PMF), Conditional PMF, Cumulative Distribution Function (CDF), Expected value, Variance and estimated deviation, Families and functions of discrete random variables.

**Continuous Random Variables:** Probability Density Function (PDF), CDF and Expected values, Gaussian random variables, Delta functions, Families and conditioning of contentious random variables, Moment Generating Functions (MGF).

**Pairs and sums of Random Variables:** Marginal PMF, Joint PMF, Joint PDF, Joint CDF, Functions of two random variables, Expected values, Conditioning by event and by random variable, Independent and Bivariate Gaussian random variables, PDF, MGF and Expected value of the sums of two random variables, Central limit theorem and its application.

**Random vector:** Vector notation, PDF and Expected value of vector, Correlation matrix, Functions of random vectors, Gaussian random vectors.
**Parameter Estimation and Detection:** Sample mean, Spectral estimation, Mean-square error estimation, MAP and ML estimation, Hypothesis testing, Detection and Linear fitting.

**Stochastic Process:** Types, Independent and identically distributed Random sequences, Poisson process, Stationary process, Brownion motion process, Gaussian process, Wide-sense stationary process and their properties, Expected value, Correlation, Cross-correlation and Markov chain.

**ETE 3113: Microwave Engineering** 3.00 Credit

**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 3114: Sessional Based on ETE 3113** 0.75 Credit

Laboratory based on Microwave Engineering (ETE 3113)

**ETE 3115: Numerical Methods in Engineering** 3.00 Credit

**Numbers and Errors:** Significant Figures, Absolute and Relative error, Rounding. Error in Functional evaluation, Propagation of Error in Arithmetic Process.

**Solution of Non-linear Equation:** Picard Iteration, Newton Raphson Method, Convergence.

**Interpolation:** Difference Tables, Newton forward and Backward Interpolation Formulae with Error, Divided Difference and Central Difference Formulae, Lagranges Interpolation formula, Numerical Differentiation, Numerical integration by Trapezoidal rule, Simpson’s rule, Rhomberg Rule with Error, Curve fitting by least Squares, Cubic Spline, Chebyshev Polynomials, Minmax Properties.

**Differential Equations:** Modified Euler Method, Runge – Kutta method, Predictor Corrector method, Linear Algebraic Systems, Direct and Iterative Methods, Matrix Inversion.

**Solution of Partial Differential Equation:** Introduction to Partial Differential Equation, Geometric Interpretation. Definition of Elliptic, Parabolic and Hyperbolic Partial Differential Equation.

ETE 3116: Sessional Based on ETE 3115 1.50 Credit
Laboratory based on Numerical Methods in Engineering

(ETE 3115)

EEE 3153: Control System 3.00 Credit
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.


EEE 3154: Sessional Based on EEE 3153 0.75 Credit
Laboratory based on Control System (EEE 3153)

EEE 3155: Measurement, Instrumentation and Sensors Applications 3.00 Credit
Introduction: Classification of variables and analogies, Generalized approach to a measuring system, Performance characteristics of instruments, Analysis of errors, Units.


Electronic Measuring Instruments: 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, CRO.

Instrumentation: Extension of instrument range. Use of CT and PT and calculation of their burden, instrumentation of substation.

Transducers: Active transducers, Resistive, Inductive, Capacitive types, Electromagnetic, Thermo electric, Photovoltaic and piezoelectric transducers and digital transducers, Measurement of temperature, pressure, displacement, velocity, acceleration. Strain gauge and their applications, Flow transducer, Hall effect
transducer, Humidity transducer, Optical transducer, LVDT, Ultrasonic transducer.

**EEE 3156: Sessional Based on EEE 3155**  
1.50 Credit

Laboratory based on Measurement, Instrumentation and Sensors Applications (EEE 3155)

**Third Year Even Semester**

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No. of Theory Courses : 5  
Total Contact Hours/Week : 27.00  
No. of Lab/ Sessional Courses : 5  
Total Credits : 21.00

**ETE 3200: Project Design Based on Communication Systems**  
1.50 Credit

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

**ETE 3211: Information Theory**  
3.00 Credit

**Introduction:** Introduction to quantitative theory of information, Properties of information, Information Rate and Shannon’s Theory, Transmission of information at the rate above capacity, Probability distributions, Random variables, Probability mass function, Cumulative distribution function, Probability density function, Outage probability applications of information theory for reliable and efficient communication systems.

**Entropy and Mutual Information:** Discrete source and channel, Information content of discrete sources, Convexity and Concavity, Jensen’s inequality, Information inequality, Data processing theorem, Fanos’s inequality, Different types of
convergence, Asymptotic equipartition property (AEP), Entropy, Joint entropy, Conditional entropy, Relative entropy, Chain rule of entropy, Differential entropy, Properties of differential entropy, Maximize the differential entropy, Mutual information, Properties of mutual information, Chain rule for mutual information, Applications of entropy and mutual information for communications systems, Data compression, Kraft inequality.

**Capacity:** Channel capacity, Binary symmetric channel, Binary Erasure channel, Time varying channels, Outage channel capacity, Maximizing capacity, Gaussian channel and parallel Gaussian channel, Waveform channel, Capacity of discrete and continuous noisy channel, Gaussian and Rayleigh channels with feedback, Multiple access channels, Broadcast channels, Wideband channels and Finite Markov channels.

**ETE 3213: Digital Signal Processing** 3.00 Credit

**Introduction:** Digital Signal Processing and its benefits, Key DSP Operations, Real-time signal processing, Applications.

**The z Transform:** Definition, Region of convergence, Inversion, Basic properties, Solution of difference equations, Relation of z transform to discrete time Fourier transform, Stability of discrete time systems.

**Discrete Fourier Transforms:** Periodic and Finite Duration Sequences, Odd and Even Sequences, Properties of DFT, Linear Convolution using DFT, FFT Algorithms (decimation in time and decimation in frequency algorithms).

**IIR Filter Design:** Impulse Invariant and Bilinear Transformation Methods, Spectral Transformation Technique for HP, BP and BS Filter Design, Direct Design of IIR Filters, Finite Word Length Effects.

**Filter Structures:** Direct Form I, Direct Form II, PSOS and CSOS Forms, Lattice Structures.


Wavelet Signal Processing: Wavelet, Continuous and Discrete Wavelet Transform, Fast Wavelet Transform, Orthogonal basis, Wavelet Multi-resolution analysis, Applications of Wavelet, Short time Fourier Transform.

ETE 3214: Sessional Based on ETE 3213 0.75 Credit
Laboratory based on Digital Signal Processing (ETE 3213)

ETE 3215: Digital Communication 3.0 Credit

Digital Modulation: Digital modulation scheme; Amplitude-shift keying- principle, ON-OFF keying, Bandwidth requirements, Detection, Noise performance; Phase-shift keying (PSK)- Principle, bandwidth requirements, Detection, differential PSK, Quadrature PSK, Frequency-shift keying (FSK)- Principle, Continuous and discontinuous phase FSK, Minimum-shift keying, Bandwidth requirements, Detection of FSK, M-array Data Communication Systems, Quadrature Amplitude Modulation (QAM) Systems, QPSK, MSK, GMSK, OFDM, WDM.

Coding: Different Types of Line Codes and Spectra, Eye Pattern, Regenerative Repeater, Source coding theorem, Optimal codes, Prefix codes, Huffman codes, Shannon-Fano-Elia codes, Slepian Wolf code, Channel coding, Channel coding theorem, Strong coding theorem, Block codes, Space-time block code, Convolution codes, Turbo codes, Low density parity check codes, BCH codes, CRC codes, Hadamard Codes, Hamming codes, Raptor codes, Reed-Solomon code, Walsh-Hadamard code, Fountain codes, Alamouti codes, Random coding bound.


Optimum Receiver Design: Detection-Error Probability (BER) for Binary Communications, Optimum Threshold Detection, Matched Filter, Coherent and Non-coherent Detection, Performance in Noisy channel, BER for various modulations and line codes, Optimum Receiver.
ETE 3216: Sessional Based on ETE 3215
Laboratory based on Digital Communication (ETE 3215)

ETE 3217: Antennas and Propagation


ETE 3218: Sessional Based on ETE 3217
Laboratory based on Antenna hardware and dedicated software (ETE3217).

EEE 3253: Microprocessor and Interfacing

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 3254: Sessional Based on EEE 3253**

Laboratory based on Microprocessor and Interfacing (EEE 3253)

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**Fourth Year Odd Semester**

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No. of Theory Courses : 5  
Total Contact Hours/Week : 25.50  
No. of Lab/Sessional Courses : 6  
Total Credits : 20.25

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54
ETE 4100: Project and Thesis 1.50 Credit

A detailed theoretical study of some problems in Electronics and 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 4111: VLSI Design 3.00 Credit

Introduction to Silicon Semiconductor and Ga-As Technology, CMOS processing Technology, Basic Electrical Properties and Design Process of MOS and Bi CMOS Circuits, Inverter Circuits.


Design of Integrated Circuits: Design of RTL, DTL, TTL, ECL and CMOS. CMOS subsystem design; Data path operation, Addition, Multiplication, Counters.

ETE 4112: Sessional Based on ETE 4111 0.75 Credit

Laboratory based on VLSI Design (ETE 4111)

ETE 4113: Data Communication and Computer Networks 3.00 Credit


Data Link Layer Design: Character count, Byte stuffing, Bit stuffing, Error detection: Cyclic redundancy check, Parity bit checking and correction: Hamming
code, Windowing protocols: go back N ARQ, Selective repeat ARQ, Elementary data link protocols, High-level data link control, Point to point protocol, The medium access control sub-layer, Congestion control algorithms, Quality of service.

**Multiple Access:** Random Access; ALOHA, CSMA, CSMA/CD, CSMA/CA, Channelized access, Controlled access, Reservation, Poling, Token passing, Ethernet, wireless LANs and Bluetooth.

**Switching:** Circuit switching, Packet switching, Message switching, Routing algorithms, Virtual circuit and Datagram.

**Network Layer Protocols:** Classification of IPv4 addressing, Subnet Mask, CIDR, Private IP Address, Public IP address, Subnetting, VLSM etc. Address resolution protocol, Internet protocol, Internet control, Message protocol, IPv6, Routing information protocol, Open shortest path first, User datagram protocol, Transmission control protocol.

**Network Security:** Cryptography, Substitution cipher, Transposition cipher, One time pads, Public key cryptography, Encryption and Decryption, Authentication protocol digital signature, Key distribution center, Different symmetric key algorithm, Certificate authority, DNS, Electronic mail, World Wide Web.

**Other:** HTTP and recent advances in internet protocols, Web server performance, Proxy servers, Load balancing in web servers, IP security, Voice over IP.

**ETE 4114: Sessional Based on ETE 4113**
0.75 Credit
Laboratory based on Computer Networks (ETE 4213)

**ETE 4115: Wireless and Mobile Communication**
3.00 Credit

**Introduction:** Wireless systems and standards, Introduction to wireless communication, Advantages and disadvantages of wireless communication, Application of wireless communication, Advantages and disadvantages of mobile communication, Applications of mobile communication, Introduction to radio paging, Modulation techniques for mobile radio.

**The Cellular Concept:** Frequency Reuse, System capacity, Co-channel interference, Adjacent channel interference, Cell splitting, Sectoring and Micro cell zone concept.

**Cellular Radio Systems:** Basic elements of Cellular radio systems/network, GSM transmission process (Segmentation, Speech coding, Channel coding, Interleaving, Burst formatting), Cell selections, Physical and logical channels, Overview of cellular standard systems, Frequency spectrum and Management, Radio planning.
**Mobile Radio Propagation:** Free space Propagation Model, Propagation Mechanisms, Ground Reflection Model, Knife-edge Diffraction Model, Outdoor and Indoor propagation model.

**Fading and Multipath:** Factors influencing fading, Time dispersion parameters, Coherence bandwidth, Doppler spread, Coherence Time, Flat fading, Frequency Selective Fading, Slow fading, Fast fading, Rayleigh Fading Distribution, Ricean fading distribution etc.

**Equalization, Diversity and Channel Coding:** Fundamentals of equalization, Linear equalizers, Nonlinear Equalizers, Decision Feedback Equalizers, Maximum Likelihood Sequence Estimation (MLSE) Equalizers, Diversity Techniques, Space Diversity, Frequency Diversity, Time Diversity, Rake Receiver, Fundamentals of Channel Coding, Block Codes, Reed-Solomon Coding, Convolution Codes.

**Handoff and Dropped Calls:** Initiation of a Handoff, Two Handoff Level Algorithm, Hard Handoff (NCH, MCH, MAH), Soft Handoff, Calculation of Dropped Call Rate.

**ETE 4116: Sessional Based on ETE 4115**
Laboratory based on Wireless and Mobile Communication (ETE 4115) 0.75 Credit

**ETE 4117: Fiber Optic Communication** 3.00 Credit

**Light Propagation through Optical Fiber:** Overview of Optical Fiber Communication, Nature of light, Ray theory, Refractive index, Critical angle, Numerical Aperture, Integrated Optic waveguide and components, Modes in waveguide, Mode chart.

**Dispersion:** Normal Dispersion, Anomalous Dispersion, Polarization mode Dispersion, and other types of dispersions. Effects and Compensation techniques, Mathematical expressions of dispersions.

**Conventional Fiber:** Optical Fiber types and applications, Modes and Index profile, Transmission windows, Mode cutoff, Polarization, Polarization effects, Distortions, Fiber Losses, Non-linear effects; Pockel effect and Kerr effect, Fiber materials and Fabrication Techniques, Protection of optical fiber.

**System Measurements:** Fiber Attenuation and Dispersion measurement, OTDR, Eye pattern technique.

**Optical Sources:** LEDs and Lasers, Spectral width Efficiency, Modulation characteristics, Material and fabrication.

**Optical Detector:** Types of detector, Principle of detection, detector characteristics, Cut-off wavelength and detector response.
**Couplers and fiber components:** Types of coupling, Lensing Schemes, Splicing techniques, Misalignment, Fiber optic couplers, Optical Amplifiers, Switches, Bragg grating, Attenuator, Circulator, Isolator and Resonance cavity.

**Optical Networks:** Fiber Optic Data Buses and LANs, Protocol and Architecture, Wavelength Division Multiplexing (WDM), Dense Wavelength Division Multiplexing (DWDM) and SONET/SDH.

**System Design:** Noise and SNR analysis, Analog and digital system design.

**ETE 4118: Sessional Based on ETE 4117**  
Laboratory based on Fiber Optic Communication (ETE 4117)  
0.75 Credit

**ETE 4120: Seminar**  
Students will works in groups or individually to prepare review papers on topics assigned by the teachers and will present before audience.  
0.75 Credit

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### Fourth Year Even Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
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No. of Theory Courses : 5  
Total Contact Hours/Week : 26.00

No. of Lab/Sessional Courses : 5  
Total Credits : 20.50
ETE 4200: Project and Thesis  
2.50 Credit

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 4213: Radio and TV Engineering  
3.00 Credit

Radio: Introduction to radio communication, History, Frequency management, Design of radio transmitter and receiver, 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, Cellular radio; Spectral analysis, phase locked loops, burst communication and cognitive radio.

Television: TV systems, TV standards, Theory of scanning, TV bandwidth and Modulation.

Monochrome TV: Transmitter and receiver block diagram, Antennas, Camera and picture tubes, Video transmission, Detection of video signal, Signal generation.

Color TV: Transmitter and receiver block diagram, Camera and picture tubes, Video transmission, Color reproduction, Color matrix, Detection of color signals and signal reproduction.

HDTV: Introduction, principle, Standards and Applications, TV Booster, Digital TV and multimedia application, Satellite TV system. Introduction to VCR, CCTV, CATV, MATV, IPTV, Plasma TV and Digital TV.

ETE 4214: Sessional Based on ETE 4213  
0.75 Credit

Laboratory based on Radio and TV Engineering (ETE 4213)

ETE 4215: Telecommunication Engineering  
3.00 Credit


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.

Telephone Networks: Subscriber loop Systems, Switching Hierarchy and Routing, Transmission plan, Transmission systems, Numbering and charging plan, Signaling techniques in-channel and Common channel signaling, SS7 signaling, Public Switched Telephone network architecture, Introduction to ISDN, New services, Network and protocol architecture, Transmission standards, User network Interfaces.

ETE 4216: Sessional Based on ETE 4215 0.75 Credit
Laboratory based on Telecommunication Engineering (ETE 4215)

ETE 4217: Satellite Communication and Radar 3.00 Credit


ETE 4218: Sessional Based on ETE 4217 0.75 Credit
Laboratory based on Satellite Communication and Radar (ETE 4217)

IPE 4261: Project Planning and Legal Issues 3.00 Credit
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.
<table>
<thead>
<tr>
<th>Category</th>
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<th>Credit (s)</th>
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<td>Elective-I</td>
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<td>ETE 4123</td>
<td>Industrial Drives</td>
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<td>ETE 4125</td>
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<td>ETE 4127</td>
<td>Biomedical Engineering</td>
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<td>ETE 4129</td>
<td>Adaptive Filters</td>
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<td>ETE 4131</td>
<td>Radio Wave Propagation</td>
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<td>ETE 4133</td>
<td>Neural and Fuzzy Systems in Communications</td>
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<td>ETE 4135</td>
<td>Spread Spectrum and CDMA Technology</td>
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<td>ETE 4137</td>
<td>Discrete Mathematics</td>
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<td>ETE 4139</td>
<td>Graph Theory</td>
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<td>ETE 4141</td>
<td>Optoelectronics</td>
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<td>ETE 4143</td>
<td>Processing and Fabrication Technology</td>
<td>3.00</td>
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</tbody>
</table>

**ETE 4121: Microprocessor Based System Design** 3.00 Credit

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 troubleshoot a microcomputer system.

**ETE 4123: Industrial Drives** 3.00 Credit

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 4125: Multimedia Communication** 3.00 Credit

**Multimedia:** Media and data streams, medium, properties of multimedia systems, multimedia, and traditional data stream characteristics.

**Sound/Audio:** Basic sound concepts, music, MIDI devices and standards, speech generation, speech analysis and transmission.

**Images and Graphics:** Digital image representation, image format, graphic format, computer image processing.

**Video and Animation:** Video signal representation, computer video format, and computer based animation.

**Data Compression:** Coding requirements, source coding, entropy and hybrid coding, basic compression techniques, JPEC, H.261, MPEG, DVI.
**Computer Technology:** Communication architecture, multimedia work-stations, UNIX based systems, quicktime, windows multimedia extensions, OS/2 multimedia presentation director multimedia communication systems, application subsystem, transport subsystem, quality of service and resource management.

**Multimedia Applications:** Tele-conferencing, virtual reality, authoring tools, multimedia documents, games.

**ETE 4127: Biomedical Engineering**
**3.00 Credit**

**Introduction:** Medical terminology, Cell physiology, Membrane potential, Action potential, Excitation and rhythmically, Rhythmic excitation of heart, Transducers used in medical diagnostics.

**Biomedical Instrumentation:** Normal Electrocardiograph, ECG simulator, Watch filter, ECG amplifier, Pulse beat monitor, galvanic skin resistance detector, Respiratory and suction apparatus, Electronic stethoscope, Electronic clinical thermometer, Blood flow and pressure monitoring recorders, Metabolic rate measurement.

**Special topics:** Bio-telemetry, Application of ultrasonic and laser in biology and medicine, Clinical X-ray equipment, Fluoroscopy. Infrared heating, Implantable and non-implantable medical devices: Pacemaker, Deep brain stimulation, Direct current stimulation, Transconial magnetic stimulation and Spinal cord stimulation.

**ETE 4129: Adaptive Filters**
**3.00 Credit**


**ETE 4131: Radio Wave Propagation**
**3.00 Credit**

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 4133: Neural and Fuzzy Systems in Communications**
**3.00 Credit**

**Introduction:** Human Brain Mechanism, Neural Machine Intelligence.

**Neural Dynamics:** Activation and Signals, Activation Models.


Genetic Algorithm: Basic Concepts, Offspring, Encoding, Reproduction, Crossover, Mutation Operator, Application of GA.

ETE 4135: Spread Spectrum and CDMA Technology 3.00 Credit

Introduction: CDMA Concept, CDMA Technology and evolution.

Spread Spectrum Technique: Spread spectrum communication systems, Features of spread spectrum, classification of spread spectrum system, Direct sequence spread spectrum system, Frequency hopped spread spectrum system, Time hopped spread spectrum system, Spreading codes, Properties of spreading codes, Generation and detection of Spreading codes, code acquisition and tracking.

CDMA Technology: Overview of IS-95A, Radio and Physical Channelization, Reverse link physical channel, Forward link channels, Power control schemes in IS-95A. Link adaptation, Multiuser diversity, Beam forming, Transmit diversity, CDMA 2000 network architecture, Link Budget Analysis, Radio Network Planning and dimensioning, RAKE Receivers.

ETE 4137: Discrete Mathematics 3.00 Credit

Sets and its operations, Relations: Relations and their properties, n-ary relations, Partial Ordering, Lattice.

Logic: Logic, Propositional equivalence, Predicate and Quantifiers.


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 4139: Graph Theory**

3.00 Credit

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; External graph theory; Ramsey theory.

**ETE 4141: Optoelectronics**

3.00 Credit

**Light:** Polarization, Superposition, Interference, Diffraction, Sources, Blackbody radiation.

**Modulation of Light:** Elliptical polarization, Birefringence, Quarter wave plate, Optical activity, Scanning and switching, Magneto-optic devices, 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.

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

**ETE 4143 Processing and Fabrication Technology**

3.00 Credit

**Monolithic Fabrication Processes and Structures:** Substrate materials: Crystal growth and wafer preparation. Basic MOS process, Basic Bipolar process, Photolithographic process, pattern generation, pattern transfer, mask alignment, soft and hard baking, Photomask fabrication. Thermal oxidation, oxide quality, oxide thickness characterization.

**Cleaning:** Surface cleaning, organic cleaning and RCA cleaning.

**Diffusion:** Mathematical model, constant source diffusion, limited source diffusion, two-step diffusion, sheet resistance. Diffusion systems: Boron, Phosphorous, Ion implementation.
**Etching:** Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching.

**Film Deposition:** Evaporation, sputtering, CVD, Epitaxy.

**Isolation:** p-n junction isolation, mesa isolation and oxide isolation, BJT based microcircuits, p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging. Interconnection, contacts, packaging and testing.

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**Elective-II (Subjects ContainSessional)**

<table>
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<th>Category</th>
<th>Course No.</th>
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<td>ETE 4221</td>
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**ETE 4219: Microwave Devices**

3.00 Credit

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 4220: Sessional Based on ETE 4219**

0.75 Credit

Laboratory based on Microwave Devices (ETE 4219)

**ETE 4221: Microwave Solid State Devices**

3.00 Credit

**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 4222: Sessional Based on ETE 4221**
0.75 Credit

Laboratory based on Microwave Solid State Devices (ETE 4221)

**ETE 4223: Numerical Techniques in Electromagnetics**
3.00 Credit

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 4224: Sessional Based on ETE 4223**
0.75 Credit

Laboratory based on Numerical Techniques in Electromagnetic (ETE 4223)

**ETE 4225: Digital Image Processing**
3.00 Credit


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.


**ETE 4226: Sessional Based on ETE 4225**
0.75 Credit

Laboratory based on Digital Image Processing (ETE 4225)
ETE 4227: Digital Speech Processing 3.00 Credit
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 multi-resolution 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 4228: Sessional Based on ETE 4227 0.75 Credit
Laboratory based on Digital Speech Processing (ETE 4227)

ETE 4229: Voice Communication Techniques 3.00 Credit
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 4230: Sessional Based on ETE 4229 0.75 Credit
Laboratory based on Voice Communication Techniques (ETE 4229)

ETE 4231 Embedded System Design 3.00 Credit

ETE 4232: Sessional Based on ETE 4231 0.75 Credit
Laboratory based on Embedded System Design (ETE 4231)
ETE 4233  Renewable Energy  


ETE 4234: Sessional Based on ETE 4233  

Laboratory based on Renewable Energy (ETE 4233)