CALENDAR 1985-86

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

CALENDAR 1985-86 BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

CALENDAR 1985-86

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

Published by :
Publication and Information Office
Directorate of Advisory, Extension & Research Services
July, 1985

Correspondence about Research, Publication and Teaching Assistantship/ Fellowship may be made to :
Director, Advisory, Extension and Research Services

Correspondence about Consultation and Expert Services may be made to :
Director, Bureau of Research, Testing and Consultation

All other official communications should be addressed to :
Registrar

Cable Address : BUET, DHAKA

Postal Address :
Bangladesh University of Engineering and Technology,
Ramna, Dhaka-2, Bangladesh
Telephone : PABX 505171—77

Price : Tk. 20.00 Plus Postage

Printed by : Balaka Art Press, Dhaka.

Chancellor and Vice-Chancellor of the
Bangladesh University of Engineering and Technology

CHANCELLOR

Lt. General H. M. Ershad
ndc, psc
President
of the Peoples Republic of Bangladesh

VICE-CHANCELLOR

Professor A. M. Patwari
M.S. E.E., M.A., Ph.D., F.I.E.

DEANS OF FACULTIES

Dean of Faculty of Architecture & Planning
Professor M. A. Muktadir

Dean of Faculty of Civil Engineering
Professor J. R. Choudhury

Dean of Faculty of Electrical & Electronic Engineering
Professor Shamsuddin Ahmed

Dean of Faculty of Engineering
Professor M. Serajul Islam

Dean of Faculty of Mechanical Engineering
Professor M. Anwar Hossain

PROVOSTS OF HALLS OF RESIDENCE

Ahsan Ullah Hall
Professor Dipak K. Das

Nazrul Islam Hall
Professor S. M. Nazrul Islam

Shahid Smirity Hall
Dr. Shahjahan Mridha

Sher-e-Bangla Hall
Professor A. M. M. Safiullah

Suhrawardy Hall
Dr. Tofazzal Hossain

Titumir Hall
Professor M. Feroze Ahmed

CONTENTS

GENERAL INFORMATION OF THE UNIVERSITY

Historical Background

Bangladesh University of Engineering and Technology, abbreviated as BUET, is the oldest institution for the study of Engineering and Architecture in Bangladesh. The history of this institution dates back to the days of Dhaka Survey School which was established at Nalgola in 1876 to train Surveyors for the then Government of Bengal of British India. As the years passed, the Survey School became the Ahsanullah School of Engineering offering three-year diploma courses in Civil, Electrical and Technical Engineering. In 1948, the School was upgraded to Ahsanullah Engineering College (at its present premise) as a Faculty of Engineering under the University of Dhaka, offering four-year bachelor's courses in Civil, Electrical, Mechanical, Chemical and Metallurgical Engineering. This action was taken with a view to meet the increasing demand for engineers in the newly independent country and to expand the facilities for quicker advancement of engineering education, in general. In order to create facilities for postgraduate studies and research, in particular, Ahsanullah Engineering College was upgraded to the status of a University giving a new name of East Pakistan University of Engineering and Technology in the year 1962. After independence of Bangladesh in 1971, it was renamed as the Bangladesh University of Engineering and Technology.

The BUET campus is in the heart of the city of Dhaka. It has a compact campus with halls of residence within walking distances of the academic buildings. The physical expansion of the University over the last ten years has been impressive with construction of new academic buildings, auditorium complex, students' hall of residence etc.

Undergraduate courses in the faculties of Engineering, Civil Engineering, Electrical & Electronic Engineering and Mechanical Engineering extend over four years and lead to B.Sc. Engineering degrees in Civil, Electrical & Electronic, Mechanical, Chemical, Metallurgical and Naval Architecture & Marine Engineering. In the Faculty of Architecture and Planning, the degree of Bachelor of Architecture is obtained in five years.

Postgraduate studies and research are, now among the primary functions of the university. Most of the departments under the different faculties offer M.Sc. Engg. and M. Engg. degrees and some departments have started Ph.D. courses. Postgraduate degrees in Architecture (M. Arch.) and in Urban and

Regional Planning (MURP) are offered by the Faculty of Architecture and Planning. In addition to its own research programmes, the University undertakes research programmes sponsored by outside organisations, viz. UN Organizations, Commonwealth, UGC etc. The expertise of the University teachers and the laboratory facilities of the University are also utilized to solve problems of and to provide upto-date engineering and technological knowledge to the various organisations of the country. The University is presistent in its effort to improve its research facilities, staff position and courses and curricula to meet the growing technological challanges confronting the country.

List of Faculties and Teaching Departments :

The University has fifteen teaching departments under five faculties. Not all of them are degree offering. Faculty-wise list of the departmenrs with the status of the degrees offered is given below :

Faculty	Departments	Status of degree offering		
		PG only	Both UG & PG	Non degree offering
Architecture and Planning	Architecture		x	
	Urban and Regional Planning	x		x
	Huminities			
Civil Engineering	Civil Engineering		x	
	Water Resources Engineering	x		
Electrical and Electronic Engineering	Electrical and Electronic Engineering		x	
	Computer Engineering	x		
Engineering	Chemical Engineering		x	
	Metallurgical Engg.		x	
	Chemistry	x		x
	Mathematics			
	Physics	x		
Mechanical Engineering	Industrial and Production Engineering	x		
	Mechanical Engineering		x	
	Naval Architecture and Marine Engineering		UG only	

Admission Requirements, Academic Fees and Examination Rules & Regulations :

Admission requirements for both undergraduate and postgraduate studies (see next section of this book).

Academic Fees :

(a) Admission fee Tk. 206.00

(b) A local student has to pay Tk. 317.00 as tuition and other fees in each academic session. The details of the fees are given below :

Tuition fees	— Tk.	180.00	(Tk. 22.50 per instalment)
Seat rent	— Tk.	40.00	(Tk. 5.00 ,, ,,)
Examination fees	— Tk.	60.00	(per academic year)
Athletic fees	— Tk.	13.00	(,, ,, ,,)
Union fees	— Tk.	17.00	(,, ,, ,,)
Medical fees	— Tk.	7.00	(,, ,, ,,)

(c) A foreign student has to pay one thousand U.S. dollars per academic year as tuition and other fees.

Scholarships and Awards :

Scholarships, stipends, teaching assistantships/fellowships are given to the local students. The students enjoy scholarships from the Education Boards, also technical scholarships, scholarships from the University Grants Commission and other organizations, societies and clubs, namely, Bangladesh Chemical Industries Corporation, 61-Club, tafsils, district bodies, Bangladesh Tobacco Company, National Science & Technology, Bangladesh Sugar & Food Industries Corporation, Aligarh Old Boy's Association, Ahsanur Rahman Scholarship, Habibur Rahman Scholarship etc. Merit scholarships and University stipends are also available. Awards are also given by the University for outstanding performance. Other than awards, gold medals are awarded namely, Masud Hasan gold medal, Malik Akram Hossain gold medal and Ahsanur Rahman gold medal.

Examination :

An academic session, normally of one calendar year, is divided into approximately two equal parts, namely, Part A and Part B, for the purpose of examination. A formal written examination is taken at the end of each part and the promotion to next higher academic year is based on the aggreegate

of the marks of these two examinations and also the class tests (20 percent of the total marks for each subject) and the obtaining passing grades in the sessional subjects. The rules and regulations of examinations are given in details in the next section on 'Admission Regulations and Examination Rules and Regulations'. The academic regulations are framed by the Academic Council on recommendations from the Boards of Studies, the Faculties and the Committee of Advanced Studies and Research (CASR).

Teaching Staff of the University :

The total number of teaching posts is 324 out of which 218 teachers are in active service and 106 teachers are on leave for higher studies abroad. There are four positions of teachers, namely, Lecturer, Assistant Professor, Associate Professor and Professor. The following table gives position and degree-wise breakdown of the teachers in active service including those on leave-vacancies also :

Statistics of teachers in post with their qualifications

Position	B.Sc. Engg., B. Arch., M.A. M.Sc., M.Com.	Master in Engg., Arch. & M.phil.	Ph.D.	Total
Professor	—	1	41	42
Associate Professor	—	12	24	36
Asstt. Professor	21	16	23	60
Lecturer	74	6	—	80
Total	95	35	88	218

Besides these teaching posts, there are Professorships and Chairs which are given below :

a) Dr. Rashid Chair : In memory of late Dr. M.A. Rashid, formerly Professor of Civil Engineering and the First Vice-Chancellor of BUET, a chair has been created, sponsored by the graduates of the year 1961 of BUET (61-Club). Professor M. A. Jabbar, an eminent Mathematician and formerly Professor of Mathematics of the University joined as the first Dr. Rashid Chair Professor.

b) Professors Emiritus and Supernumerary Professors :

In order to get the benefits from the services of eminent people of either scholastic and academic brilliance or outstanding professionals in

Engineering, Architecture and Planning, the University has established provisions for appointment of such persons as Emiritus and Supernumerary Professors. Prof. A.M. Zahoorul Huq and Prof. M. Ibrahim, formerly Professors of Electrical & Electronic Engineering and Metallurgical Engineering of BUET respectively are now serving in their respective departments as Supernumerary Professors.

Note : The date in the fourth column indicates the date of original appointment. Abbreviations used in the second column are as follows : Arch—Architecture, CE—Civil Engineering, ChE—Chemical Engineering, Chem—Chemistry, CompE—Computer Engineering, EEE—Electrical & Electronic Engineering, Hum—Huminities, IPE—Industrial & Production Engineering, IFCDR—Institute of Flood Control & Drainage Research, IAT—Institute of Appropriate Technology, Math—Mathematics, ME—Mechenical Engineering, MetE—Metallurgical Engineering, NAME—Naval Architecture & Marine Engineering, Phy—Physics, URP—Urban & Regional Planning, WRE—Water Resources Engineering.

List of Academic Staff of the University in alphabetical order :

Name	Department	Designation	Date of Joining
Abedin, Md. Zoynal	CE	Asstt. Professor	23.12.80
Afzal, Syed Ali	Math	Professor	28.4.78
Ahmad, Md. Zakaria	CE	Lecturer	18.9.84
Ahamed, Rukunuddin	URP	Asstt. Prof.	15.3.76
Ahmed, Azmal Hayat	URP	Assoc. Prof.	24.3.66
Ahmed, Belal	ME	Assoc. Prof.	26.5.77
Ahmed, Dil Afroze	Phy	Asstt. Prof.	31.3.70
Ahmed, Faruque	CE	Asstt. Prof.	22.3.80
Ahmad, Giasuddin	Phy	Professor	25.1.61
Ahmed, Irtishaduddin	CE	Asstt. Prof.	6.2.78
Ahmed, Jamal Uddin	EEE	Assoc. Prof.	5.9.81
Ahmed, Kazi Mohiuddin	EEE	Asstt. Prof.	26.7.84
Ahmed, Khaliq	ChE	Lecturer	12.8.82
Ahmed, Mahbub Iftekhar	EEE	Asstt. Prof.	8.6.81
Ahmed, M. Feroze	CE	Professor	1.9.69
Ahmed, Md. Kurshid	Hum	Lecturer	23.7.77
Ahmed, Mustaq	IFCDR	Lecturer	25.6.81
Ahmed, Nesaruddin	CE	Lecturer	8.6.81

University Publications :

The University publishes the following items at various times :

(i) Calendar and Diary : About 5500 copies of Calendar and 1500 copies of diary annually.

(ii) Annual Report : Annually about 750 copies

(iii) Research Abstract : Biannually about 750 copies

(iv) Research bulletins : Mechanical Engineering,
Chemical Engineering,
Water Resources Engineering,
Electrical & Electronic Engineering
(Published annually)

(v) Ordinance, Statutes, Rules and Regulations, Published occassionally.

(vi) University Calendar (Syllabus) : 5500 copies published biannually.

ADMISSION AND EXAMINATION RULES AND REGULATIONS

Admission Requirements for Undergraduate and Postgraduate Courses :

Students get their admission into the four-year B.Sc. Engineering degree course in the various engineering departments and in the five-year architecture course through an open admission test. Candidates for admission into the B.Sc. Engg. and the B. Arch. courses must have passed the Higher Secondary Certificate (HSC) examination (Science group) after twelve years of schooling or its equivalent. Students are generally selected on the basis of the result of the admission test. The number of fresh entrant in the engineering faculty is usually 510 and that for Architecture is 50. Moreover, a maximum of 26 seats are reserved for foreign students and 21 seats for the members of the Bangladesh armed forces. Students would give option for any of the branches of engineering viz. Chemical, Civil, Electrical and electronic, Mechanical, Metallurgical and Naval Architecture & Marine Engineering during admission.

The qualifying requirements for the admission test for subsequent entry in the undergraduate courses are as follows :

(i) Minimum of 50% of marks in Secondary School Certificate (10 years of schooling equivalent to Matriculation) examination.

(ii) Minimum of 55 % of marks in aggregate in the subjects of Physics, Chemistry and Mathematics and not less than 45% marks in each of these subjects separately in the Higher Secondary Certificate examination.

The detailed rules of admission for each academic session are framed by the Academic Council of the University. Usually, the notice for admission is advertised in the local news papers soon after the results of the HSC examinations are announced. Application forms and any other information may be obtained from the Academic Section of the Registrar's Office.

Overseas students may contact the Registrar of the University for details about the admission procedure.

Registration/Admission :

Students qualified in the admission test, have to undergo a medical check-up. The medical check-up is conducted at the Students Health Centre of the University. Medical Examination is preceeded by verification of previous academic documents at the academic section of the Registrar's office before the students can get their admissions into the first year classes.

The right of admisson to the University is subject to the requirement that the student will comply with the admission procedure and will obey the existing statutes, ordinances, rules and regulations of the University and those framed from time to time.

Discipline and Conduct :

As member of the university community a student is expected to behave in a seemly fashion. It is obligatory for him to abide by the rules and regulations of the University. In case of violation of some rules or in case of misconduct or an act of indiscipline a student may be penalised by the concerned authorities of the university, or his case may be referred to the Board of Residence and Discipline for appropriate action. Student may be informed of the relevant rules at different times by the offices of the Registrar, the Comptroller, the Controller of Examinations, the Librarian, the Director of Students Welfare and the Provosts of residential halls. Students should keep themselves aware of the different notifications issued by these offices. In case a student is interested to know about any regulation of the university he may contact the office of the Registrar of the university.

Postgraduate Admission and Course Qualifying Requiremements and Academic Regulations :

(i) M.Sc. Engg./M. Engg. and M. Arch.—A student must have a bachelor's degree or its equivalent from a recognized university or institution with a good academic record.

(ii) Master of Urban & Regional Planning—A student must have a bachelor's degree or its equivalent in Engineering/Architecture/Planning/Agricultural Economics or a Master's degree in Sociology/Social Welfare/Social Work/Geography/Economics from a recognized university or institution with a good academic record.

(iii) M. Phil in Physics and Chemistry—A student must have a bachelor's degree or its equivalent in relevant Engineering or a Master's degree in relevant subjects from a recognized university or institution with a good academic record.

(iv) Ph.D.—A student must have a Masters' degree or M. Phil from a recognized university or institution a student ; in the Master's programme may be transferred to the Ph.D. programme if he shows excellent progress in his Master's thesis after completion of courses.

Academic Duration :

(i) Master's courses in Engineering and Architecture are of three semesters with a minimum duration of one year and a half.

(ii) M.Phil, MURP and Ph.D. are of four semesters with a minimum duration of two years.

A candidate for the Master's degree must complete all requirements within five calendar years and Ph.D. within six calendar years from his first enrolment in respective programmes.

Academic Regulations :

The academic year for postgraduate studies is divided into two semesters. Academic progress is measured in terms of credit hours earned by a student. One credit hour subject should require one hour of class attendance per week for one semester. A student needs credit hours for respective degrees as follows:

Degrees	Course Cr. hr.	Thesis/Project Cr. hr.
M.Sc. Engg/M. Arch	18	18
M. Engg.	30	6
M. URP	30	18
M. Phil	18	30
Ph. D.	9	45

Examinations Rules and Regulations For Undergraduate and Postgraduate Students

A. Undergrduate

Rules relating to conduct of examinations for undergraduate engineering and architecture courses applicable to the students admitted to this university in session 1983-84 onwards and repeaters along with them :

System & conduct of Examination

The B. Sc. Engineering and Architecture degrees courses shall be divided for the purposes of the examination and promotion as follows :

For 1st Year, 2nd Year, 3rd Year and 4th year (for Engineering) and 1st Year, 2nd Year, 3rd Year, 4th Year and 5th Year (for Architecture) each will extend over one academic session. For the purpose of examination, a course will be divided into two parts, Part 'A' and Part 'B'. Part 'A' Examination will be held in the middle of the session and will carry 40% of the total marks allotted for the courses/subjects and part 'B' examination will be held at the end of the session and will carry 40%of the total marks allotted for the courses/subjects.

Class test

There shall be continuous assessment of performance of students through class tests in all theory courses and 20% of total marks of that course (10% of total marks in each of part-A and part-B) shall be allotted for these class tests. In each part of the session, the teacher(s) concerned shall take at least two, but not more than three class tests and shall prepare marksheet which he shall submit separately at the end of each part of the session.

Date of Examination

The dates of various examinations shall be announced by the Dean at the beginning of each session. The dates of examinations shall not be changed except by a specific decision of the Academic Council on the recommendation of the Faculty concerned.

Preparatory leave

A preparatory leave of two weeks will be allowed before part 'A' examination and two to three weeks before part 'B' examination.

Minimum pass/ qualifying marks

40% is the minimum pass marks in each theory/sessional subject. Where a subject is taken as more than one distinctly different subjects mentioned in the curricula, the paper shall be divided into requisite number of parts and it shall be obligatory to pass the parts separately. Marks obtained in the part 'A' and 'B' examinations and the class tests will be added to calculate the total marks obtained by a student in that subject. Absence in any paper

will be considered equivalent to securing zero in that paper.

A student will be promoted to the higher class when he passes in all the subjects.

Distribution of marks (for engineering)

Distribution of marks of different courses will be as follows :

		1st year	2nd year	3rd year	4th year	
1	period per week	50	100	100	100	Theory
2	,, ,,	150	150	200	200	subjects
3	,, ,, ,,	200	250	300	300	
4	,, ,, ,,	300	300	400	400	

For sessional/practical, for all years for a course of 3 hours per week, marks will be 100 and/or of a course of 3 hours per alternate week, marks will be 50.

Eligibility of examinee

A candidate may not be admitted to any university examination unless :

: Submits an application for appearing in the examination in the prescribed form to the Controller of Examinations.

: Paid the prescribed examination fees and all outstanding University and Hall dues.

Merit position & award of Class

Class of a student shall be decided on the marks he obtained in the regular examinations and class tests.

The classes will be determined on the basis of the aggregate of marks obtained by a candidate in all the eight theory/sessional examinations of the four year courses for engineering and in all the ten theory/sessional examinations of the five year courses for architecture.

A candidate securing 75% or above in the aggregate of marks in all the papers for all the four year classes for engineering and for all the five year classes

for architecture, shall be placed in the First Class with Honours. If the aggregate is below 75% but 60% or higher he/she shall be declared to have obtained First Class. If the aggregate is below 60% but 50% or higher, he/she shall be declared to have obtained Second Class (Upper). Other successful candidates shall be placed in the Second Class.

Referred Examination

A student who fails in not more than two theory subjects, provided that he has already obtained at least 40% marks in aggregate (i.e. total of all theory and sessional courses for that year), will be allowed to sit for a referred examination to clear those subjects to be held normally in the 2nd week from the beginning of the classes of the next academic session. A student taking referred examination will be provisionally allowed to attend the higher class until the result of the referred examination is published. A student who will pass in the referred subjects shall be declared to have passed in the relevant examinaton.

Attendance

The rules for attendance report of students are as follows : Student's attendance reports for each subject in one academic session shall be notified in four instalments as given below :

i) First quarterly report : Six weeks after the resumption of classes of the part-A

ii) Second quarterly report (Cumulative) : A cumulative attendance of a student during part-A at the end of part-A classes

iii) Third quarterly report (Cumulative) : A cumulative attendance of a student during part-A and the current quarter of six weeks after the resumption of classes of part-B

v) Final overall cumulative report : At the end of classes of the part-B, total cimulative attendance of a student during the session.

A student shall not be admitted to part-B examination if his cumulative attendance so recorded above falls short of 60% of the total classes held in every subject during part-A and part-B classes of the session.

A list of the students whose attendance is less than 60% will be prepared by the Registrar within 2 working days after obtaining a report and the respective guardians of these defualting students would be informed.

If after the third report a student's attendance falls below 60% and is such that even if the student attends all the classes after the announcement of this third report and still could not achieve 60% attendance, he shall not be allowed to continue attending the remaining classes of part-B.

Private

A student who fails as per rules and who has passed in all sessional/practical subjects may appear in the examination in which he failed, as a private candidate on payment of examination fees. He shall be required to pass all theory subjects for promotion to the higher class.

Exemption

Repeater students may be exempted in the theory course(s) in which he secured 60% or more marks. Head of the relevant department concerned may, however, disallow such exemption. For exemption in sessional/practical subjects following rules will apply :

i) 40% shall not be exempted

ii) above 40% and below 45%, Head of the Department concerned may allow exemption

iii) 45% and above, shall be exempted directly on the basis of application (provided the student has applied for such exemption within the specified time).

B. Postgraduate

Rules relating to conduct of examinations for postgraduate courses in M. Sc. Engg., M. Engg., M. Arch., M.URP, M. Phil. and Ph. D.

Conduct of Examination

i) For all postgraduate degrees in Engineering, Architecture, Urban & Regional Planning and Physics and Chemistry, in addition to test, assignments and/or examinations during the semester as may be given by the teacher(s) concerned, there shall be a written examination and/or other test for each of the subjects offered in a semester at the end of that semester. The dates of which shall be announced by the Dean of the respective Faculties at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and/or examinations.

Grading System

Final grades for courses shall be recorded as follows :

Grade	Merit description	Grade points	Numerical markings
A+	Excellent	4.0	90% and above
A	Very good	3.5	80% to below 90%
B+	Good	3.0	70% to below 80%
B	Average	2.5	60% to below 70%
C	pass	2.0	50% to below 60%
F*	Failure	-	below 50%
I**	Incomplete	-	
S or U	Satisfactory or Unsatisfactory (for non-credit course)		
W	Withdrawn from course		

* Subject in which the student gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GPA).

** Given only a student is unable to complete the course because of circumstances beyond his control. it must be made up by the close of next two semesters or the incomplete grade becomes a failure. He may, however, be allowed to register without further payment of tuition fees for that course.

Qualifying Requirements

The qualifying requirement for graduation is that a student must earn the minimum grade point of 2.65 based on the weighted average in his course work.

The C grades, upto a maximum of two subjects may be ignored for calculation of grade point average (GPA) at the written request of the student, provided the student has completed the total credit hour requirement with a minimum weighted GPA of 2.65 in the remaining subjects. No subject shall be repeated unless it is a compulsory requirement for the degree as determined by the Board of Postgraduate Studies. Performance in all the subjects shall be reflected in the transcript.

If the cumulative number of F grades obtained by the student is three or more he shall not be allowed to continue in the programme.

If at the end of the second or any subsequent semesters, the cumulative GPA falls below 2.5 (considering all grades including F grades), he shall not be allowed to continue in the programme.

Thesis/Project

In addition to successful completion of course works every student shall submit a thesis/project on his research work, fulfilling the requirements as detailed below.

Every candidate submitting a thesis/project in partial fulfilment of the requirements of a degree, shall be required to appear at an oral examination, on a date or dates fixed by the Head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems, of undertaking independent work, and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work.

(ii) For Ph.D. degree :

Conduct of Examination

As in (i) above for Masters and M. Phil degrees.

Qualifying Requirements

To qualify for the degree a student must earn a minimum grade of 2.65 based on the weighted average in his course work.

Comprehensive Examination

The date and time of the comprehensive examination shall be fixed by the Doctoral Committee on the request of the supervisor. Comprehensive Examination shall ordinarily be held after the completion of the course work by the student.

The comprehensive examination shall comprise a written examination and/or an oral examination to test the knowledge of the student in his field of study. The Doctoral Committee shall conduct the comprehensive examination. If a student fails to qualify in a comprehensive examination he shall be given one more chance to appear in the examination as scheduled by the Doctoral Committee.

Research work for a thesis shall be carried out in this University or at a place(s) approved by the Doctoral Committee in consultation with the supervisor.

Thesis

At the end of the student's research work the student shall submit a thesis which must be an original contribution to engineering/sciences and worthy of publication. At least five type written copies of the thesis in the final form must be submitted to the Head of the department through the supervisor in the approved format .

In case a student fails to satisfy the Board of Examiners in thesis and /or oral examination, the student shall be given one more chance to resubmit the thesis and / or appear in oral examination as recommended by the Board.

A student who has been transferred to the Ph.D. programme from the M.Sc. Engg./M. Phil. programme may be awarded an M. Sc. Engg./M. Phil. degree on recommendation of the supervisor, if the student fails to qualify for the award of the Ph.D. degree.

SUMMARY OF COURSES OF THE DEPARTMENTS

Faculty of Electrical & Electronic Engineering

Department of Electrical & Electronic Engineering

Teaching Staff :

Supernumerary Professor

A.M. Zahoorul Huq, B.Sc. (Hons), M.Sc., M.S., Ph.D.

Professors

Shamsuddin Ahmed, B.Sc. Engg. (Elect), M.Sc., Ph.D.
Syed Fazl-i-Rahman*, B.Sc. Engg. (Elect), M.S., Ph.D.
A.K.M. Mahfuzur Rahman Khan, B.Sc. Engg. (Elect), M.S., Ph.D.
Md. Mujibur Rahman, B.Sc. Engg. (Elect), M. Engg., Ph.D.
A.B.M. Siddique Hossain, B.Sc. Engg. (Elect), M.Sc. Engg., Ph.D.
Md. Khurshid Alam, B.Sc. Engg. (Elect), M.Sc. Engg., Ph.D.

Associate Professors

Md. Mahdiuzzaman, B.Sc. Engg. (Elect), D.I.C., M.Sc. Engg., Ph.D.
Jamal Uddin Ahmed, B.Sc. Engg. (Elect), M. Sc. Engg., Ph. D.
Md. Abdul Matin, B.Sc. Engg. (Elect), M. Engg., D. Engg.

Assistant Professors

Syed Anisur Rahman, B.Sc. Engg. (Elect), M.S.
Bangshi Badan Saha, B.Sc. Engg. (Elect), M.Sc. Engg.
Mohd. Hamidur Rahman, B.Sc. Engg. (Elect)
Md. Shamsul Alam, B.Sc. Engg. (Elect), M.Sc. Engg.
M. Abdul Malek Mia, B.Sc. Engg. (Elect), M.Sc. Engg.
Md. Emdadul Huq Khan, B.Sc. Engg. (Elect), M.Sc. Engg.
Saiful Islam, B.Sc. Engg. (Elect), M.Sc. Engg.
Saroj Kanti Biswas, B.Sc. Engg. (Elect), M.Sc. Engg.
Mohd Qamrul Ahsan, B.Sc. Engg. (Elect), M.Sc. Engg., Ph.D.
Faruq Ahmed Sharif, B. Sc. Engg. (Elect), M.Sc. Engg., Ph.D.
Mahbubul Huq, B.Sc. Engg. (Elect), M.Sc. Engg., Ph.D.
Md. Aminul Haq, B.Sc. Engg. (Elect), M. Sc. Engg.
M. M. Shahidul Hasan, B.Sc. Engg. (Elect)
Md. Nurul Amin Chowdhury, B.Sc. Engg. (Elect)
Shahidul Islam Khan, B.Sc. Engg. (Elect), M.Sc. Engg.

**Head of the department*

Mohammad Ali Chowdhury, B.Sc. Engg. (Elect), M.Sc. Engg.
Enamul Basher, M. Sc. Engg. (Elect), Ph.D.
Md. Hamidul Haque, B.Sc. Engg. (Elect), M.Sc. Engg.
Abdullah Faruque, B.Sc. Engg. (Elect), M.Sc. Engg.
Mahbub Iftekhar Ahmed, B. Sc. Engg. (Elect), M. A. Sc.
Satya Prasad Majumder, B.Sc. Engg. (Elect), M.Sc. Engg.
S.M. Lutful Kabir, B.Sc. Engg. (Elect), M.Sc. Engg.
Md. Easin Khan, B.Sc. Engg. (Elect), M.Sc. Engg.
Kazi Mohiuddin Ahmed, M.Sc. Engg. (Elect), Ph.D.

Lecturer$

Md. Habibur Rahman, B.Sc. Engg. (Elect), M.Sc.
A. I. M. Nazme Rahmani Khandaker, B.Sc. Engg. (Elect), M.Sc. Engg.
Md. Rezwan Khan, B. Sc. Engg. (Elect)
Md. Anisur Rahman, B.Sc. Engg. (Elect)
Syeda Rasheda Begum, B. Sc. Engg. (Elect)
Mustafizur Rahman Chowdhury, B .Sc. Engg. (Elect)
Fahmida Nilufar, M.Sc. Engg. (Elect)
Rafiqul Murshed, B.Sc. Engg. (Elect)
Md. Atiquz Zaman, B.Sc. Engg. (Elect)
A. S. Mahmudul Hassan, B.Sc. Engg. (Elect)
Bhumip Khasnabish, B.Sc. Engg. (Elect)
Md. Mashuqur Rahman, B.Sc. Engg. (Elect)
A. H. Ehsanul Kabir, B. Sc. Engg. (Elect)
Md. Syed Kamrul Islam, B.Sc. Engg. (Elect)
S. Shahnawaz Ahmed, B.Sc. Engg. (Elect)
M. Showkat-ul-Alam, B.Sc. Engg. (Elect)
Md. Rezaul Karim Begg, B.Sc. Engg. (Elect)
Syed M. M. Reza, B.Sc. Engg. (Elect)
A. K. Dutta, B.Sc. Engg. (Elect)
Narayan Ch. Debnath, B.Sc. Engg. (Elect)
Tapan Kr. Saha, B.Sc. Engg. (Elect)
Md. Sajjad Hossain, B.Sc. Engg. (Elect)
A. H. M. Zahirul Alam, B.Sc. Engg. (Elect)

Introduction :

Electrical & Electronic Engineering play an important and indispensable role in establishing and maintaining instant communication across the country and beyond with high ranged fidelity and functional frugality, among many other functions.

The department is, thus, committed to a large and varied programme of research in its effort to solve the national level problems in the field of electrical and electronic engineering,

The department is currently engaged in research in such fields as: power system stability, comparative study of new and conventional methods of measuring synchronous machine quantities, optimum load scheduling, AC transmission system stabilization by DC link, determination of radio data for Bangladesh terrain at microwave frequencies, properties of dielectrics made of indigenous materials, microwave filters, analysis, design and synthesis of electronic circuits, fabrication of solid state diodes and transistors, energy conversion, Bio-Engineering etc,

Moreover, the department is now also working in the fields of energy research, Projects on various aspects of Electric, Electronic, Communication including Material Science. The postgraduate programme of the department leading to M.Sc. (Engg), M. Engg. and Ph.D. is designed to include such areas of research as: circuits, communications, control, electronics, material science, microwave, fields, machines, high voltage engineering and power systems.

SUMMARY OF COURSES

Undergraduate

Course No.		Subject Title	Hours/week	Marks
First year				
CE	104	Civil Engineering Drawing	0—3/2	50
CE	108	Servey Practical	2 weeks	50
Chem	101	Chemistry	3—0	200
Chem	102	Chemistry Sessional	0—3	100
CompE	101	Computer Techniques	2—0	150
CompE	102	Computer Techniques Sessional	0—3/2	50
EEE	101	Basic Electrical Engineering	3—0	200
EEE	102	Basic Electrical Engineering Sessional	0—3/2	50
Hum	101	English and Economics	2—0	150
Math	105	Mathematics		
		Paper II	2—0	150
		Paper II	2—0	150
ME	103	Basic Mechanical Engineering	2—0	150

Course No.		Subject Title	Hours/week	Marks
ME	104	Basic Mechanical Engineering Sessional	0—3/2	50
ME	112	Mechanical Engineering Drawing	0—3/2	50
Phy	101	Physics	3—0	200
Phy	102	Physics Sessional	0—3	100
Shop	104	Foundry Shop	0—3/2	50
Shop	106	Metal and welding shop	0—3/2	50
Shop	108	Machine Shop	0—3/2	50
Second year				
CE	225	Mechanics of Materials	2—0	150
CE	226	Mechanics of Materials Sessional	0—3/2	50
EE	200	Electrical Design and Drafting	0—3/2	50
EE	203	Electrical Circuits I	3—0	250
EE	204	Electrical Circuits I Sessional	0—3/2	50
EE	205	Electrical Machines I	3—0	250
EE	206	Electrical Machines I Sessional	0—3/2	50
EE	207	Electronics I	3—0	250
EE	208	Electronics I Sessional	0—3/2	50
Hum	203	Acocuntancy and Industrial Management :		
		Accountancy	1—0	100
		Industrial Management	2—0	150
Math	205	Mathematics		
		Paper I	2—0	150
		Paper II	2—0	150
ME	207	Thermodynamics and Fluid Mechanics	3—0	250
ME	208	Fuel Testing and Fluid Machanics Sessional	0—3/2	50
Third year				
CompE	301	Digital Techniques	2—0	200
CompE	302	Digital Techniques Sessional	0—3/2	50
EEE	300	Electronics Shop Sessional	0—3/2	50
EEE	301	Electronics II	3—0	300
EEE	302	Electronics II Sessional	0—3	100
EEE	303	Electrical Circuits II	3—0	300
EEE	305	Electrical Machines II	3—0	300
EEE	306	Electrical Machines II Sessional	0—3	100
EEE	307	Measurements and Instrumentation	2—0	200

Course No.		Subject Title	Hours/week	Marks
EEE	308	Measurements and Instrumentation Sessional	0—3/2	50
EEE	309	Electromagnetic Fields and waves	2—0	200
EEE	311	Transmission and Distribution of Electrical power	3—0	300
EEE	314	Electrical Design Sessional	0—3/2	50
Math	309	Mathematics	2—0	200
Fourth Year				
CompE	401	Microprocessors & Digital Computers*	2—0	200
CompE	402	Microprocessors Digital Electronics	0—3/2	50
EEE	400	Project and Thesis	0—6	200
EEE	401	Control Systems	2—0	200
EEE	402	Control Systems Sessional	0—3/2	50
EEE	403	Power Systems Analysis	2—0	200
EEE	404	Power Systems Analysis Sessional	0—3/2	50
EEE	405	Power Stations	2—0	200
EEE	407	Integrated Circuits and Industrial Electronics	3—0	300
EEE	408	Integrated Circuits and Industrial Electronics Sessional	0—3/2	50
EEE	409	Telecommunication Engineering	2—0	200
EEE	410	Telecommunication Engineering Sessional	0—3/2	50
EEE	411	Science of Materials	2—0	200
EEE	412	Switchgear and Protection	2—0	200
EEE	414	Switchgear and Protection Sessional	0—3/2	50
EEE	415	Microwave Engineering*	2—0	200
EEE	416	Microwave Engineering Sessional	0—3/2	50
EEE	417	Electronics III*	2—0	200
EEE	418	Electronics III Sessional	0—3/2	50
EEE	419	High Voltage Engineering*	2—0	200
EEE	420	High Voltage Engineering Sessional	0—3/2	50
EEE	423	Electrical Circuits III*	2—0	200
EEE	424	Electrical Circuits III Sessional	0—3/2	50

**Indicates optional courses. A student has to take two of these courses. in the combination suggested by the department and from amongst those offered, including appropriate laboratories.*

Postgraduate

Course No.		Subject Title	Credit hours
EEE	6000	Thesis	18
EEE	6000	Project	6
EEE	6001	Seminar	0
Compul$ory Subjects			
EEE	6011	Engineering Analysis	3
EEE	6012	Energy Conversion Processes	3
Optional Subjects			
EEE	6101	Linear System Analysis	3
EEE	6102	Network Synthesis I	3
EEE	6103	Network Synthesis II	3
EEE	6104	Non-Linear Circuits	3
EEE	6105	Advanced Topics in Network Theory	3
EEE	6201	Statistical Communications Theory	3
EEE	6202	Information Theory	3
EEE	6203	Telephone Traffic Theory	3
EEE	6401	Advanced Electronics	3
EEE	6402	Quantum Electronics	3
EEE	6403	Solid State Devices	3
EEE	6404	Active Circuit Design	3
EEE	6501	Electric and Magnetic Properties of Material	3
EEE	6502	Electronics of Solids	3
EEE	6503	Laser Theory	3
EEY	6601	Applied EM Theory	3
EEE	6602	Microwave Theory and Techniques	3
EEE	6603	Microwave Tubes and Circuits	3
EEE	6604	Antennas and Propagation	3
EEE	6701	Non-linear Control	3
EEE	6702	Sampled-data Control	3
EEE	6703	Modern Control Theory	3
EEE	6704	Optional Control Systyms	3
EEE	6705	Statistical Models for Engineering Systems	3
EEE	6801	Generalized Machine Theory	3
EEE	6802	Special Machines	3
EEE	6803	Power Semiconductors and Modulators	3
EEE	6804	Advanced Machine Design	3
EEE	6901	Optimization of power System Operation	3
EEE	6902	Computer-aided Power System Design	3
EEE	6903	Protective Relays	3
EEE	6904	Power System Stability	3
EEE	6905	Transients in Power Systems	3
EEE	6906	Reliability of Power Systems	3
EE	6907	Power System Planning	3

BUET

Department of Computer Engineering

Teaching Staff :

Professor*

A.K.M. Mahfuzur Rahman Khan**, B.Sc. Engg. (Elect), M.Sc., Ph.D.

Assistant Professors

Syed Mahabubur Rahman, M.Sc. Engg. (Elect), Ph.D.
Ali Iftekhar, B.Sc. Engg. (Elect), M.Sc. (Comp.)

Lecturers

Dulal Chandra Kar, B.Sc. Engg. (Elect)
Shah M. Rezaul Islam, B.Sc. Engg. (Elect)

Introduction

A rapid proliferation of computers and computer usage during the last few years, has called for a large number of computer personnels in the country. Graduate programme is, thus, primarily designed to meet this need.

The department offers postgraduate degrees leading to M. Sc. Engg. and M. Engg. in hardware and software aspects of computers. The aim is to give an appreciation of mainframe, mini and microcomputer hardwares and softwares. These include organization, architecture, networking, operating systems and various usage of all types of computers with special emphasis on the the Microcomputers and Microprocessor applications.

Graduates of the department should be able to take up work in, (i) planning and management of computer installations, (ii) develop systems for all computer environments, (iii) design and development of microprocessor-based control systems, (iv) computer-based management and data processing systems, and (v) research in specialized branch of computers and microprocessors. Two research groups are engaged in researches, one on microprocessor applications and the other on software engineering.

**Professor of Electrical & Electrical Engg. Deptt.*
***Head of the department*

DETAILED COURSES

OF THE DEPARTMENTS

Workshop

Arch 6204 Urban Systems 1+1 = 2 credits

History and analysis of the city as a social system ; the development of communities and neighbourhoods and effects of ethnic, racial and religious groups ; the distribution of income and occupation, class structure, life styles and their effects on communities and neighbourhoods.

Analysis of the city as an economic system ; Interrelationship between business, commerce and industry and their effects on urban pattern ; Urban locational decisions and transportation ; land value and urban form.

Analysis of the city as a political and administrative system ; interrelationship between urban planning and design and the political setup ; the urban planning and design institutions and co-ordination of their activities ; project programming, implementation, management and control workshop.

Arch 6205 Health Facilities Planning and Design 1 credit

Fundamentals of health facilities planning, programming and design ; Case studies of approaches in health facilities planning and design in the developed as well as the developing countries ; Review of the approach in Bangladesh, its problems and prospects.

Arch 6206 Research Methodology in Architecture 1 credit

Aspects and scope of research in architecture ; problem identification and selection ; Research design, data collection, processing and analysis, computer application ; Research report writing.

Arch 6303 Domestic Architecture 2+1 = 3 credits

Development of house through the ages ; the pre-urban house ; the oriental urban house ; the ossidental urban house ; Rural house in Bangladesh Influence of socio-technical changes in domestic design ; Meaning and purpose of different domestic spaces ; Relationships between domestic organization and the house design ; Family and house—changing need, adaptation, space appropriation in different stages of family life.

Workshop

Arch 6304 Luminous Environment in Built-forms 2+1 = 3 credits

Introduction ; Effects of luminous environment on men ; Daylighting and the determinants of the daylighting environment ; Daylighting measurement and calculations ; Daylighting design criteria and designing for daylighting. Artificial lighting and the determinants of the artificial lighting environment; Artificial lighting measurements and calculations ; Artificial lighting design criteria and designing for artificial lighting.

Department of Humanities

UNDERGRADUATE COURSES

HUM 101 English And Economics

2 hours per week 150 marks

For First year CE. EEE, ME, MetE, NAME

English

PART A

Definition of scientific terms, comprehension, precis writing, phrases and idioms, commercial correspondence and tender notice.

PART B

Essay writing, application and description, construction of sentences and paragraphs.

Economics

PART A

Nature of an economic theory, applicability of economic theories to the problems of developing countries. Some basic concepts—supply, demand and their elasticities. The relationship among average, margin and total and their derivation. Equilibrium-stable. straight and dynamic equilibrium. Consumer's equilibrium-indifference curve, producer's equilibrium-isoquant.

PART B

Production—factors of production, production possibility curve—equilibrium of a firm, fixed cost and variable cost, the short run and the long run. The cost curves and supply curves, law of returns, internal and external economies and diseconomics. Economics of development and planning, basic concept—saving, investment, GNP, NNP, percapita 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-output analysis, planning in Bangladesh—first five year plan, development problems related to agriculture, industry and population of Bangladesh.

Hum 103 English

2 hours per week 200 marks

For First year ChE.

PART A

Precis writing ; comprehension ; Commercial correspondance ; Tenders ; Idioms ; Proverbs ; Synonyms ; Prefixes and Suffixes, and Punctuation.

PART B

Paragraph writing ; Essay writing ; Common mistakes in grammar, Vocabulary ; Amplification ; Report writing ; Analysis and figures speech.

HUM 111 Sociology and Psychology

2 hours per week 200 marks
For First year Architecture

Sociology : Introduction to sociology, principles of human relations. contribution of biology. geography, group life and culture to development personality, living habits in Bangladesh, working habits in Bangladesh. social evolution.

Psychology : Principles of human behaviour, motivations of behaviour and mechanisms of adjustment to conflicts.

HUM 201 Government And Sociology

2 hours per week 150 marks
For Second year ChE.

Government

PART A

Some basic concepts of Government and Policies. Functions. organs and forms of modern state and Government: Socialism; Fascism : Marxism; U.N.O.

PART B

Government and politics of Bangladesh. Some major administrative systems of developed countries. Local self-government.

Sociology

PART A

Scope, social evolution and techniques of production, culture and cultivation. Social structure of Bangladesh. Population and world resources. Oriental and Occidental societies. Industrial revolution.

PART B

Family—urbanization and Industrialization. Urban Ecology, Co-operative and Socialist movements. Rural sociology.

HUM 203 Accountancy And Industrial Management

3 hours per week 250 marks.
For Second year EEE

Accountancy

I hour per week 100 marks

Basic Accounting principles. Different kinds of cheque. Cash book—Petty cash book. Elements of cost : Direct costs. Overhead allocation.

PART B

Prepararion of cost sheet. Marginal analysis. Computation of breakeven point. Standard costing, Cost variance.

Industrial Management

2 hours per week 150 marks

PART A

Authority and responsibility, administration, management and organization. Scientific management and organisation ; Time and motion study ; Learning curve ; Organization structure ; Principles of organization ; Organization chart ; Span of control ; Policies ; Decision making.

Analytical methods in management—Linear programming ; Waiting line and cost data for decision, network analysis, arrow diagram, critical path ; Planning—Types of planning ; investment policy and criteria ; Depreciation, various methods ; Equipment policy. Personnel management—Selection and recruitment of employees, Interview and indoctrination ; training and its types ; Promotion ; Basis of promotion—industrial reaction ; Wage systems and incentive and supplementary wage and salary administration ; Accident prevention and safety instruction. Job-evaluation and merit rating. Statistical quality control.

PART B

Plant layout, layout of physical facilities, Transportation and storage, material handling. Maintenance ; Classification of objects to be maintained ; Maintenance policy ; Planning maintenance function, turn-around or standby machine, control of maintenance function. Production control in intermittent and continuous manufacturing Industry ; objectives and functions of production control ; Supplementary planning ; Schedulling ; Despatching ; Assembly line control. Forecasting ; utility and various methods ; Coordination between sales and manufacturing ; Manufacturing economics.

Purchasing procedure : Inventory control—need and methods of control ; Factors affecting inventory build-up, economic lot size and re-order point. Sales ; organisation and promotion ; Measures of performance, measurement and analytical problem of productivity, cost of management and industrial reorganisation. Production standard and work measurement ; work sampling and its methods ; Allowance in production standards.

Hum 207 Accounts and Sociology

2 hours per week 150 marks
For Second year CE

Accounts

PART A

Basic Accounting principles, Different kinds of cheque. Cash book ; petty cash book. Elements of cost. Direct and Indirect elements ; Accounting for direct and indirect costs. Overhead allocation.

PART B

Preparation of cost sheet. Marginal analysis. Computation of break-even point. Standard costing—cost variances.

CE 104 Civil Engineering Drawing
3 hours every alternate week 50 marks
For First year EE, ChE, ME, and NAME.

Plan, Elevations and section of one story buildings ; Plan, Elevations and sections of Multi storied Residential Buildings ; Plan and section of septic tank ; Detailed drawing of Roof truss ; Plan, elevation and sections of culvert.

CE 108 Survey Practical
For 2 weeks 50 marks
For First year MetE and EEE

Handling of Instruments

The students will learn handling of all types of instruments issued to them. They also will check the permanent adjustments and will detect defects (if any of their instuments) and will show it to the respective teacher in-charge.

Chain Survey
The students will select the stations, measure the lines and take the offsets of different objects in the field.

Theodolite Survey
The students will measure the included angles and the sides of a pentagon with the help of a theodolite. The bearing, the reduced bearing, the latitude and the departure of all the sides are to be calculated. The total error should be determined and be adjusted in tabular form. The students will then calculate the area within the traverse in acres and decimals and also in bighas and kattas.

Plane Table Survey
The students will plot all the important features of the plot by intersection and/or by the radiation method of plane tabling.

Levelling
In levelling, the profile of a 6 chain long stretch of land will be made by taking readings at 50′ interval along the chain line. The cross-section will be taken at 100′ interval, 50′ or less (depending on site) on either side. Staff readings on the cross—section will be taken at an interval of 25′. The longitudinal profile and the cross-sections will be plotted on a tracing paper.

Stadia Survey
Determination of stadia constants and plotting of objects of a small plot as instructed by the teacher.

Height and Distance Problem

The students will measure the height of an object and the spatial distance between two points by measuring angles with the help of the theodolite.

CE 200 Details of Construction and Estimating
3 hours per week 100 marks

PART A
Brick masonry ; Framed structures and bearing walls ; Arches and lintels ; Details of floors and roofs ; Pointing ; Plastering and interior finishing ; Scaffolding ; Staging ; Shoring and underpiping ; Thermal insulation and acoustics.

PART B
Analysis of rates ; Detailed estimate of all items of work of a building, bridge truss, highway.
Specifications of materials for the above constructions.

CE 201 Surveying
3 hours per week 250 marks

PART A
Calculation of areas and volumes ; Reconnaissance survey ; Chain survey ; Traverse survey ; Plane table survey ; Levelling and contouring ; Problems on heights and distances ; Curves and curve ranging, transition curve, vertical curves.

PART B

Tacheometry : Introduction, Principles and problems on tacheometry ; Astronomical surveying ; Definition ; Instruments ; Astronomical corrections ; Systems of time. Photogrammetry : Introduction ; Terrestrial photography ; Aerial photography ; Reading of photo mossaic, scale ; Project surveying ; Errors in surveying ; Remote sensing.

CE 202 Practical Surveying
3 weeks of field work 100 marks
Field work based on CE 201

CE 203 Engineering Materials
3 hours per week 250 marks

PART A
Properties and uses of bricks, efflorescence, cement, cement chemistry, aggregates, cement and lime mortars, concrete, standard test of bricks,

cement and concrete, salinity problem in concrete, corrosion and its prevention, paints, varnishes, metallic coating.

PART B

Design of concrete mix, atomic structure and bonding ; crystal structures, mechanical properties, yielding, fracture, elasticity, plasticity, properties and uses of rubber, timber and plastics. Concrete for special purposes. Ferrocement.

CE 205 Computer Programming and Numerical Methods in Civil Engineering

2 hours per week 150 marks

PART A

Basic components of computer systems ; FORTRAN language ; Numerical solution of algebraic and transcendental equations ; Solution of systems of linear equations ; Matrices ; Interpolation.

PART B

Computer applications to Civil Engineering problems ; Curve-fitting by least squares ; Numerical differentiation and integration ; Finite differences ; Numerical solution of differential equations.

CE 206 Computer Programming Sessional

3 hours every alternate week 50 marks

Development of FORTRAN programs and solution of problems using a digital computer.

CE 207 Geology and Geomorphology

2 hours per week 150 marks

PART A

Minerals ; Identification of minerals. Common rock forming minerals ; Physical properties of minerals ; Mineraloids Rocks ; Types of rocks, cycle of rock change ; Earthquake and seismic map of Bangladesh.

Structural Geology : Faults ; Types of faults ; Fold and Fold type ; Domes ; Basins ; Erosional process ; Quantitative analysis of erosional land forms.

PART B

Channel development ; Channel widening ; Valley shape ; Stream terraces ; Alluvial flood plains ; Deltas and alluvial fans ; Channel morphology ; Channel parterns and the river basin ; Geomorphology of Bangladesh.

CE 211 Mechanics of Materials

3 hours per week (1 hour tutorial) 250 marks

PART A

Fundamental concepts of stress and strain ; Mechanical properties of materials ; Stresses and strains in members subjected to tension. compression, shear and temperature changes ; Rivetted and welded joints ; Bending moment and shear force diagrams ; Flexural and shearing stresses in beams ; Shear centre.

PART B

Torsional stresses in shafts ; helical springs ; thin pressure containers ; principal stresses ; deflection of beams ; columns ; unsymmetrical bending.

CE 212 Structural Mechanics and Materials Sessional (Strength of Materials Sessional)

3 hours every alternate week 50 marks

For Second year CE and NAME

Tension, direct shear and impact tests of mild steel specimen ; Compression test of timber specimen, slender column test ; Static bending test ; Hardness test of metals ; Helical spring tests.

CE 214 Concrete Sessional

3 hours every alternate week 50 marks

General discussion on preparation and properties of concrete. Test for specific gravity, Unit weight, Moisture content and absorption of coarse and fine aggregates ; Normal consistency and initial setting time of cement ; Direct tensile and compressive strengths of cement mortar ; Gradation of coarse and fine aggregates ; Design and testing of a concrete mix.

CE 225 Mechanics of Materials

2 hours per week 150 marks

For Second year EEE

PART A

Introduction : Analysis of forces, stress and strain ; Mechanical properties of Materials ; Allowable stresses ; Stresses in the pressure vessels ; Torsional stresses in circular shafts and circular beams.

PART B

Shear force and bending moment diagrams for statically determinate structures.

CE 226 Mechanics of Materials Sessional

3 hours every alternate week 50 marks

For Second year EEE

Tension test and impact test of mild steel specimen ; Compression test of timber specimen ; Direct shear test ; Slender column test ; Static bending test ; Hardness test of metals ; Helical spring test.

WRE 6403 Physical Modelling and Hydraulic Similitudes 3 credits

Principles and illustration of dimensional analysis; Principles of the theory of similarity; Reynolds' models ; River and open channel models; Filtration models; Design of expriments; Materials and methods of construction; Equipment in models; Model calibration.

WRE 6404 Mathematical Modelling 3 credits

Introduction: Concept of a mathematical model; Types of model. Numerical modelling techniques ; finite difference, characteristics finite element, consistency convergence, stability and accuracy of a numerical integration scheme. Hydrologic and hydrodynamic models : Data organization, schematization and boundary conditions; calibration, validation and application of a model; Models of water resources systems elements. ,

WRE 6501 Coastal Engineering 3 credits

Introduction; Waves : theory and forecasting; Ports and marine structures : wharves ; jetties, piers, bulkheads dolphines, moorings, locks and shore protection works ; Dredging ; Use of models.

WRE 6502 Estuarine Hydraulics 3 credits

Estuarine behaviour : Hydrodynamics of estuaries; Mixing process; Tides and harmonic analysis; Modelling of tides; Saline water intrusion; Hydraulics of deltas : Pollution in estuaries : Control of estuaries; Estuarine problems in Bangladesh.

Faculty of Electrical and Electronic Engineering

Department of Computer Engineering

UNDERGRADUTE COURSES

CompE 101 Computer Techniques

2 hours per week 150 marks

PART A

Elements of computer structures and languages. Number system. Binary arithmetic. Principles of programming. Flow charts. The FORTRAN language.

PART B

Numerical methods and computational algorithms. Application of computers in solving electrical and electronic engineering problems.

CompE 102 Computer Techniques Sessional

3 hours every alternate week 50 marks

Laboratory expriments based on CompE 101

CompE 301 Digital Techniques

2 hours per week 200 Marks

PART A

Number System and Codes : Number system—binary, decimal, octal and hexadecimal number systems and their representation, conversions, complementation, addition, subtraction, multiplication and division. BCD, alphanumeric, gray and excess—3 and parity codes.

Digital logic : Boolean algebra, De Morgan's laws, logic gates and their truth tables. Canonical forms, combinational logic circuits, Karnaugh Map. Logic Families : TTL, ECL, I^2L, and CMOS logic, brief description and principle of operation. Propagation delay, speed delay, product and noise-immunity.

Arithmetic and data-handling logic circuits : Half adder, full adder, half subtractor, full subtractor, BCD to decimal decoders, BCD to seven segment decoder/drivers, endoders, multiplexers/demultiplexeres. Study and use of TTL Data Handbooks.

PART B

Review of Combinational Circuits ; Combinational Circuit design. Flip-Flops. R-S Flip-Flop, Clocked R-S Flip-Flop, simple D-type Flip-Flop, race problems. T Flip-Flops, J-Kmaster-slave Flip-Flop, direct set and reset

facilities. Counters-Asynchronous counters, propagation delay in asynchronous counters, synchronous counters and applications. Registers-different types, shift registers, serial to parallel and parallel to serial, left shift, right shift and circular registers and their applications. D To A and A to D converters with applications. Different types of digital storage media.

CompE 302 Digital Techniques Sessional
3 hours every alternate week 50 Marks
Laboratory experiments based on CompE 301

CompE 401 Microprocessors and Digital Computers
2 hours per week 200 marks

PART A
Introduction to different types of microprocessors. Instruction sets. Hardware organization. Microprocessor interfacing. Introduction to available microprocessor peripheral IC's. Bit-slice processors. Microprocessor applications.

PART B
Design of digital computer subsystems, flow of information and logical flow diagram in timing and control signals. System organization. Hardware structures. Design of the control unit of a digital computer. Introduction to microprograming. Multi-programming, time-sharing and real time computer systems.
Data and instructions. Data systems, addressing of operative memory. Machine instructions. Channel programs. Assembler program. Program execution. Interrupt systems. I/O systems. Inter-connection of computers. Operating systems. Control program. File handler. Program structure. Virtual memory.

CompE 402 Microprocessors and Digital Electronics Sessional
3 hours every alternate week 50 Marks
Laboratory experiments based on CompE 401.

POSTGRADUATE COURSES

CompE 6101 Microcomputers and Microprocessors 3 Credits
Review of the hardware and software of microcomputers, programming in microcomputers. Hardware-software interfacing in microcomputer system design. I/O structure and auxiliary electronics. Interrupt structure, direct memory access. Priority interrupt structure. The design of digital systems based around microcomputers-timing considerations; Input/output design and total system design. Case studies including CPU and peripheral IC's of Intel, Motorola, Zilog etc.

CompE 6201 Digital Computer Theory and Design 3 Credits
Introduction to stored program computers. Overall computer organization with specific examples as IBM 360/370 and IBM 4331/4341. System organization of digital systems including minicomputer and microprocessor architecture and comparision. Control unit design—hardwared control and microprogram control. Control unit organization to include serial-parallel modes of operation.
Design of the control unit of a small digital computer for laboratory use.
Characteristics of computer system hardware and software to provide for multiprocessing, multiprogramming and time-shared operation. Interrupt systems. Concurrent process in multiprocessors.

CompE 6202 Computer Organization 3 Credits
Stored program computers; Data representation; Algorithmic treatment; Instruction formats; Computer units; Systems structures, special features of Intel 8080,8085,8086, Motorola 6800/68000, PDP-8 and PDP-11, IBM-370, IBM-4300, CDC 7600, Elliac and the latest Microprocessors. Hardware description, methodologies, considerations in simulation and testing of designs.

CompE 6203 Advanced Topics in Microcomputers 3 Credits
Latest developments in microprocesor field including 32 bit microprocessors—hardware structure and software capabilities, memory development with examples, bubble memories. Microcomputer development systems. Bit slice Microprocessors and Microprogramming, design of and instruction. Set using micro-control. Software for microcomputers, assemblers, high level microprogramming languages.

Department of Electrical and Electronic Engineering

UNDERGRADUATE COURSES

EEE 101 Basic Electrical Engineering

3 hours per week 200 marks
For first year EEE, ME and NAME

PART A

Electrical units and standards, electrical networks and circuit theorems, introduction to measuring instruments. Magnetic concepts and circuits.

PART B

Alternating current, definition of A. C. quantities, phasors, RL, RC, RLC series and parallel circuits.

EEE 102 Basic Electrical Engineering Sessional

3 hours every alternate week 50 marks
For first year EEE, ME and NAME
Leboratory experiments based on EEE 101

EE 103 Basic Electrical Engineering (Technology)

3 hours per week 200 Marks
For First year Civil Engineering

PART A

Electrical units and standards. Electrical networks and circuit solutions-series, parallel and mesh current methods. Measurement of electrical quantities—current, voltage, resistance. Measuring instruments; ammeters, voltmeters, watt meters and multimeters.
Instantaneous current, voltage and power, effective current and voltage, average power.

PART B

Phasor algebra (as applied to A.C. circuit analysis), sinusoidal single-phase RLC circuits, balanced three phase circuits. Introduction to electrical wiring for residential and commercial loads. Familiarization with different types of electrical machines such as D.C. generators and motors, A.C. alternators, motors, transformers. Working principles of transfomers, induction motors. Introduction to electronics principles with simple applications.

EE 104 Basic Electrical Engineering (Technology) Sessional

3 hours every alternate week 50 marks
Laboratory experiments based on EE 103

EE 105 Electrical Engineering Fundamentals
(Basic Electrical Engineering)

2 hours per week 150 Marks
For First year ChE and MetE

PART A

Electrical units and standards. Electrical networks and circuits theorems, introduction to measuring instruments.

PART B

Alternating current, RLC series, parallel circuits, magnetic concepts and magnetic circuits.

EE 106 Electrical Engineecing Fundamentals Sessional
(Basic Electrical Engineering Sessional)

3 hours every alternate week 50 Marks
Laboratory experiments based on EE 105.

EE 107 Electrical Engineering Principles

3 hours per week 150 Marks

PART A

Electrical units and standards, electrical networks and circuit theorems, introduction to measuring instruments.

PART B

Alternating current, RLC series, parallel circuits, magnetic concepts and magnetic circuit.

EE 108 Electrical Engineering Principles Sessional

3 hours every alternate week 50 Marks
Laboratory experiments based on EE 107.

EE 200 Electrical Design and Drafting

3 hours every alternate week 50 marks

Safety rules, electricity rules and electricity codes. Electrical and electronic symbols. Electrical wiring, house wiring, industrial installation wiring. Insulation measurement, use of meggers. Battery charging.

EE 203 Electrical Circuits

3 hours per week 250 Marks

PART A

Waveforms, response of single elements to different waveforms. Single phase circuit analysis. Q of a circuit, wave trap, maximum. power transfer,

Network theorems, Y-Delta transformation ; Coupled circuits, Polyphase balanced and unbalanced circuits ; Power measurement.

PART B

Periodic nonsinusoidal waves, frequency spectrum, effective values and power. Electric wave filters : basic principles, constant K, M—derived half and full-section, transients.

EE 204 Electrical Circuits Sessional

3 hours every alternate week 50 Marks
Experiments based on EE 203

EE 205 Electrical Machines I

3 hours per week 250 Marks

PART A

D.C. generator : Principles, construction, classification, armature winding, voltage build up; Armature reactions and commutation, performance and testing. D.C. motor operation, types, speed-torque characteristics, methods of speed control.

Transformers : Construction, cooling, principle, vector diagrams and voltage regulation.

PART B

Transformer : Equivalent circuits, performance and testing, special transformers uses and harmonics in polyphase transformers.

Induction motors : Principle of operation, constructional details, equivalent circuits, speed-torque relations, losses and efficiency. Circle diagram. Induction generator.

Synchronous Generators : General outline of synchronous generators ; salient pole and non-salient pole. Armature and field cores. Winding insulation, cooling.

EE 206 Electrical Machines Sessional

3 hours every alternate week 50 Marks
Experiments based on EE 205

EE 207 Electronics I

3 hours per week 250 marks

PART A

Electronic phenomena in metals and semi-conductors; Electron emmissions and their different types; vacuum types—diodes, triodes, tetrodes, pentodes and multigrid tubes, their characteristics and equivalent circuits. Semi-conductor diodes, bipolar and field effect transistors, MOSFETS and other electronic

devices, their characteristics and equivalent circuits. Applications of vacuum diodes and semi-conductor diodes in rectification and power supplies, logic circuits and switching circuits (All treatment circuit & device oriented).

PART B

Detailed discussion of load line, bias and stabilization for transistor and FET amplifiers. Different transistor configurations and their equivalent circuits, h-parameters ; Basic transistor and tube amplifiers and their analysis at I.F., M.F., and H.F. ranges ; Untuned voltage amplifiers. Regulated power supplies using zener diodes and transistors.

EE 208 Electronics I Sessional

3 hours every alternate week 50 Marks

Laboratory experiments based on EE 207

EE 211 Electrical and Electronics Technology

3 hours per week 250 Marks

For Second year ME and NAME

PART A

Balanced three-phase circuit analysis and power measurement. Single phase transformer-equivalent circuit and laboratory testing, introduction to three-phase trasformer.

D. C. Generator—principle, types, performances and characteristics, D. C, motor—principles, types of motor, performances, speed control, starters and characteristics. A. C. Machines—three phase induction motor principles, equivalent circuit. Introduction to synchronous machines and fractional horse power motors.

PART B

Vacuum tubes, Semiconductor diode, Transistor-characteristics, equivalent circuits, self-biasing circuits, emitter follower amplifiers, push-pull amplifier. Indroduction to silicon controlled rectifier and its application, Oscilloscope.

Transducers : Strain, temperature, pressure, speed and torque measurements.

EE 212 Eectrical and Electronics Technology Sessional

3 hours every alternate week 50 Marks

Laboratory experiments based on EE 211.

EE 231 Electrical and Eectronic Technology

3 hours per week 300 Marks

For third year ChE and MetE

PART A

Balanced three-phase circuit analysis and power measurement, single phase

transformer—equivalent circuit and laboratrory testing. Introduction to three-phase transformer.

D. C. Gernerator—principle, types, performances and characteristics. D. C. motor-principle, types of motors, performances, speed control, starters and characteristics. A. C, machines—three phase induction motor-principles, equivalent circuit. Introduction to synchronous machines and fractional horse power motor.

PART B

Vacuum tubes, Semiconductor diode, transistors—characteristics, equivalent circuits, self-biasing circuits, emitter follower amplifiers, push-pull amplifier. Introduction to silicon controlled rectifier and its application ; Oscilloscope. Transducers ; Strain, temperature, pressure, speed and torque measurements.

EE 232 Electrical and Eelectronic Technology Sessional

3 hours every alternate week 50 Marks

Laboratory experiments based on EE 231

EEE 300 Electronics Shop Sessional

3 hours every alternate week 50 Marks

Radio receivers—study and circuit tracing, fault finding by signal injection and other means, alignment. Trouble shooting of amplifiers, oscillators, oscilloscopes. Trouble shooting of television receivers.

EEE 301 Elecronics II

3 hours per week 300 Marks

PART A

Feedback, effect of feedback on amplifier characteristics ; Types of feedback, stability, Nyquist criterion ; Negative feedback amplifiers ; Feed back amplifier frequency response. Conditions of self-oscillation and study of different types of oscillators. Direct coupled amplifiers ; Tuned voltage amplifiers, untuned power amplifiers—Class A, Class AB and Class B.

PART B

Tuned Class B and Class C power amplifiers : Modulation—amplitude modulation and demodulation : study of superheterodyne radio receivers, AGC. Television engineering : Introduction and principles of operation ; Camera tubes ; Synchronising pulses ; Television transmitters and receivers ; Introduction to colour television.

EEE 302 Electronic II Sessional

3 hours per week 100 Marks
Laboratory experiments based on EEE 301

EEE 303 Electrical Circuits II

3 hours per week 300 marks

PART A

Characteristics of a linear system—classical methods of transient and steady state solutions of Differential and Integrodifferential equations. Network theorems, Analogous systems. Analysis by Fourier methods.

PART B

Laplace Transformation and its application to linear circuits. Impulse function; Convolution integral and their applications. Matrix with simple applications in circuits: Network function, poles and zeroes of a network. Introduction to Topological concepts in electrical and magnetic circuits network.

EEE 305 Electrical Machines II

3 hours per week 300 marks

PART A

Synchronous Generators : Air gap flux and voltage expressions, armature winding, alternator regulation, determination of machine parameters from tests, vector diagrams, armature reaction, direct and quadrature—axis reactances, losses and efficiency. Blondel's two reaction analysis, transient conditions in alternators, interconnected system of alternators, conditions, methods and problem of parallel operation and load sharing of alternators.
Synchronous motors : General constructional features, theory of operation, motor terminal characteristics, mathematical analysis, vector diagrams, V-curves, motor tests, losses, efficiency and starting.

PART B

Generalized energy conversion processes, general principles of electro-mechanical energy conversion, energy storage, transformation and conversion methods of formulation of motion equations and co-ordinate transformation. Interpretation of generalized machines from field concepts.
Special Machines: Single phase machines—types, principle of operation, characteristics and starting problems, electrostatic motor, repulsion motor, permanent magnet motor, hysteresis motor and power modulators, power rectifiers, amplidynes, power thyristors and frequency multipliers.

EEE 306 Electrical Machines Sessional

3 hours per week 100 marks
Laboratory experiments based on EEE 305

EEE 307 Measurement and Instrumentation

2 hours per week 200 Marks

PART A

Measurement of resistance, inductance and capacitance. Measurement of conductivity of bulk materials. Cable faults and localization of cable faults. Magnetic measurements, ballistic galvanometers, flux meters. Measurements and separation of iron losses. Illumination measurements. High voltage measurements. Operational amplifiers and their applications.

PART B

Instrumentation amplifiers. Transducers ; Measurement of strain, pressure, temperature and flow. Measuring instruments : Classification. Ammeters, voltmeters and multimeters ; Extension of instrument ranges ; Current and voltage transformers ; Measurement of power and energy: Wattmeters Watt-hour meters and maximum demand indicators. Measurement of speed, frequency and phase differences ; Electronic measuring instruments: Oscilloscopes, Digital meters, DMM, VTVM, Q meters. Statistical methods in measurements.

EEE 308 Measurement and Instrumentation Sessional

3 hours every alternate week 50 Marks
Laboratory experiments based on EEE 307

EEE 309 Electromagnetic Fields and Waves

2 hours per week 200 marks

PART A

Review of Vector Analysis. Electrostatics: Coulomb's Law, force, electric field intensity, electrical flux density, Gauss' theorem with application, electrostatic potential, boundary conditions, method of images, Laplace's and Poissons equations, energy of an electrostatic system, conductor and dielectrics.

Magnetostatics : Concept of magnetic field, Ampere's Law, Biot-Savert law, vector magnetic potential, energy of magnetostatic system, mechanical forces and torques in electric and magnetic fields, Curvilinear co-ordinates. Rectangular, cylindrical and spherical coordinates, solutions to static field problems.

Graphical field mapping with applications, solution to Laplace's equation. Rectangular, cylindrical and spherical harmonics with applications.
Maxwell's equations : Their derivations, continuity of charges, concept of displacement current. Boundary conditions for time-varying systems, Potentials used with varying charges and currents. Retarded potentials. Maxwell's equations in different coordinate systems.

PART B
Relation between circuit theory and field theory : Circuit concepts and the derivation from the field equations. High frequency circuit concepts, circuit radiation resistance. Skin effect and circuit impendance. Concept of good and perfect conductors and dielectrics. Current distribution in various types of conductors, depth of penetration, internal impedance, power loss, calculation of inductance and capacitance.

Propagation and reflection of electromagnetic waves in unbounded media : Plane wave propagation, polarization, power flow and Poyinting's theorem. Transmission line analogy, reflection from conducting and conducting dielectric boundary; Display lines ion in dielectrics, liquids and solids, plane wave propagation through the ionosphere. Introduction to radiation.

EEE 311 Transmission and Distribution of Electric Power

3 hours per week 300 marks

PART A
Inductance of Transmission Lines : Flux linkage ; Inductance due to internal flux; Inductance of single phase two-wire line. Flux linkage of one conductor in a group, inductance of composite conductor lines. G.M.D. examples; 3 phase line with equilateral and with unsymmetrical spacing. Parallel circuit 3 phase lines. Use of table.

Electric field ; Potential difference between points due to a charge, capacitance of a two wire line. Group of charged conductors. Capacitances of 3 phase line with equilateral and with unsymmetrical spacing. Effect of earth ; Parallel circuit lines.

Resistance and skin effects : Resistance and temperature, skin effects, influence on resistance. Use of table, current and voltage relation on a transmission line ; Representation of line—short, medium, and long transmission line, tee and pye representation, exact solution. Equivalent circuit of a long line. Mechanical characteristics ; Transmission line, sag and stress analysis. Wind and ice loading ; supports at different elevations; Conditions at erection; Effect of temperature changes.

PART B
Generalized line constant : General line equations in terms of A.B.C.D. constants. Relations between constants, charts of line constants, constants of combined networks, Measurement of line constants.

Circle Diagrams : Receiving and/ sending end power-circle diagrams. Power transmitted ; Maximum power. Universal power-circle diagrams. Voltage and power factor control in transmission systems. Tap changing transformers; On load tap changing. Induction regulators. Moving coil regulators; Booting transformers. Power factor control ; Static condensers; Synchronous condenser, Insulators for overhead lines ; Types of insulators, their constructions and performance. Potential distribution in a string of insulators , string efficiency. Methods of equalizing potential distribution; Special types of insulators. Testing of insulators.

Insulated cables : Cables versus overhead lines. Insulating materials. Electrostatic stress grading. Three core cables; Dielectric losses and heating ; Modren development; Oil filled and gas filled cables. Measurement of capacitances. Cable testing.

Introduction to Transmission Line Protection : Overcurrent relay and time grading, reverse power relays. Differential protection. Distance relays. Distribution : Distributor calculation, ring mains and interconnections.

EEE 314 Electrical Design Sessional

3 hours every alternate week 50 Marks

General design principles of electrical apparatus involving electric and magnetic circuits. Design and specification of chokes, transformers, starters, field regulators etc. Elements of design of rotating machines. Design and interpretation of electrical system layouts.
General design aspect of electronic components ; filters, amplifiers, oscillators, audio transformers. Power supply from both mains and batteries. Typical design problems.

EE 323 Basic Electrical Technology for Architects (Electrical Equipments)

1 hour per week 100 Marks
For third year Architecture

Electrical units and standards, electrical networks and circuits theorems. Alternating current—RLC series and parallel circuits.
Introduction to electrical wiring for residential and commercial loads. Illumination and working principles of different types of lamp.

EEE 400 Project and Thesis
6 hours per week 200 marks
Study of problems in the fields of Electrical and Electronic Engineering.

EEE 401 Control Systems
2 hours per week 200 marks

PART A

Introduction to linear dynamic system and their representation by different equations and Laplace trasform. Block diagram representation and transfer function. Routh's criterion for stability. Frequency respone methods—Bode, Nyquist : Nichols plot etc.

PART B

Type of systems and system analysis in time domain. Root locus. Cascade compensation using root locus and frequency methods. Feedback compensation. Introduction to state variables.

EEE 402 Control Systems Sessional
3 hours every alternate week 50 marks
Laboratory experiments based on EEE 401

EEE 403 Power System Analysis
2 hours per week 200 marks

PART A

Power network representations, per-unit system of calculations, reactances of a synchronous generator and its equivalent circuits, voltage characteristics of load, power and reactive power flow in simple systems, load flow studies of large systems using the Gauss-Seidel methods, control of voltage, power and reactive power, use of network analysers and digital computers, symmetrical fault calculations, limitation of short-circuit currents using regulators.

PART B

Symmetrical components, positive, negative and zero sequence networks of generators, transformers and lines, sequence network of systems, unsymmetrical fault calculations.
Power system stability involving two-machine systems, swing equation, Equal-area criterion of stability and its applications, solution of swing equation, factors affecting transient stability.

EEE 404 Power System Analysis Sessional
3 hours every alternate week 50 marks
Laboratory work based on EEE 403

EEE 405 Power Stations
2 hours per week 200 marks

PART A

Power plant load curves : Estimates of load, load curves, study and analysis of load curves, Interpretation of load curves. Determination of actual demand and capacity of various components in a system, plotting the expected load curve of a system. Use of the load curves. Load growth and extrapolation of load curves. Selection of plant : Effect of variable load on power plant design, continuity of service requirements, its effect on plant design. Cost consideration. Equations of performance for plant equipment and electric service. Selection of units. Standby units, large or small units. Number and sizes of units, Plant location. Considerations for site selction for different types of plants ; General considerations for different types of power plants—Big, medium and small, conventional and nuclear.

PART B

Economic marginal transmission cost. Graphical solution for location of different types of distribution. Recatangular distribution of loads. Economic conductor section. General consideration.
The ideal conductor. Effect of any deviation from the ideal cross section. Limits for size of under ground cables. Selection of ideal supply voltage. Plant performance and operation characteristics. Performance characteristics. Efficiency. Heat rate. Incremental rate method. Station performance characteristics. Station incremental rate. Capacity scheduling. Base load and peak load. Load division between steam and hydro stations. Bus systems, Importance of power control. Current limiting reactors. Different types of bus system lay out. Forces on buses in the case of short circuits. Nuclear power stations. Comparison with conventional generation methods. Chain reactors. Moderators. Classification of reactors. Types of reactors. Special power reactors. Shielding.

EEE 407 Integrated Circuits and Industrial Electronics
3 hours per week 300 marks

PART A

Review and analytical treatment of bipolar-transistor, FET, UJT, MOS and CMOS transistors. IC technology : Fabrication and characteristics of ICs. Detailed study of FET, MOS and CMOS integrated circuits. IC devices : amplifiers, oscillators and special devices.

PART B

Power rectifying devices, gas-filled tubes and power transistors. Controlled rectification using Thyratrons, Ignitrons and SCR. Use of DIACS and

TRIACS in power control. Saturable reactors and magnetic amplifiers. Electronic control of motors. Industrial relay circuits. Timing circuits. Photo-electric devices and circuits. Electronic control of welding machines. Induction and dielectric heatings and their applications in industry. Solar Cells and their applications.

EEE 408 Integrated Circuits and Industrial Electronics Sessional
3 hours every alternate week 50 marks
Laboratory experiments based on EEE 407

EEE 409 Telecommunication Engineering
2 hours per week 200 marks

PART A
Introduction to telegraphy, single current and double current telegraphy, teleprinters, VFT and carrier telegraphy, introduction to telephony, manual switching systems, electro-mechanical switching—strowger and EMD systems, electronic switching, Reed relays, basic impulsing circuits, uniselectors, group selectors and final selectors; Trunking diagrams—strowger system and EMD systems ; Distribution frames—testing and protection of telephone lines. traffic calculations, introduction to network planning.
Introduction to information theory—Measurement of channel capacity, signal transmission through RC network.

PART B
Transmission principles, power levels, attenuation and delay distortions, cross talks, transmission standards, echo and noise, wireless telephony, carrier telephony, repeater, SSB transmitters and receivers, high accuracy crystal latticefilters, introduction to VHF and UHF systems, space communications, tropospheric scatter and satellite communication, lasers and masers with application in communications. Frequency modulation and demodulation periodic sampling and pulse modulation, comparative analysis of information transmission system, signal to noise ratio calculation in PPM, PCM and qualification for noise, introduction to statistical methods in communications.

EEE 410 Telecommunication Engineering Sessional
3 hours every alternate week 50 marks
Experiments based on EEE 409

EEE 411 Science of Materials
2 hours per week 200 marks
PART A
Atoms and aggregates of atoms, crystals, waves in crystals, Schrodinger Wave Equation. Quantum statistics ; Conductivity theory, Collision theory

and conductivity of metals, conductors, Carrier Transport theory. P-N junction, metal semiconductor junction, surface phenomenon, photocell, solar cell, tunneling principles, dielectric : polar and non-polar dielectrics ; Langevinin function, Clausius-Mossotti equation, ferroelectricity.

PART B
Magnetic properties of materials ; magnetic moment, domain wall motion and coercive force in crystals ; polycrystalline and permanent magnetic materials, magnetic resonance, testing of magnetic materials, superconductivity. Quantum electronics.

EEE 413 Switchgear and Protective Relays
2 hours per week 200 marks

PART A
Circuit breakers ; Speed of circuit breakers. Relays Voltage rating (high, medium, lower, low) of circuit breakers. Oil circuit breakers. Circuit breaker operating mechanisms and control systems. Arc extinction. Recovery voltage. Devices to aid arc extinction in oil. Maintenance of oil circuit breakers. Air circuit breakers. Air blast circuit breakers.
Ratings of power circuit breakers and selection of circuit breakers. Testing of circuit breakers. Protective Relays : General requirements. Relay operation principles. Construction of relays. Relay currents and voltages ; Use of instrument transformer for relays.

PART B
Problem of high speed relaying of transmission lines. Overcurrent relays. Directional relays. Distance relays. Impedance relays. Reactance relays. Mho relays. Modified impedance relays. Sequence and negative sequence relays. Balanced current relaying of parallel line. Ground fault relaying. Pilot relaying principles. Carrier pilot relaying. Operating characteristics of different types of relays. Apparatus protection ; Circuits and relay setting. Generator and motor protection ; Transformer protection. Bus protection ; Line protection.

EEE 414 Switchgear and Protective Relays Sessional
3 hours every alternate week 50 marks
Laboratory experiments based on EEE 413

EEE 415 Microwave Engineering
2 hours per week 200 marks

PART A
H. F. transmission lines, Smith chart, impedance matching and applications, E. M. wave propagation, reflection and refraction, wave guides ; parallel plane, rectangular, coaxial wave guides.

PART B

Transit time effects. Velocity modulation, space charge wave, microwave tubes, klystron, magnetron, travelling wave tube amplifier. Wave guide components, cavity resonators, antennas and radiation, hertzian dipole, long antennas analysis, radiation patterns, rhombic and slot antenna, frequency independent and logperiodic antennas, antenna arrays, introduction to antennas and array design.

EEE 416 Microwave Engineering Sessional

3 hours every alternate week 50 marks

Laboratory experiments based on EEE 415.

EEE 417 Electronics III

2 hours per week 200 marks

PART A

Wave shaping. Electronic circuit design using OPAMP. Television engineering : basic television system, composite video signal and television standards, television cameras, transmission and relay systems. Television receivers : black and white, Principles of colour T.V.

PART B

Propagation of Radio waves, Ionospheric, Tropospheric and ground wave propagation. Effect of earth curvature on propagation. Radar—principles of operation and radar systems, Radar equation, magnetron, pulser, TR, ATR, tubes, duplexer, radio-aid-to navigation, LORAN and ILS ; Civil, military and weather applications of radar.

EEE 418 Electronics III Sessional

3 hours every alternate week 50 marks

Laboratory experiments based on EEE 417

419 High Voltage Engineering

2 hours per week 200 marks

PART A

High voltage supplies ; AC Cascaded Transformers. Tesla coils ; DC Valve rectifier Circuits. Cascaded rectifiers. Electrostatic generators ; Vande-Graff generators. Corona : Power loss calculations. Break down of solid, liquid and gaseous dielectrics. Insulation tests. Standard specification.

PART B

Impulse generators. Impulse wave shapes. Mathematical analysis and design consideration of impulse generators. Triggering of impulse

generators. Measurement of high voltages. Transmission line design based on direct strokes, . Insulation co-ordination. Lightning arresters and protector tubes.

EEE 420 High Votage Engineering Sessional

3 hours every alternate week 50 marks

Laboratory experiments based on EEE 419

EEE 423 Electrical Circuits III

2 hours per week 200 marks

PART A

Introductory network concepts. Definition and symbols. Sign convention. Terminals and ports. Network functions. Complex frequency, Driving point and transfer functions. Representation by poles and zeros. Properties of network function, Properties of immititance function ; Positive real function. Hurwitz polynomials. Natural frequencies of network ; Parts of a , network function (Magnitude and phase plots, code and Nyquist diagrams). Minimum phase trasfer function. Calculation of a network function from prescribed real part, imaginary part magnitude or phases. Synthesis of two element : Kind—one port LC, RC and RL one port network.

PART B

Two port networks. Classificatin and characterization of two ports. Two port parameters and natural frequencies. Interconnections of two ports. Common two port configuration. Scattering parameters. One end parameters ; Iterative and image parameters. Filters : Type of filters. Frequency and impedance scaling. Image parameter. Filter ; Design frequency transformation, Butterworth and Schebychev response. Insertion loss. Methods of network Analysis. Block diagrams; Signals flow graphs. State variable techniques. Lattice networks. Bartletts bisection thorem. Synthesis of Lattice network. Unbalancing of Lattice networks transmission characteristic. Signal distortions. Relationship between bandwith and rise time, and between rise time, delay time and net-functions.

EEE 424 Electrical Circuits III Sessional

3 hours every alternate week 50 marks

Laboratory experiments based on EEE 423

POSTGRADUATE COURSES

EEE 6011 Engineering Analysis 3 Credits

Professional methods of dealing with problems. Mathematical and physical principles applied to problems of diverse topics in electrical engineering. Simulation techniques ; statistical methods,

EEE 6012 Energy Conversion 3 Credits

Energy conversion processes ; General introduction, energy sources, principles of conservation of energy balance equations. Direct electrical energy conversion : Introduction ; Magnetohydrodynamic (MHD) ; Fuel cell ; Thermo-electrostatic ; Ferro-electric ; Photo-electric ; Photovoltaic, electrostatic and piezoeoelectric energy conversions ; Characteristics including efficiency, power densities, terminal properties and limitations.

Electro-mechanical energy conversion ; General introduction of electrical to mechanical, mechanical to electrical and electrical to electrical conversions ; Bulk energy conversion devices ; General formulations of equations ; Co-ordinate transformation and terminal characteristics.

EEE 6101 Linear System Analysis 3 Credits

Concepts and properties associated with state and state equations ; Linearity and time invariance ; State vectors and state equations of time invariant differential systems ; Linear time invariant differential systems ; Stability of linear differential systems ; Impulse response of non-differential linear systems ; Impedance functions. Transfer functions and their properties ; Discrete-time systems.

EEE 6102 Network Synthesis I 3 Credits

Properties of driving point and transfer impedance ; Driving point and transfer functions of two-element kind networks ; Synthesis of LC driving point impedances ; Synthesis of R-C driving point impedances, properties of two terminals-pair networks ; Synthesis of loss-less two terminals pair network, real-part sufficiency and related topics ; Synthesis of RLC driving point impedances, filter design.

EEE 6103 Network Synthesis II 3 Credits

Transformer-loss driving point impedance synthesis, conventional methods of transfer function synthesis. Other methods of realizing transfer function. RC transfer function synthesis. The approximation problems. Time domain synthesis.

EEE 6104 Nonlinear Circuits 3 Credits

Numerical methods ; Graphical methods ; Equations with known exact solution ; Analysis of singular points ; Analytical methods ; Forced oscillating system ; Systems described by differential difference equations. Linear differential equation with varying co-efficient. Stability of non-linear systems.

EEE 6105 Advanced Topics in Network Theory 3 Credits

Approximation problem ; Potential analog method ; Distributed networks ; Filters, delay lines, matching transformers, directional couplers, multiplexers, sensitivity analysis, time domain synthesis.

EEE 6201 Statistical Theory of Communication 3 credits

Periodic and random signals; Stationary random processes ; Elements of probability theory, statistical characteristics of messages and noise ; Auto-correlation ; Cross-correlation and spectral analysis. Determination of correlation functions and separation of signals from noise.
Application of correlation techniques. Optimum filter, prodictor etc. Synthesis of optimum linear systems.

EEE 6202 Information Theory 3 credits

Fundamentals of probability theory with a brief review of the methods for the representation and analysis of linear system. Definition of a measure of information. Discrete noiseless and noisy systems ; Channel capacity, coding —the continuous case.

EEE 6203 Telephone Traffic Theory 3 credits

Introduction : Types of switching systems ; Nature of telecommunication traffic ; Full availability ; Limited availability and link system : Lost call cleared theory ; Lost call held theory ; Non-blocking networks ; Characteristics of telecommunication network planning ; Traffic measurement ; Traffic prediction ; Traffic simulation.

EE6301 Power Semiconductor Circuits
EE6302 Design of Power Electronic Circuits

EEE 6401 Advanced Electronics 3 credits

Bias and thermal stability ; High frequency and transient behaviour of transistors ; Z, Y and H parameters in T and equivalent circuits ; Matrix approach ; Amplifiers ; Amplifier stability ; Oscillators ; Integrating, differentiating, counting, timing and pulse circuits ; Wave forming and wave shaping circuits ; Logic circuits.

EEE 6402 Quantum Elactronics 3 credits

Topics in quantum theory important for measure and other quantum-electronic devices. Interaction of radiation and discrete energy level systems. Stimulated transitions rate equations ; Generalized block equations ; Microwave solid state masers ; Optical masers ; Noise and fluctuation phenomena in masers and other amplifiers. Introduction to the quantized electromagnetic fields. Interaction of matter with quantized radiation field. Quantum statistics and description of noise ; Non-linear quantum effects.

EEE 6403 Solid State Devices 3 Credits

Solid state diodes and triodes ; Solid state microwave devices ; Integrated electronic circuits.

EEE 6404 Active Circuit Design 3 Credits

Multi-stage low pass and feedback amplifiers ; High frequency band-pass amplifiers ; Coupling and matching networks.

EEE 6501 Electric and Magnetic Properties of Materials 3 Credits

Crystal structure ; Dielectric properties of materials ; Magnetic properties of materials ; Conduction in materials and semi-conductors. Gaseous discharges and properties of plasma.

EEE 6502 Electronics of Solids 3 Credits

Crystallography ; Energy bands and phoneus transport theory of solids with emphasis on semiconductors ; Superconductivity. Solid state devices, solid state diodes and triodes ; Solid state microwave devices ; Integrated electronic circuits.

EEE 6503 Laser Theory 3 Credits

Quantum electronics applied to electronic energy level transitions. Classical radiation and absorption by electronic narrow band spectra of solids. Principles of gaseous and solid state laser devices. Laser rate equations.

EEE 6601 Applied EM Theory 3 Credits

Generalized approach to field theory : Introduction to reaction concept ; Wave propagation through isotropic, anisotropic and gyrotropic media. Scattering of EM waves. Mircowave antennas—theory and design. Advanced topics in EM theory.

EEE 6602 Microwave Theory and Techniques 3 Credits

Mircrowave oscillators and amplifiers ; Principles of generation of millimeter and sub-millimeter waves ; Detailed analysis of Klystrons, Magnetrons and TWT amplifiers and backward-wave oscillators. Harmonic generators, Gunn-effect devices. Microwave circuits ; Mircrowave network analysis and synthesis. Matrix representation and scattering matrix. Analysis of waveguide discontinuation obstacles, junctions and cavities and strip-lines. Methods of microwave precision measurements.

EEE 6603 Microwave Tubes and Circuits 3 Credits

Electron guns and their design ; Interaction of electron beams and electromagnetic fields. Details of mircrowave tubes. Masers, parametric amplifiers, solid state microwave devices, micro-wave circuits ; Matrix representation of microwave junction ; Periodic structures and backward-wave oscillators. Microwave component design. Analysis of waveguide discontinuations and non-reciprocal microwave circuits, selected topics.

EEE 6604 Antennas and Propagation 3 Credits

Definitions, antenna as an aperature ; Arrays of point sources ; Review of dipoles, loop and thin linear antennas. Helical antenna, biconical and spheroidal antennas. Internal-equation methods, current distribution ; Self and mutual impedances ; Arrays ; Design and synthesis ; Reflector-type antennas. Babiner's principle and complementary antennas ; Select and Horn antennas. Lens and other types of antennas. Application of reaction concept and variational principles in antennas and propagation ; Frequency independent antennas. Scattering and defraction. Selected topics in microwave antennas. Antenna measurements. Application to broadcasting, microwave links, satellite communications and radio astronomy.

EEE 6701 Non-Linear Control Systems 3 credits

General introduction : The phase plane ; Method of isoclines ; Linenard's method ; Pelts method ; Common non-linearities : Transident response from phase trajectory ; Describing functions and their applicants ; Relay servo-mechanism, Liapunov's method.

EEE 6702 Sampled-Data Control Systems 3 credits

Introduction ; Transform and modified Z transform ; Root-Locus and frequency method of analysis of sampled-data systems. Compensation, discrete and continuous method. Physical realization of discrete compensations.

EEE 6703 Modern Control Theory 3 credits

General intruduction ; State space concept ; System design by state—Transition method, concept of controllability and observability. Optimal control-variational calculas method ; Principle of maximum and dynamic programming. Stochastic and adaptive control processes. On-line computer control.

EEE 6704 Optimal Control Systems 3 credits

The optimal control problem. Cost functionals. Use of calculus of variations in optimal control. Optimization by Pontrygin's maximum priniciple and dynamic programming ; applications. Linear regulator problems. Computational methods of solving two-point boundary value problems.

EEE 6705 Statistical Models for Engineering Systems 3 Credits

Introduction to different engineering systems and types of mathematical models. A brief introduction to statistical models with applications. Complex curve fitting, models from sampled time response of various engineering systems with emphasis on electrical engineering systems. Modelling of electrical energy generating systems. Recent advances in system modelling.

EEE 6801 Generalized Machine Theory 3 credits

Introduction to generalized machine theory. Kron's primitive machine ; Moving to fixed-axis transformation ; Parke's transformation ; Three-phase to d—q transformation ; Variable co-efficient transformation, other transformation ; Matrix and tensor analysis of machine, Three-phase synchronous and induction machine ; Two-phase servo motor ; Single-phase induction motor. Smooth-motor two-phase doubly excited machine ; Smooth-airgap two-phase synchronous machine. Two-phase induction machine. The n—m winding symmetrical machine ; Diagonalization by a change of variable ; Symmetrical three-phase machine and special limiting cases.

EEE 6802 Special Machines 3 credits

Course will be broadly on current research topics on electrical machines and devices. The following areas will be covered : Permanent magnet machines, hysteresis machine, eddy current forgue devices ; Homopolar machines, PAM motors, and reluctance machines.

EEE 6803 Power Semiconductors and Modulators 3 credits

Introduction to power modulators ; Review of semiconductor principle with special reference to higher current ratings. Power SCRS, their

design and application to power devices. Power thyristors. Common power rectifiers—Mercury-arc, metallic end semiconductors. Power frequency multipliers.

EEE 6804 Advanced Machine Design 3 credits

General Treatment of Electrical Machine Design. Review of standard procedures in design of D. C. machines, A. C. machines, transformers and special machines. Optimization and synthesis of design procedures. Application of material balance and critical path principles in electrical design. Design economics and safety factors. Applications of computers in modern designs including the operation of the machine in non-linear ranges; Magnetic flux-plots and heat transfer process, etc. Mechanical design of electrical machinery and relation between mechanical and electric machine design.

EEE 6901 Optimization of Power System Operation 3 Credits

General principles of optimization, its application to power system planning, design and operation. Probability analysis for bulk power security and outage data. Economic operation of power system—economic operation of thermal plants, combined thermal and hydro-electric plants. Theory of economic operation of inter-connected areas. Development and application of transmission loss formulae for economic operation of power systems. Methods of optimum scheduling and despatch of generator.

EEE 6902 Computer Aided Power System Design 3 Credits

General review of netwok and matrix theories. Algorithms for formation of network matrices. Three-phase networks flux-linkage calculations, line parameter calculations, short-circuit calculations, load flow studies, system stability studies, prediction of reliability, over voltages and relay co-ordinations.

EEE 6903 Protective Relays 3 Credits

Relay design and constructions ; Main characteristics of protective relays. Over current, directional differential distance and pilot relays. Static relays. Comparators. Errors introduced by C.T's P.T.'s on relay operation. Linear computers.

Effects of transients on relay operation. Harmonic relaying. Reliability of relays. Maintenance and testing of relays. Relaying of the future.

EEE 6904 Power System Stability 3 credits

The stability problems of power system. Distinction between steady state and transient stability. The swing equation and its solution. Solution of networks for stability studies. Transient stability limits criteria. Two machine and multimachine problems. Stability under different types of faults. Typical stability studies and methods of improving stability.

The influence of swinging and out-of step operation upon protective relays. Rapid reclosing for improving stability.

EEE 6905 Transients in Power Systems 3 credits

Transients in simple electric and magnetically linked circuits ; Fundamentals ; Impacts of switching on rotating machinery. Parallel operation of interconnected networks ; Distribution of power impacts. Interaction of Governor's in power systems. Overvoltages during power system faults. Systems voltage recovery characteristics. Effect of arc restriking on recovery voltage. Switching surges and overvoltage arrester requirements. Overvoltages caused by sudden loss of load and by open conductor.

Faculty of Engineering

Department of Chemical Engineering

UNDERGRADUATE COURSES

ChE 101 Elements of Chemical Engineering
2 hours per week 150 marks

PART A

Scope of Chemical Engineering. Principles of chemical engineering calculations : Systems of units, basic concepts of dimensional analysis, process variables, basis of calculation, conservation of mass and energy. Material balance ; overall and component balance, recycle and bypass, simple reactive systems and combustion reactions. Energy balance : Forms of energy and the first law of thermodynamics, thermodynamic data and tables, energy balance on closed and open systems.

PART B

Application of mass and energy balance to real processes. Measurements of process variables : fluid statics and manometry, mechanical energy balance, flow measurement, temperature measurement. Computational techniques : the method of least squares, solution of algebraic equations by Newton's method, numerical integration, application of computers in chemical engineering.

ChE 201 Material and Energy Balance
3 hours per week 250 marks

PART A

Review of material and energy balances involving recycling parallel and bypass operations. Operations involving vapourization, humidification, psychrometry, phase diagrams. Material balances with chemical reactions and multiple components use of algebraic techniques. Energy balances involving change of phases.

PART B

Energy balances on chemical processes. Heats of formation and reaction, effects of temperature and pressure. Heats of mixing, solution. Enthalpy-composition diagram. Combustion, theoretical flame temperature, optimum excess air, ultimate CO_2. Stoichiometry and unit operations in industrial processes.

ChE 202 Material and Energy Balance Sessional
3 hours every alternate week 50 marks
Laboratory experiments based on ChE 201

Department of Chemistry

UNDERGRADUATE COURSES

Chem 101 Chemistry

3 hours per week 200 marks

For first year CE, EEE, MetE, ME and NAME

PART A

Inorganic chemistry : The structure of atom : Particles constituting the atomic model. Wave nature of electrons and shape of the orbitals. Periodic table : Classification of elements, Mande-Leev's periodic table, critical studies on periodic table with its usefulness and limitations. Physical chemistry : Properties of gases and equation of state : Aqueous solution : Types of solution, factors influencing the solubility of a substance, the Le-Chatelliers principle, mechanism of dissolution, evolution and absorption of heat. Different units of concentration, problems involving acid base titrations. Solution of gases in liquids. Distribution of solute between two immiscible solvent, application of distribution law. Properties of dilute solution, vapour pressure, Raoult's Law-its application. Elevation of boiling point, depression of freezing point and osmotic pressure. Colloids and properties of Colloidal system ; Stoichiometry : Empirical and molecular formulas, ionic equations, solution of problems.

PART B

Inorganic chemistry : Nobel Gases ; Occurence, discovery, isolation, general properties, and uses. Importance of noble gas elements in the study of chemistry ; Chemical bond ; Different types of chemical bond, general properties of ionic and covalent compounds. Modern approach of covalent bond. Modern concepts of acids and bases. Different types of chemical reactions. Physical chemistry : Kinetics and chemical equilibria ; Rate of a reaction, factors determining the rate. Law of mass action, evaluation and characteristics of equilibrium constant of a reaction. Ionisation of water and concept of p_H Thermo-chemistry : Types of energy, enthalpy, heat of reaction, heat of combustion, heat of formation and heat neutralization. Experimental determination of thermal changes during chemical reaction. Electrochemistry : Electrolytes, mechanism of electrolytic conduction, transport number and electrolytic conductance.

Chem 102 Chemistry Sessional

3 hours per week 100 marks,

For First year EEE, MetE, ME and NAME

Introduction and scope of analytical chemistry, elementary concepts of quantitative analysis ; Volumetric and grairmetric analysis. Chemical

balance, evaluation of analytical data. Report writing. Experiments ; Preparation of standard solutions of sodium carbonate, Sodium oxalate, oxalic acid, Potassium dichromate etc., standardization of sodium hydroxide, hydrochloric acid, sodium thiosulphate, potassium permanganate etc. Determination of total alkalinity of soda ash. Determination of acetic acid content of vinegar. Determination of copper in copper sulfate solution. Determination of F++ in Mohr's salt and calculation of purity of Mohr's salt. Determination of iron in an ore. Determination of calcium. Determination of chloride by Mohr method. Determination of bleaching powder by iodometry. Determination of sulfur by frairmetric method. Determination of Aluminium as Aluminium oxide.

Chem 102 Chemistry Sessional

3 hours every alternate week 50 marks

For First year CE

Introduction and scope of analytical chemistry, elementry concepts of quantitative analysis : volumetric and gravimetric analysis. Chemical balance, evaluation of analytical data. Report writing.

Experiments : Preparation of standard solutions of sodium carbonate, sodium oxalate, oxalic acid, potassium dichromate etc., standardization of sodium hydroxide, hydrochloric acid, sodium thiosulphate, potassium permanganate etc. Estimation of (i) Cu++ in copper sulphate, (ii) Fe++ in Mohrs salt and calculation of purity of Mohr's Salt (iii) sulphur by gravimetric method.

Chem 103 Physical, Inorganic and Organic Chemistry

3 hours per week 200 marks

For First year ChE

PART A

Physical chemistry : The gaseous state : Equation of state. ideal gas equation, kinetic theory of gases, molecular collision, Dalton's Law of partial pressure and Grahams law of diffusion. The liquid state ; Structure of liquids, surface tension and viscosity of liquids. Molecular, structure and properties of water. Solutions : concentration units, solubility, solubility of gases in liquids, Nernst distribution law and its uses. Thermodynamics scope and limitation. The first law of themodynamics, reversible and irreversible processes. Inorganic chemistry : Modern concept of atomic structure, periodic classification of elements, critical appreciation of the periodic law and periodic table, general treatment and application of the periodic table. Noble Gases : Discovery. sources,

isolation, properties and uses, importance of noble gas elements in the study of chemistry. Organic chemistry ; Introduction to organic chemistry and its importance in our daily life. A comprehensive study of (i) Alkanes, (ii) Alkenes and (iii) Alkynes with special reference to nomenclature, methods of preparation, properties. reactions and important uses. Molecular formula and its fundamental importance, empirical formula, determination of molecular formula from percentage composition. Alcohols, Aldehydes and ketones—their structure, nomenclature, industrial sources, preparation, properties and reactions.

PART B

Physical chemisry ; Changes of state : Vapour pressure of liquid and vapourization, Clausius—Clapeyron equation, vapour pressure of solutions. The phase rule and its application. Collegative properties of dilute solutions. Chemical equilibria : The law of mass action, equilibrium constantant and its characteristics, application of the law to homogeneous and heterogeneous reactions. Dessociation of water and p^H concept. Ionic equilibria. Inroganic chemistry ; Concept of chemical bond, different types of bond and their general treatment. Modern views on acid and bases. Different types of chemical reaction, oxidation—reduction reactions and their applications. Molecular structure and properties of the compounds. Organic chemistry : Aromatic compounds : Benzene and its aromatic character, preparation, and reactions. Studies on structure, nomenclature industrial sources, preparation and properties of alkyl benzene alcohols alkolyde keton carboxylic acids and ester.

Chem 104 Chemistry Sessional

3 hours per week 100 marks

For first year ChE

Volumetric analysis : Acid base titrations, oxidation reduction titrations, estimation of iron in Mohrs salt, iodometric determination of copper, determination of chloride by Volhards method. Determination of calcium in lime stone. Gravimetric analysis : (i) sulfphur as $BaSO_4$ (ii) Zinc as ZnP_2O_7 (iii) Nickel as Ni-dimethyl glyoxime. Detection of sulphur, nitrogen, halogen in organic compounds. Detection of important functional groups in organic compounds.

Math 103 Mathematics Paper II
2 hours per week 150 marks
For First year CE

PART A
Section A : Integral Calculus
Definition of integrations. Integration by the method of substitution. Integration by parts. Standard integrals. Integration by the method of successive reduction. Definite integrals, its properties and use in summing series. Wallis's furmulae.

Section B : Integral Calculus
Improper integrals. Beta function and Gamma function. Area under a plane curve in cartesian and polar co-ordinates. Area of the region enclosed by two curves in cartesian and polar co-ordinates. Trapezoidal rule. Simpson's rule. Arc lengths of curves in cartesian and polar co-ordinates, parametric and pedal equations. Intrinsic equations. Volumes of solids of revolutlon. Volume of hollow solids of revolution by shell method. Area of surface of revolution.

PART B
Section A : Ordinary Differential Equation
Degree and order of ordinary differential equation. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher order with constant co-officients. Solutions of homogeneous linear equations. Applications.

Section B : Matrices, Vectors and three dimensional Co-ordinate Geometry
Matrices : Definition of matrix. Equality of two matrices. Addition, subtraction and multiplication of matrices. Transpose of a matrix and invere of a matrix. Three dimensional Co-ordinate Geometry : System of co-ordinates. Distance of two points. Section formula. Projection. Direction cosines. Equations of planes and lines. Vectors : Definition of vectors. Equality of vectors. Addition and multiplication of vectors. Triple product and multiple products. Applications to geometry and mechanics. Linear dependence and iudependence of vectors.

Math 105 Mathematics Paper I
2 hours per week 150 marks
For First year EEE

PART A
Section A: Differential Calculus
Limit. Continuity and differentiability. Differentiation of explicit and implicit functions and parametric equations. Significance of derivatives.

Differentials. Successive differentiation of various types of functions. Leibnitz's theorem. Rolle's theorem. Mean value theorems. Taylor's theorem in finite and infinite forms. Maclaurin's theorem in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainders. Expansion of functions by differentiation and integration. Partial differentiation. Euler's theorem.

Section B : Differential Calculus
Tangent. Normal. Subtangent and subnormal in cartesian and polar co-ordinates. Determination of maximum and minimum values of functions and points of inflexion. Applications. Evaluation of indeterminate forms by L 'Hospitals' rule. Curvature, radius of curvature, circle of curvature, centre of curvature and chord of curvature. Evolute and involute. Asymptotes. Envelopes. Curve tracing.

PART B
Section A : Co-ordinate Geometry
Change of axes : Transformation of co-ordinates, simplification of equations of curves.
Pair of straight lines : Conditions under which general equations of the second degree may represent a pair of straight lines. Homogeneous equations of second degree. Angle between the pair of lines. Bisectors of the angle between the pair of lines. Pair of lines joining the origin to the point of intersection of two given curves.

Circle : Equation of the circle in cartesian and polar co-ordinates. General equation of a circle. Centre and radius of a circle. Tangents and normals. Condition of tangency of a line. Pair of tangents. Length of tangents. Common chord. Chord in terms of its middle point. Orthogonal circles. Radical axis. Radical centre. Properties of radical axes. Coaxial circles and limiting points.

Section B : Co-ordinate Geometry
Equations of parabola, ellipse and hyperbola in cartesian and polar co-ordinates. Tangents and normals. Pair of tangents. Chord of contact. Chord in terms of its middle point. Parametric co-ordinates. Diameters, conjugate diameters and their properties. Director circles and asymptotes.

Math 105 Mathematics Paper II
2 hours per week 150 marks
For First year EEE

PART A
Section A : Integral Calculus
Definitions of integrations. Integration by the method of substitution. Integration by parts. Standard intergrals. Intergration by the method of successive reduction. Definite integrals, its properties and use in summing series. Wallis's formulae.

Section B : Integral Calculus
Improper integrals. Beta function and Gamma fuction. Area under a plane curve in cartesian and polar co-ordinates. Area of the region enclosed by two curves in cartesian and polar co-ordinates. Trapezoidal rule. Simpson's rule. Arc lengths of curves in cartesian and polar co-ordinates, parametric and pedal equations. Intrinsic equation. Volumes of solids of revolution. Volume of hollow solids of revolution by shell method. Area of surface of revolution.

PART B
Section A : Ordinary Differential Equations
Degree and order of ordinary differential equation. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant co-efficients. Solutions of homogeneous linear equations. Applications.

Section B : Matrices, Vectors and three dimensional Co-ordinate Geometry
Matrices : Definition of matrix. Equality of two matrices. Addition, subtraction and multiplication of matrices. Transpose of a matrix and inverse of a matrix. Three dimensional Co-ordinate Geometry : System of co-ordinates. Distance of two points. Section formula. Projection. Direction cosines. Equations of planes and lines.
Vectors : Definition of vectors. Equality of vectors. Addition and multiplication of vectors. Triple product and multiple products. Applications to geometry and mechanics. Linear dependence and independence of vectors.

Math 107 Mathematics Paper I
2 hours per week 150 marks
For First year ChE and MetE

PART A
Section A : Differential Calculus
Limit. Continuity and differentiability. Differentiation of explicit and implicit

functions and parametric equations. Significance of derivatives. Differentials. Successive differentiation of various types of functions. Leibnitz's theorem. Rolle's theorem. Mean value theorems. Taylor's theorem in finite and infinite forms. Maclaurin's theorem in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainders. Expansion of functions by differentiation and integration. Partial differentiation. Euler's theorem.
Section B : Differential Calculus
Tangent. Normal. Subtangent and subnormal in cartesian and polar co-ordinates. Determination of maximum and minimum values of functions and points of inflexion. Applications. Evaluation of indeterminate forms by L'Hospitals' rule. Curvature. Radius of curvature. Circle of curvature centre of curvature and chord of curvature. Evolute and involute. Asymptotes. Envelopes. Curve tracing.

PART B
Section A : Co-ordinate Geometry
Change of axes : Transformation of co-ordinates, simplification of equations of curves.
Pair of straight lines : Conditions under which general equations of the second degree may represant a pair of straight lines. Homogeneous equations of second degree. Angle between the pair of lines. Bisectors of the angle between the pair of lines. Pair of lines joining the origin to the point of intersection of two given curves.
Circle : Equation of the circle in cartesian and polar co-ordinates. General equation of a circle. Centre and radius of a circle. Tangents and normals. Condition of tangency of a line. Pair of tangents. Length of tangents. Common chord. Chord in terms of its middle point. Orthogonal circles. Radical axis. Radical centre. Properties of radical axes. Coaxial circles and limiting points.

Section B : Co-ordinate Geometry
Equations of parabola, ellipse and hyperbola in cartesian and polar co-ordinates. Tangents and normals. Pair of tangents. Chord of contact. Chord in terms of its middle point. Parametric co-ordinates. Diameters, conjugate diameters and their properties. Director circles and asymptotes.

Math 107 Mathematics Paper II
2 hours per week 150 marks
For First year ChE and MetE

Section A : Integral Calculus
Definitions of integrations. Integration by the method of substitution. Integration by parts. Standard integrals. Integration by the method of successive

factorization of operators. Solution of differential equations by the method of Frobenius. Solution of Bessel's and Legendre's differential equations with properties.

Math 203 Mathematics

3 hours per week 250 marks

For Second year CE

PART A

Section A : Matrices and Differential equations

Rank and elementary transformation of a matrix. Linear dependence and independence of vectors. Solution of linear equations by matrix method. Solution of differential equations of higher order when the dependent and independent variables are absent. Solution of differential equation by the method based on factorization of the operators.

Section B : Vector calculus

Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of scalar function. Divergence and curl of a vector function. Physical significance of gradient, divergence and curl. Various formulae. Integral forms of gradient. Divergence theorem. Stoke's theorem. Green's theorem. Gauss's theorem and their applications. Laplace's equation.

PART B

Section A : Differential equations and Laplace transforms

Solution of differential equation by the method of Frobenius. Definition of Laplace transform. Elementary transformations and properties. Convolution. Solution of differential equations by Laplace transforms. Evaluation of improper integrals by Laplace transforms.

Section B : Differential equations and spherical trigonometry

Solution of Bessel's and Legendre's equation with properties. Spherical triangle. Polar triangle. Properties of spherical triangles. Relations between the sides and angles of a spherical triangle. Properties of a right angled triangle. Solution of triangles.

Math 205 Mathematics Paper I

2 hours per week 150 marks

For Second year EEE

PART A

Section A : Matrices

Rank and elementary transformations of a matrix. Linear dependence and independence of vectors. Solution of linear equations by matrix method.

Vector space, Quadratic forms. Matric polynomials. Determination of characteristic roots and vectors. Null space and nullity of a matrix. Characteristic subspace of matrix.

Section B : Ordinary Differential equations and Fourier series

Solution of differential equations of the higher order when the dependent and independent variables are absent. Solution of differential equation by the method based on the factorization of the operators. Fourier series.

PART B

Section A : Frobenious Method, Bessel's and Legendre's Differential Equations

Solution of differential equations by Frobenius method. Solution of Bessel's and Legendre's equations. Properties of the solutions and expansion of functions in terms of them.

Section B : Partial Differential Equations

Partial differential equations. Wave equations. Particular solutions with boundary and initial conditions.

Math 205 Mathematics Paper II

2 hours per week 150 marks

For Second year EEE

PART A

Section A : Vector Calculus

Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of a scalar function. Divergence and curl of a vector function. Physical significance of gradient, divergence and curl. Various formulae. Integral forms of gradient, divergence and curl. Divergence theorem.

Section B : Multiple Integrals and Vector Calculus

Jacobians. Multiple integrals with applications. Stoke's theorem, Green's theorem and Gauss's theorem.

PART B

Section A : Complex Variables

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. Infinite series. Convergence and uniform convergence.

Section B : Complex Variables

Line integral of a complex function. Cauchy's integral theorem. Cauchy's integral formula. Lieuville's theorem. Taylor's & Laurent's theorems. Singular points. Residue, Cauchy's residue theorem. Evaluation of residues. Contour integration. Conformal mapping.

Math 209 Mathematics

4 hours per week 300 marks

For Second year ChE

PART A

Section A : Multiple integrals and vectors

Jacobians. Multiple integrals with applications. Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of scalar function. Divergence and curl of a vector function. Physical significance of gradient, divergence and curl. Various formulae. Integral forms of gradiant, divergence and curl, Divergence theorem. Stoke's theorem, Green's theorem, Gauss's theorem and their applications. Laplace's equation. Curvilinear co-ordinates.

Section B : Sets, groups, rings and fields, Infinite series and matrices

Sets. Subsets. Basic set operations. Mappings and relations. Definitions of group, ring and field. Convergence and divergence of infinite series. Rank. Elementary transformations of matrix. Solution of linear equations by matrix methods. Vector spaces. Linear dependence and independence of vectors. Quadratic forms. Matric polynomials. Determination of characteristic roots and vectors. Null space and nullity of a matrix. Characteristic subspace of a matrix.

PART B

Section A : Differential equation

Singular solutions and their physical interpretations. The homogeneous linear equations. Simultaneous linear equations with constant co-efficients. Solutions of differential equations of higher order (i) when dependent variables are absent, (ii) when independent variables are absent. Solution of differential equations by the method based on the factorization of the opetors. Solution in series by Frobenius methods. Bessel's and Legendre's differential equations and their properties.

Section B : Laplace transforms

Definition of Laplace transforms. Elementary transformations and properties. Application of Laplace transforms for determining the solutions of differential equation. Evaluation of improper integrals by Laplace transforms.

Math 211 Mathematics

3 hours per week 250 marks

For Second year MetE

PART A

Matrices : Rank and elementary transformation of matrix. Solution of linear equations by matrix methods. Vector spaces. Linear dependence and independence of vectors. Quadratic forms. Matric polynomial. Determination of characteristic roots and vectors.

Solid Geometry : Angle between lines and planes, distance from a point to a plane, condition of perpendicularity and parallelism of planes and straight lines, perpendicular distance from a point to a strainght line, coplanar lines, shortest distance between two given straight lines and volume of a tetrahedren,

Vector calculus : Differentiation and integration of vectors together with elementary applications. Definition of line, surface and volume integrals. Gradient, divergence and curl of a vector function. Physical significance of gradient, divergence and curl, various formulae. Divergence theorem, Stoke's theorem, Green's theorem, Gauss's theorem and their application.

PART B

Differential equation : Solution of differential equation of higher order when the dependent and the independent variables are absent. Solution of Euler's linear homogeneous differential equation. Solution of the differential equation by the method based on factorization of the operator.

Convergence and divergence of infinite series. Solution of differential equation by the method of Frobenius. Solution of Bessel and Legendre equations with properties. Laplace's transform : Definition of Laplace's transform. Elementary transformation and properties. Convolution. Solution of differential equation by Laplace's transforms. Evaluation of improper integrals by Laplace's transfrom. Fourier series expansion.

Math 213 Mathematics paper I

2 hours per week 150 marks

For Second year NAME

PART A

Section A : Vector calculus

Differentiation and integration of vectors together with elementary applications. Difinitions of line, surface and volume integrals. Gradient of a scalar function. Divergence and curl of a vector function. Physical significance of a gradient, divergence and curl of various formulae.

Caledar

Fourier series. Convergence of Fourier series, Fourier analysis. Fourier integral. Introduction to Laplace equation in cartesian, cylindrical and spherical co-ordinates. Cylindrical harmonics. Spherical harmonics Potential of a ring. Potential about a spherical surface. General properties of harmonic functions. Partial differential equation. Wave equations. Particular solution with boundary and initial conditions.

Section B : Numerical Analysis

Solution of algebraic and tanscendental equations by graphical method. Regula falsi method. Newton-Raphson method. Iteration method. Geometrical significance of Newton-Raphson method and Iteration method. Convergence of Iteration and Newton-Raphson methods. Newton—Raphson method and Iteration method for the solution of simultaneous equations. Graeffe's root-squaring method for the solution of algebraic equations. Solution of ordinary first order differential equations by Picards method and Euler's method. Runge-Kutta's method for solving different equations.

PART B

Section B : Complex Variables

Complex Number System. General function of a complex variable. Limits and continuity of a function of complex variable and related theorems. Complex differentiation and Cauchy-Riemann equations. Infinite series. Convergence and uniform convergence. Line integral, complex function. Cauchy's integral theorem. Singular points. Residue. Cauchy's residue theorem. Evaluation of Residues. Contour integration, conformal mapping.

Section B : Numerical analysis

Interpolation. Simple differences. Simple difference tables. Newton's formula for forward interpolation. Newton's formula for backward interpolation. Divided differences. Tables of divided differences. Relation between divided differece and simple differences. Newton's general interpolation formula. Lagrange's interpolation formula. Inverse interpolation by Langrange's formula and by successive approximations. Numerical integration. General quadrature formula for equidistant ordinates, Trapezoidal rule. Simpson's rule. Weddle's rule. Relative study of the three rules. Gauss's quadrature formula. Legendre's polynomials. Newton—Cote's formula. Principle of least squares. Curve fitting.

Math 309 Mathematics

2 hours per week 200 marks

For third year EEE

PART A

Section A : Laplace transforms and differential equation

Definition of Laplace transform. Elementary transformations and properties. Convolution. Solution of differential equations by Laplace transforms. Evalution of improper integrals by Laplace transforms. Differerential equations. Wave equations. Particular solution with boundary and initial conditions.

Section B : Fourier series and Harmonic Analysis

Fourier series. Convergence of fourier series. Fourier integral. Introduction to Laplace equation in cartesian, cylindrical and spherical co-ordinates. Cylindrical Harmonics. Spherical Harmonics. Potential of a ring. Potential about a spherical surface. General properties of Harmonic functions.

PART B

Section A : Statistics

Frequency distribution. Mean. Median. Mode and other measure of central tendency. Standard deviation and other measures of dispersion. Moments. Skewness and curtesis. Elementary probability theory and discountinuous probability distributions, e. g. binomial, Poisson and negative binomial.

Section B : Statistics

Continuous probability distributions, e. g. normal and exponential. Characteristic of distributions. Elementary sampling theory. Estimation. Hypothesis testing and regression analysis.

Department of Physics

UNDERGRADUATE COURSES

Phy 101 Physics
3 hours per week 200 marks
For First year CE, EEE, ME and NAME

PART A

Heat and Thermodynamics

Kinetic theory of gases : Deduction of gas laws, principle of equi-partition of energy. Equation of State : Andrew's experiment, Vander Waals' equation, Critical constants. Transmission of Heat : Conduction, Convection and Radiation.

Laws of Thermodynamic : First law of thermodynamics, Internal energy, specific heats of gases, work done by expanding gas, elasticities of a perfect gas; Second law of thermodynamics, Carnot's cycle, efficiency of heat engines, Absolute scale of temperature, Entropy and its physical concept, Maxwell's thermodynamic relations, Statistical mechanics.

Optics

Combination of Lenses : Equivalent lens and equivalent focal length. Defects of images formed by lenses : Spherical aberration, astigmatism, Coma, distortion, curvature of the image, chromatic aberration. Theries of Light : Huygen's principle and construction. Interference of light : Young's double slit experiment, biprism, Newton's rings, interferometers, interferenc by multiple reflection. Diffraction of light : Fresnel and Fraunhofer diffraction, diffractipn by single slit. diffraction by double slit, diffraction gratings. Polarization : Production and analysis of polarized light, optical activity. Optics of Crystals.

Waves and Oscillations

Oscillations : Simple harmonic motion, Combination of S. H. M. and Lissajous figures, Damped Osciliations, Forced Oscillations, Resonance, Vibrations of membranes and columns.

Waves : Travelling waves, the principle of superposition, Wave velocity, group velocity and phase velocity, power and intensity in wave motion, Interferenc of waves, diffraction of waves, Reflection and transmission of waves at a boundary, standing waves.

Sound Waves : Audible, Ultrasonic, infrasonic and Supersonic waves ; Propagation and speed of longitudinal waves, travelling longitudinal waves, Standing longitudinal waves, Vibrating systems and sources of sound, beats, The Doppler effect.

Architectural Accoustics : Reverberation, Noise insulation and reduction, Sound absorption, Sound distribution, Room accoustics, Recording.

PART B

Properties of Matter

Atomic Structure of Matter : Atoms, ions and molecules, States of matter ; Solids, Liquids and gases, Interparticle Forces. Elasticity : Stress Strain, Elastic Constants. Viscosity : Critical velocity and Reynold's number, Poiseulli's equation Stoke's law. Hydrodyamics : Equation of continuity, Bernoulli's equation and its Applications. Surface Tension : Surface effects, free surface energy, Molecular Theory of surface tension, excess-pressure theorem, contact angle, capillarity. Crystallography : Types of bonds, Types of Crystals, X-ray diffraction and Bragg's law, Plasticity and crystal defects, metals, Insulators and semiconductor, elementary band theory, Superconductors and plasma.

Modern Physics

Relativity : Michelson-Morley experiment, Lorentz-Einstein transformation, Mass energy relation. Quantum effect : Photo electric effect, Compton effect. Wave Mechanics : de—Broglie wave, Correspondence principle, Uncertainty principle, Schrodinger's wave equation. Atom model : Bohr's theory of one electron atoms, vector atom model. Radio—activity : Radio active decay, Half life, mean life, laws of successive disintegration, radioactive equilibrium. The Nucleus Properties of a Nucleus—binding energy, Nuclear reactions—nuclear reactors.

Electricity and magnetism

Electrostatics : Charge and matter, Coulomb's law, the electric field, Gauss's law, electric potential, capacitors and dielectrics.

Current Electricity : Current and resistance, Ohmic and non-ohmic material, variation of resistance with temperature—resistance thermometer ; Thermo-electricity-thermoelectric thermometer.

Electromagnetism : Magnetic fields, Ampere's law, Faraday's law, Lenz's law, Inductance—Self and mutual inductance.

Magnetic Properties of matter : Magnetomotive force, magnetic field intensity, Permeability and susceptibility, classification of magnetic material, magnetization curves of Ferromagnetic materials, magnetic circuits, magnetostriction.

Phy 102 Physics Sessional

3 hours every alternate week 50 marks

Experiments based on Phy 101

Phy 103 Physics

3 hours per week 200 marks

For First year ChE and MetE

PART A

Heat and Thermodynamics

Kinetic Theory of Gases : Deduction of gas laws, Principle of equipartition energy, Conductivity, Viscosity, Diffusivity. Equation of State : Andrew's experiment, Vanderwaals' equation, Critical constants. Transmission of Heat : Conduction, Convection and radiation.

Laws of Thermodynamics : First law of thermodynamics, Internal energy, specific heats of gases work done by expanding gas. Elasticities of a perfect gas; Second law of thermodynamics, Carnot's Cycle, Efficiency of heat engines, Absolute scale of temperature, Entropy and its physical concept. Maxwell's thermodynamic-relations, Surface tension and surface energy, Statistical mechanics.

Optics

Combination of Lenses : Equivalent lens and equivalent focal length. Defects of images formed by lenses : Spherical aberration, Astigmatism, Coma, Distortion, Curvature of the Image, Chromatic aberration. Optical Instruments : Compound Microscope, Polarizing Microscope, Resolving power of Microscopes, Camera and photographic techniques. Theories of Light : Huygen's principle and construction. Interference of Light : Young's double slit experiment. Biprism. Newton's rings. Interferometers Interference by multiple reflection. Diffraction of Light : Fresnel and Fraunhofer diffraction, Diffraction by single slit, Diffraction by double slit, Diffraction gratings. Polarisation : Production and analysis of polarized light, Optical activity, Optics of crystals.

Waves and Oscillations

Oscillations : Simple harmonic motion. Combination of S. H. M. and Lissajous figures, Damped oscillations, Forced ocillations. Resonance, Vibrations of membrances and columns.

Waves : Travelling waves. The principle of Superposition, Wave velocity, Group velocity and phase velocity, Power and intensity in wave motion, Interference of waves, Diffraction of waves Reflection and transmission of waves at a boundary, Standing waves.

Sound Waves : Audible, Ultrasonic, Infrasonic and Supersonic waves; propagation and speed of Longitudinal waves, Travelling Longitudinal waves,

optimality analysis : Transportation-Primal and dual algorithms ; Revised simplex ; Decomposition principle ; Network flow ; An introduction to MPSX programme.

IPE 6205 Quantitative Analysis II (Preq. IPE 6201) 3 Credits

Mathematical tools ; Cost, volume, profit analysis ; Decision making with an uncertain future ; Linear Programming : Games and Strategies ; Inventory and production : Forecasting ; Markov analysis ; Waiting lines ; PERT, CPM.

IPE 6206 Computer Methods in Industrial Engineering 3 Credits

Computers and modes of storage memory. Access time for different data storage system. Software of a computer : Executive, Macros, Library system, monitoring and editing of a programme. Batch Processing, time-sharing, paging, Computer languages ; FORTRAN, GPSS, DYNAMO. Use of computers in Production Planning and control, Information system, inventory management, simulation etc.

Department of Mechanical Engineering

UNDERGRADUATE COURSES

ME 101 Thermal Engineering
3 hours per week 200 marks
For first year ME and NAME

PART A
Study of sources of energy, introduction to renewable energy sources, study of steam generating units with accessories and mountings, performance study of steam generators ; reciprocating steam engines and steam turbines—their study and performance ; study of pumps, blowers and compressors.

PART B
Introduction to internal combustion engines and their cycles, study of petrol engines, diesel engines and gas turbines with their accessories, performance study of internal combustion engines, Study of refrigeration and air-conditioning systems.

ME 102 Thermal Engineering Sessional
3 hours every alternate week 50 marks
For First year ME and NAME
Sessional classes based on ME 101

ME 103 Basic Mechanical Engineering
2 hours per week 150 marks
For First year EEE

PART A
Study of fuels, steam generating units with accessories and mountings, performance study of steam generator, steam turbine, their study and performance ; study of pumps and compressors.

PART B
Introduction to internal combustion engines and their cycles : study of petrol engines, diesel engines and gas turbines with their accessories ; performance study of internal combustion engines, study of refrigeration syatem.

ME 104 Basic Mechanical Engineering Sessional
3 hours every alternate week 50 marks
For First year EEE
Sessional classes based on ME 103

ME 105 Engineering Mechanics
3 hours per week 200 marks
For First year ChE

PART A
Introduction, resultant and component of forces ; Freebody diagrams ; Friction—belt friction, pivot friction ; Non-coplanar forces ; Non-coplanar parallel forces ; Centroids ; Moments of inertia of area and mass.

PART B
Kinematics of plane motion : Rectilinear motion, Curvilinear motion, Trajectory ; Simple Harmonic Motion, Centro, Relative Motion.
Kinetics : Newton's laws, Inertia force. Conservation of energy, K.E. of a rotational body, Bodies in plane rolling, work, power. Impulse, conservation of momentum, Impact ; Basic mechanisms.

ME 107 Basic Thermal Engineering and Engineering Mechanics
3 hours per week 200 marks
For First year MetE

PART A
Sources of Energy. Boilers and their accessories and mountings ; Study of steam turbines. Introduction to Internal combustion engines ; study of petrol engines, diesel engines and gas turbines. Introduction to pumps, blowers and compressors. Introduction to Refrigeration and Air-Conditioning.

PART B
Introduction to engineering mechanics : Resultant and components of forces ; Free-body diagrams. Moments and coplanar forces ; Trusses ; Friction. Centroid, Moments of inertia. Application of Work-Energy principles of rigid bodies. impulse aud Momentum.

ME 108 Basic Thermal Engineering and Engineering Mechanics Sessional
3 hours every alternate week 50 marks
For First year MetE
Sessional work based on ME 107

ME 112 Basic Mechanical Engineering Drawing
3 hours every alternate week 50 marks
Introduction, Scale drawing, Sectional views, Isometric views. Missing line. Auxiliary view.

ME 201 Basic Thermodynamics
3 hours per week 250 marks
For Second year ME and NAME

PART A
Fundamental concepts and definition. Laws of thermodynamics and their corollaries, non flow process and flow process, ideal gases and their cycles, thermodynamic cycles and processes.

PART B
Properties of pure substances, mixtures of gas and vapour, fuels and combustion, principles of refrigeration, reciprocating compressors.

ME 202 Basic Thermodynamics Sessional
3 hours every alternate week 50 marks
For Second year ME and NAME
Experiments based on ME 201

ME 203 Engineering Mechanics
3 hours per week 250 marks

PART A
Introduction and basic concepts. Resultant and components of forces ; Free body diagrams. Equilibrium of coplanar forces. Centroids. Moment of interia of area and mass. Kinematics of absolute motions, Kinematics of relative motions.

PART B
Friction. Maximum and Minimum forces. Equilibrium of spatial force systems. Basic mechanisms. Kinetics of rectilinear and curvilinear motion of particles. Kinetics of Plane motion of rigid bodies. Principles of work and energy. Principles of impulse and momentum.

ME 205 Mechanics of Solids
3 hours per week 250 marks
For Second year ME and MetE

PART A
Introduction ; Analysis of axially loaded members, Thermal stress ; centrifugal stress, statically indeterminate axially loaded members stresses, in thin walled cylinders and spheres ; riveted and welded joints.

Beams, shear force and bending moment diagrams, various types of stresses in beams, Flexure formula. Deflection of beams. Integration and area moment methods.
Reinforced concrete beams and slabs.

PART B

Torsion formula, Angle of Twist, Modulus of Rupture, Helical Springs. Combined stresses, Principal stresses and principal planes, Mohr's Circle. Columns, Fuler's formula, Intermediate column formulas, the Secant formula. Flexure formula for curved beams. Thick walled cylinders. Introduction to experimental stress analysis techniques, Strain Energy, Failure Theories.

ME 206 Mechanics of Solids Sessional

3 hours every alternate week 50 marks

Solution of problems and experiments based on ME 205

ME 207 Thermofluid Mechanics

3 hours per week 250 marks

For second year EEE

PART A

System, properties and processes, equation of state, properties and laws of perfect gases, and ideal gas cycles. Pure substance, laws of thermodynamics and their corollaries.

Fluid properties and statics, principles of conservation of mass, pressure on curved surface, energy and momentum and their application, flow measurements, laminar and turbulent flow in pipes.

PART B

Thermodynamics of steam generation, boilers, steam cycles and internal combustion engine cycles.

Turbomachineries, pelton wheel ; Reaction turbines. Cantrifugal and axial flow pumps and fans ; Reciprocating pumps.

ME 208 Thermofluid Mechnics Sessional

3 hours every alternate week 50 marks

For Second year EEE

Experiments based on ME 207

ME 209 Mechanics of Materials

3 hours per week 250 marks

For Second year ChE

PART A

Introduction, Stress, Strain, thermal stress, statically indeterminate axially loaded members, stresses in thin walled cylinders. Riveted and welded joints, Thereaded Fasteners.

Beams, shear force and bending moment diagrams, relation between S.F. and

B.M., various types of stresses in beams; Flexure formula, deflection of beams, Integration and area moment method.

Reinforced concrete beams and slabs.

PART B

Torsion of shafts and springs. Combined stress, principal planes, Mohr's circle, Columns, Euler's formula, Intermediate column formula. Thick walled cylinder and spheres. Power transmission elements.

ME 212 Mechanical Engineering Drawing

3 hours every alternate week 50 marks

Introduction, fasteners and gears. Working drawing of machine elements with sectional views, detail drawing, sub-assembly drawing, assembly drawing.

ME 217 Elements of Fluid mechanics and machinery

2 hours per week 150 marks

For Second year MetE

Subject to approval of Academic Council

PART A

Fluid properties, Fluid static, Manometry, Forces on submerged planes and curved surfaces, buoyancy and floatation.

One dimensional flow of fluids : the equation of continuity. Euler's equation. Flow of fluids in pipes. Bernoulli's equation. Flow through venturimeter, Head losses.

PART B

Open chnnel flow, flow through weir, notches, Impuls and momentum principle, fans blowers study of centrifugal compressors and reciprocating pumps,

ME 300 Computer Programming

3 hours every alternate week 50 marks

Introduction to FORTRAN language. Concept of an algorithm. Development of flow charts to solve engineering problems and to complete the computational task. Conversion of flow chart to computer programme in FORTRAN. Computer programming for solution of algebraic and transcendental equations by different iteration techniques, linear equations, matrices, interpolation, differentiation, integration, finite differences, linear ordinary and partial differential equations. Curve fitting.