BUET

CALENDAR

1978

Bangladesh University of Engineering and Technology, Dacca

CALENDAR 1978

বাংলাদেশ প্রকৌশল বিশ্ববিদ্যালয়
ঢাকা

Bangladesh University of Engineering and Technology, Dacca

CALENDAR 1978

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Historical Background

Bangladesh University of Engineering and Technology, generally known as BUET, is the oldest institution for the study of engineering in Bangladesh. The history of this institution dates back to the days of Dacca Survey School which was established in 1876 to train surveyors for the then government of Bengal of the British India. As the years passed, the survey school became the Ahsanullah School of Engineering offering three year diploma courses in civil, electrical and mechanical engineering. In 1943 the school was transformed to Ahsanullah Engineering College as a faculty of engineering of the University of Dacca offering four year bachelor's courses in civil, electrical, mechanical, chemical and metallurgical engineering. With a view to meeting the increasing demand of engineers and to expand the facilities of engineering education, in general, and to create facilities for postgraduate studies and research, in particular, Ahsanullah Engineering College was upgraded to the status of a university with the name East Pakistan University of Engineering and Technology, in the year 1962. After December 16, 1971 it was renamed the Bangladesh University of Engineering and Technology.

BUET campus is in the heart of the city of Dacca. It has a compact campus with halls of residence within walking distance of the academic buildings. The physical expansion of the university over the last ten years has been impressive.

Undergraduate courses in the faculty of engineering extend over four years and lead to B Sc Engineering degrees in civil, electrical, mechanical, chemical, metallurgical, naval architecture and marine engineering and water resources engineering. In the faculty of architecture and planning, one spends five years for the degree of bachelor of architecture.

Postgraduate studies and research are now integral part of university activities. Most of the departments in the faculty of engineering now offer M Sc Engineering degree and some departments have started Ph D program. Postgraduate degree in urban and regional planning is offered in the faculty of architecture and planning. In addition to its own research programs the university undertake research programs sponsored by outside organisations. The expertise of the university teachers and the laboratory facilities of the university are also made available to the various organisations of the country. The university is persistent in its effort to continually improve its research facilities, staff position, and courses and curricula to meet the growing technological challenges faced by the country.

Chancellor
Major General Ziaur Rahman, *BU, PSC*

Vice Chancellor
Professor Wahiduddin Ahmad, *Ph D*

Dean of the Faculty of Engineering
Musharrif Husain Khan, *Ph D*

Dean of the Faculty of Architecture
Md. Abdul Muktadir, *Ph D*

Registrar
Kazi Md. Zahiruddin, *M Sc*

Comptroller
Ali Hyder Chowdhury, *M A*

Director of Students Welfare
M. A. Jabbar, *M Sc*

Director of Advisory Extension and Research Services
Jasimuz Zaman, *Ph D*

Librarian
Md. Shahabuddin, *M Sc*

Controller of Examinations
Abu Taher, *B Sc Engg.*

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General Information

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Faculty of Engineering

The Faculty of Engineering consists of the following teaching departments :

1. Chemical Engineering
2. Civil Engineering
3. Electrical Engineering
4. Mechanical Engineering
5. Metallurgical Engineering
6. Naval Architecture and Marine Engineering
7. Water Resources Engineering
8. Chemistry
9. Mathematics
10. Physics

The faculty of engineering offers Bachelor of Science in Engineering degrees in chemical, civil, electrical, mechanical, metallurgical, naval architecture and marine engineering and water resources engineering. The course extends over four years. The first year of the course is common to all students, after which the students pursue three more years of studies in the branches of their choice.

Entrance Requirements

Students get themselves admitted into the general First year course through an open competitive examination. Candidates for fresh admission into the university must have passed the Higher Secodary Certificate (HSC) Examination (Science Group) of any of the Secondary Education Board of Bangladesh or they must have equivalent qualifications from abroad. Students enter the general course in engineering on the basis of the results of the competitive admission test. The number of fresh entrants in the faculty of engineering is usually 420. After studying the general course for one year and once they pass the first year examination, students opt for any of the branches of engineering viz. chemical, civil, electrical, mechanical, metallurgical, naval architecture and marine engineering and water resources

engineering. The detailed rules of admission are framed by the Academic Council of the university.

Usually, the notice for admission is advertised in the local newspapers soon after the results of the HSC examination are announced by the different Secondary Education Boards. Application blanks and any other information may be obtained from Registrar's office.

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

Registration/Admission

After the publication of the results of the competitive admission test, the qualified candidates after being medically examined by the medical officer of the University and declared fit, can get themselves admitted into the First year course by paying the necessary fees, etc. at the BUET branch of the Sonali Bank after getting their papers verified by Registrar's office.

Admittance to the university is subject to the requirement that the student will comply with the admission procedure and will obey the statutes, ordinances and regulations of the university.

Examinations and Promotions

For the purpose of examination, a Course is divided into two approximately equal parts, Part A and Part B. These divisions are approved by the Academic Council and do not normally change from session to session. Part A and B examinations are held in the theory subjects.

Examinations on the material of Part A are held in the middle of the session and they carry 50% marks allotted for the courses.

Examinations on the material of Part B only are held at the end of the session and they carry the remaining 50% of the marks for the courses.

In order to pass an examination, a candidate is required to obtain not less than 40% of the total number of marks in each of the theory, sessional/practical subjects described in the curricula.

A student is promoted to the next higher class when he passes in all the courses. The result of the examination is determined by calculating the total marks obtained by a student in a subject in Part A and Part B examinations.

Distribution of marks of different theory courses are as follows :

				1st Year	2nd Year	3rd Year	4th Year
1	hour	per	week	50	100	100	100
2	,,	,,	,,	150	150	200	200
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 for a course of 3 hours every alternate week marks will be 50.

Those who fail in not more than two theory subjects are allowed to sit for an examination called "Referred Examination" to clear those subjects. A student who fails in Referred examination is required to repeat all the courses of the previous academic year.

Merit position of students are determined among students who pass in all subjects in regular examination.

Classes are awarded on the basis of the following achievements :

1. aggregate 75% or above—Ist Class with Honours.
2. aggregate 60% or above but below 75%—Ist class.
3. aggregate below 60%—2nd class.

SUMMARY OF COURSES

First Year *(Common Course)*

Course No		Subject	Hours/week	Marks
Phys	101	Physics	3—0	200
Chem	101	Chemistry	3—0	200
CE	101	Surveying	1—0	50
EE	101	Basic Electrical Engineering	3/2—0	100
ME	101	Basic Mechanical Engineering	3/2—0	100
Math	101	Mathematics		
		Paper I	2—0	150
		Paper II	2—0	150
Hum	101	English and Economics	2—0	150
Phys	102	Physics Laboratory	0—3	100
Chem	102	Chemistry Laboratory	0—3	100
ME	102	Mechanical Engineering Laboratory	0—3/2	50
EE	102	Electrical Engineering Laboratory	0—3/2	50
CE	104	Civil Engineering Drawing	0—3/2	50
ME	104	Mechanical Engineering Drawing	0—3/2	50
CE	102	Survey Practical	2 weeks	100
Work-Shop				
Shop	102	Carpentry Shop	0—3/2	50
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

Chemical Engineering

Second Year

Chem	201	Organic and Inorganic Chemistry	3—0	250

Chem	202	Organic and Inorganic Chemistry Laboratory	0—3	100
Chem	203	Physical Chemistry	3—0	250
Chem	204	Physical Chemistry Laboratory	0—3	100
Math	201	Mathematics		
		Paper I	3/2—0	125
		Paper II	3/2—0	125
Hum	201	Government and Sociology	2—0	150
ChE	201	Chemical Process Principles	3—0	250
ChE	203	Transport Processes I	4—0	300
ChE	204	Chemical Engineering Problems and Laboratory	0—5	200
ChE	205	Process Equipment Design	2—0	150

Third Year

Hum	303	Development Economics and Accounts	2—0	200
Math	301	Mathematics	2—0	200
Math	303	Numerical Analysis	1—0	100
Math	304	Numerical Analysis Sessional	0—2/2	50
EE	231	Electrical Technology	3—0	300
EE	232	Electrical Technology Laboratory	0—3/2	50
ChE	301	Chemical Process Industries-I	3—0	300
OR				
ChE	303	Glass Technology I	3—0	300
ChE	302	Chemical Process Analysis Sessional	0—2	100
ChE	305	Transport Processes II	3—0	300
ChE	306	Chemical Engineering Laboratory and Problems	0—6	200
ChE	307	Chemical Engineering Thermodynamics	3—0	300
ChE	308	Chemical Engineering Thermodynamics Sessional	0—3/2	50
ChE	309	Chemical Reaction Engineering	2—0	200

Fourth Year

ChE	400	Project/Thesis	0—6	200
ChE	401	Chemical Process Industries II	2—0	200
OR				
ChE	403	Transport Phenomena	2—0	200
ChE	405	Economics and Management for Chemical Process Industries	3—0	300
ChE	407	Materials Science and Corrosion Engineering	3—0	300
ChE	409	Process Design and Economics for Chemical Engineers	2—0	200
ChE	410	Process Design Sessional	0—5	200
ChE	411	Process Control	2—0	200
ChE	413 }	Technology of Petrochemicals and Refinery Engineering	2—0	200
ChE	414 }	Petroleum Laboratory	0—3/2	50
OR				
ChE	415 }	Technology of Pulp and Paper	2—0	200
ChE	416 }	Pulp and Paper Laboratory	0—3/2	50
OR				
ChE	417 }	Technology of Polymers	2—0	200
ChE	418 }	Polymer Laboratory	0—3/2	50
OR				
ChE	419 }	Technology of Fuels and Gases	2—0	200
ChE	420 }	Fuels and Gas Laboratory	0—3/2	50
OR				
ChE	421 }	Technology of Glass II	2—0	200
ChE	422 }	Glass Laboratory	0—3/2	50
OR				
ChE	423 }	Nuclear Engineering	2—0	200
ChE	424 }	Nuclear Engineering Laboratory	0—3/2	50
OR				
ChE	425 }	Food Technology	2—0	200
ChE	426 }	Food Technology Laboratory	0—3/2	50
ChE	432	Applied Mathematics for Chemical Engineers Sessional	0—3	100
OR				
ChE	434	Instrumental Methods of Analysis Laboratory	0—3	100
ChE	436	Seminar	0—2/2	50
ChE	438	Chemical Engineering Problems and Laboratory	0—3	100

Civil Engineering

Second Year

WRE	221	Fluid Mechanics and Hydraulics	3—0	250
EE	201	Electrical Technology	2—0	150
EE	202	Electrical Technology Laboratory	0—3/2	50
Hum	205	Accountancy	2—0	150
Math	203	Mathematics		
		Paper I	2—0	150
		Paper II	2—0	150
CE	201	Mechanics of Materials	3—0	250
CE	202	Strength of Materials Laboratory	0—3/2	50
CE	203	Engineering Materials	3—0	250

CE	204	Materials Laboratory	0—3/2	50
CE	207	Geodesy and Photogrammetry	2—0	150
CE	210	Details of Construction and Estimating Sessional	0—3	100
CE	215	Engineering Mechanics	2—0	150

Third Year

WRE	321	Open Channel Flow and Hydraulic Machinery	3—0	300
WRE	322	Open Channel Flow and Hydraulic Machinery Laboratory	0—3/2	50
Math	305	Mathematics	3—0	300
CE	300	Plane and Geodetic Surveying Field work	4 weeks in camp	100
CE	301	Structural Analysis and Design I	3—0	300
CE	302	Structural Analysis and Design Sessional	0—3/2	50
CE	303	Reinforced Concrete	3—0	300
CE	304	Reinforced Concrete Sessional	0—3	100
CE	305	Geotechnical Engineering	3—0	300
CE	306	Geotechnical Engineering Laboratory	0—3/2	50
CE	309	Transportation Engineering I	2—0	200
CE	310	Transportation Engineering Laboratory	0—3/2	50
CE	311	Environmental Engineering I	2—0	200
CE	312	Environmental Engineering Laboratory	0—3/2	50
CE	313	Computer programming and Numerical Methods in Engineering	2—0	200

Fourth Year

WRE	421	Water Resources Engineering	3—0	300
WRE	422	Water Resources Engineering Sessional	0—3/2	50
CE	400	Project and Thesis	0—6	200
CE	401	Structural Analysis and Design II	3—0	300
CE	403	Structural Analysis and Design III	2—0	200
CE	404	Structural Analysis and Design Sessional	0—3	100
CE	405	Foundation Engineering	2—0	200
CE	407	Construction Management and Project Planning	2—0	200
CE	409	Transportation Engineering II	3—0	300
CE	410	Transportation Engineering Laboratory	0—3/2	50
CE	411	Environmental Engineering II	3—0	300
CE	412	Environmental Engineering Laboratory	0—3/2	50

Electrical Engineering

Second Year

CE	213	Mechanics of Materials	2—0	150
CE	214	Strength of Materials Laboratory	0—3/2	50
Hum	203	Sociology and Accountancy	3—0	250
Math	205	Mathematics		
		Paper I Matrices, Differential Equations and Fourier Series.	2—0	150
		Paper II Vector Analysis and Complex Variables	2—0	150
ME	207	Thermodynamics and Fluid Mechanics	3—0	250
ME	208	Fuel Testing and Fluid Mechanics Laboratory	0—3/2	50
EE	200	Electrical Drawing and Drafting	0—3	100
EE	203	Electrical Circuits I	3—0	250
EE	204	Electrical Circuits I Laboratory	0—3/2	50
EE	205	Electrical Machines	3—0	250
EE	206	Electrical Machines Laboratory	0—3/2	50
EE	207	Electronics I	3—0	250
EE	208	Electronics I Laboratory	0—3/2	50

Third Year

Hum	301	Industrial Management	2—0	200
Math	309	Statistics, Laplace's Transform and Boundary Value Problems	2—0	200
EE	300	Electronics Shop	0—3/2	50
EE	301	Electronics II	3—0	300
EE	302	Electronics II Laboratory	0—3	100
EE	303	Electrical Circuits II	3—0	300
EE	305	Electrical Machines II	3—0	300
EE	306	Electrical Machines II Laboratory	0—3	100
EE	307	Electrical Measurements	2—0	200
EE	308	Electrical Measurements Laboratory	0—3/2	50
EE	309	Electromagnetic Fields	2—0	200
EE	311	Transmission and Distribution of Electrical Power	3—0	300
EE	314	Electrical Design	0—3/2	50
EE	316	Computer Techniques Sessional	0—2	100

Fourth Year

EE	400	Project and Thesis	0—6	200
EE	401	Control Systems	2—0	200
EE	402	Control Systems Laboratory	0—3/2	50
EE	403	Power System Analysis	2—0	200

EE	404	Power System Analysis Laboratory	0—3/2	50
EE	405	Power Stations	2—0	200
EE	407	Semiconductor Circuits and Industrial Electronics	3—0	300
EE	408	Semiconductor Circuits and Industrial Electronics Laboratory	0—3/2	50
EE	409	Telecommunication Engineering	2—0	200
EE	410	Telecommunication Engineering Laboratory	0—3/2	50
EE	411	Science of Materials	2—0	200
EE	413	Switchgear and Protection*	2—0	300
EE	414	Switchgear and Protection Laboratory	0—3/2	50
EE	415	Microwave Engineering*	2—0	300
EE	416	Microwave Engineering Laboratory	0—3/2	50
EE	417	Electronics III*	2—0	300
EE	418	Electronics III Laboratory	0—3/2	50
EE	419	High Voltage Engineering*	2—0	300
EE	420	High Voltage Engineering Laboratory	0—3/2	50
EE	421	Computer Engineering*	2—0	300
EE	422	Computer Engineering Laboratory	0—3/2	50
EE	423	Electrical Circuits III*	2—0	300
EE	424	Electrical Circuits III Laboratory	0—3/2	50

*Optional : *Each student must select any two of these courses, including the appropriate laboratories, in consultation with his counsellor.*

Mechanical Engineering

Second Year

EE	211	Electrical Technology	3—0	250
EE	212	Electrical Technology Laboratory	0—3/2	50
Chem	205	Corrosion and Chemistry of Non-metallic Engineering Materials	2—0	150
Math	201	Methematics		
		Paper I	3/2—0	125
		Paper II	3/2—0	125
MetE	205	Metallic Materials	2—0	150
MetE	206	Practical Metallurgy Sessional	0—3/2	50
ME	201	Basic Thermodynamics	3—0	250
ME	202	Basic Thermodynamics Laboratory	0—3/2	50
ME	203	Engineering Mechanics	3—0	250
ME	204	Engineering Mechanics Laboratory/ Sessional	0—3/2	50
ME	205	Mechanics of Solids	3—0	250
ME	206	Mechanics of Solids Laboratory/ Sessional	0—3/2	50
ME	210	Mechanical Engineering Drawing	0—3/2	50

Third Year

Math	307	Applied Mathematics	2—0	200
Math	308	Applied Mathematics Sessional	0—3/2	50
Hum	305	Industrial Law, Accounts and Sociology	3—0	300
ME	301	Heat Transfer	2—0	200
ME	302	Heat Transfer Laboratory	0—3/2	50
ME	303	Mechanics of Machinery	3—0	300
ME	304	Machanics of Machinery Sessional	0—3/2	50
ME	305	Production Process	3—0	300
ME	306	Production Process Sessional	0—3/2	50
ME	307	Fluid Mechanics	3—0	300
ME	308	Fluid Machanics Laboratory	0—3/2	50
ME	309	Machine Design	3—0	300
ME	310	Machine Design Sessional	0—3/2	50
ME	311	Quality Control and Material Handling	2—0	200
ME	312	Quality Control and Material Handling Laboratory	0—3/2	50

Fourth Year

Compulsory

ME	400	Project and Thesis	0—9	300
ME	401	Applied Thermodynamics	3—0	300
ME	402	Applied Thermodynamics Laboratory	0—3/2	50
ME	403	Industrial Management	3—0	300
ME	407	Fluid Mechanics and Machinery	3—0	300
ME	408	Fluid Mechanics & Machinery Laboratory	0—3/2	50
ME	409	Machine Tools	3—0	300
ME	410	Machine Tools Laboratory	0—3/2	50
ME	411	Production Planning and Control	2—0	200

Elective (any two of the following subjects)

ME	421	Aerodynamics	2—0	200
ME	425	Automobile Engineering	2—0	200
ME	429	Control Engineering	2—0	200
ME	445	Operation Research	2—0	200
ME	451	Refrigeration and Air Conditioning	2—0	200

Metallurgical Engineering

Second Year

ME	205	Mechanics of Solids	3—0	250
ME	206	Mechanics of Solids Laboratory/Sessional	0—3/2	50
ME	207	Thermofluid Mechanics	3—0	250
ME	208	Thermofluid Mechanics Laboratory/Sessional	0—3/2	50

Math	201	Mathematics Paper I	3/2—0	150
		paper II	3/2—0	150
Chem	207	Physical Chemistry	2—0	150
Hum	201	Government and Sociology	2—0	150
ME	210	Mechanical Drawing	0—3/2	50
MetE	201	Fundamental Metallurgy	2—0	150
MetE	202	Fundamental Metallurgy Sessional	0—3	100
MetE	203	Geology and Mineralogy	2—0	150
MetE	204	Metallurgical Analysis aad Asseying	0—3	100
MetE	207	Fuels and Refractories	2—0	150

Third Year

ME	305	Production Processes	3—0	300
ME	306	Production Processes Sessional	0—3/2	50
EE	231	Electrical Technology	3—0	300
EE	232	Electrical Technology Sessional	0—3/2	50
Hum	311	Accounting, Economics and Industrial Law	3—0	300
MetE	301	Elements of Mining Engineering	2—0	200
MetE	302	Chemical Analysis of Minerals and Metals	0—3	100
MetE	304	Furnace Design and Drawing	0—3	100
MetE	305	Metal Physics and Physical Metallurgy	2—0	200
MetE	307	Ore Dressing and Extractive Metallurgy	2—0	200
MetE	308	Metallurgical Calculations Sessional	0—3	100
MetE	309	Foundry Engineering	2—0	200
MetE	310	Foundry Engineering Sessional	0—3	100

Fourth Year

ME	403	Industrial Management	3—0	300
ME	411	Production Planning and Control	2—0	200
MetE	400	Project and Thesis	0—9	300
MetE	401	Ferrous Metallurgy	3—0	300
MetE	403	Non-ferrous Metallurgy	3—0	300
MetE	407	Physical Metallurgy	3—0	300
MetE	408	Metallography and Heat treatment Sessional	0—6	200
MetE	409	Metal Technology	3—0	300

Naval Architecture and Marine Engineering

Second Year

CE	202	Strength of Materials Laboratory I	0—3/2	50
EE	231	Electrical Technology	3—0	250

EE	232	Electrical Technology Laboratory	0—3/2	50
Math	201	Mathematics	3—0	250
ME	201	Basic Thermodynamics	3—0	250
ME	202	Basic Thermodynamics Laboratory	0—3/2	50
MetE	209	Shipbuilding Materials	3—0	250
MetE	210	Shipbuilding Materials Laboratory	0—3	100
NAME	201	Strength of Materials I	2—0	150
NAME	203	Fluid Mechanics	2—0	150
NAME	205	Welding Engineering for Ship Construction	2—0	150
NAME	207	Elements of Merchant Ships and Ship Calculation	2—0	150
NAME	208	Elements of Ship Drawing Sessional	0—3	100

Third Year

CE	320	Strength of Materials Laboratory II	0—3/2	50
Hum	305	Industrial Law, Accountancy and Sociology	3—0	300
Math	307	Applied Mathematics	2—0	200
Math	308	Applied Mathematics Sessional	0—3	100
ME	308	Fluid Mechanics Laboratory	0—3/2	50
ME	313	Analysis and Design of Machine Elements	2—0	200
NAME	301	Strength of Materials II	2—0	200
NAME	303	Hydrodynamics, Ship Vibration and Dynamics of Ship Motion	3—0	300
NAME	304	Hydrodynamics, Ship Vibration and Dynamics of Ship Motion Laboratory	0—3/2	50
NAME	305	Details of Ship Construction	2—0	200
NAME	307	Ship Design I	2—0	200
NAME	308	Ship Drawing I Sessional	0—3	100
NAME	311	Marine Engineering I	2—0	200
NAME	316	Shipyard practice I practical Concentrated in 3 weeks	0—3/2	50

Fourth Year

ME	403	Industrial Management	3—0	300
NAME	401	Strength of Ships	2—0	200
NAME	402	Strength of Ships Sessional	0—3/2	50
NAME	403	Resistance and propulsion of Ships	2—0	200
NAME	404	Resistance and Propulsion of Ships Sessional	0—3/2	50
NAME	407	Ship Design II	2—0	200
NAME	408	Ship Drawing II Sessional	0—3/2	50
NAME	411	Marine Engineering II	3—0	300
NAME	412	Marine Engineering Laboratory	0—3/2	50

NAME	415	Shipyard Facilities, Ship Repairing and Marine Structures	2—0	200
NAME	416	Shipyard practice II Practical (Concentrated in 3 weeks)	0—3/2	50
NAME	400	project and Thesis	0—6	200

Water Resources Engineering

Second Year

CE	201	Strength of Materials	3—0	250
CE	202	Strength of Materials Laboratory	0—3/2	50
CE	204	Construction Materials Laboratory	0—3/2	50
EE	201	Electrical Technology	2—0	150
Hum	205	Accountancy	2—0	150
Math	203	Mathematics		
		Paper I	2—0	150
		Paper II	2—0	150
WRE	201	Fluid Mechanics	3—0	250
WRE	202	Fluid Machanics Sessional	0—3	100
WRE	203	Surveying	2—0	150
WRE	204	Construction Methods and Estimating	0—3	100
WRE	207	Construction Materials	3—0	250
WRE	209	Mechanics	2—0	150

Third Year

CE	301	Structural Analysis	3—0	300
CE	316	Structural Analysis Sessional	0—3/2	50
CE	303	Reinforced Concrete	3—0	300
CE	318	Reinforced Concrete Sessional	0—3/2	50
CE	307	Soil Mechanics and Foundation Engineering	3—0	300
CE	308	Soil Mechanics Laboratory	0—3	100
Math	305	Mathematics	3—0	300
Hum	307	Industrial Management and Government	2—0	200
WRE	300	Geodetic and Hydrographic Surveying Sessional	4 weeks in camp	100
WRE	301	Open Channel Flow	3—0	300
WRE	303	Hydraulic Machinery	2—0	200
WRE	304	Open Channel Flow a d Hydraulic Machinery Laboratory	0—3	100
WRE	305	Geomorphology	2—0	200

Fourth Year

CE	413	Structural Analysis and Design	3—0	300
WRE	400	Project and Thesis	0—6	200
WRE	401	Irrigation and Drainage Engineering	2—0	200

WRE	403	River Mechanics and Flood Control	3—0	300
WRE	404	Design of Bank Protection and River Training Works	0—3/2	50
WRE	405	Water Supply and Sewerage	3—0	300
WRE	406	Water Supply and Sewerage Sessional	0—3/2	50
WRE	407	Hydrology	2—0	200
WRE	409	Ground Water Engineering	2—0	200
WRE	410	Practical Problems on Irrigation and Groundwater Engineering	0—3/2	50
WRE	411	Coastal Engineering and Land Reclamation	2—0	200
WRE	412	Design of Hydraulic Structures	0—3/2	50
WRE	414	Planning Water Resources Development Projects	0—2	50

Common First Year Course Details

Phys 101 Physics

3 hours per week 200 marks

Part A

Heat—Measurement of low and high temperatures, resistance thermometers, thermocouples and radiation pyrometers. Calorimetry, specific heats of solids and liquids with radiation correction, specific heats of gases, isothermal and adiabatic transformations, kinetic theory of gases, deduction of Boyle's law, Charle's law. Avogadro's law and Graham's law of diffusion, equations of state, Andrew's experiment Vander Waals equation, determination of critical constants. Transmission of heat, determination of thermal conductivities of solids and liquids, good and bad conductors.

Thermodynamics—First law of thermodynamics, internal energy, work done by expanding gases, elasticities of a perfect gas, second law of thermodynamics, Carnot's cycle, efficiency of reversible engines, absolute scale of temperature, Carnot's theorem, theorem of Clausius, entropy, thermodynamic functions. Maxwell's thermodynamic relations, problems involving Maxwell's relations, Clausius and Clapeyron equation, Joule-Thomson effect.

Sound—Simple harmonic motion, wave motion, principle of superposition, progressive and stationary waves, free and forced vibration resonance, Medle's experiment, Kundt's tube, reflection and refraction of sound, building acoustics.

Part B

Geometrical Optics—Reflections and refraction by spherical surfaces, lenses, astigmatic lenses, combination of thin lenses, defects of images formed by spherical mirrors, spherical aberration of lenses, astigmatism, coma, distortion, curvature of the image, chromatic aberrations—

longitudinal and transverse, achromatic combination of lenses, detailed study of eye pieces and objectives.

Physical Optics—Wave theory of light, Huygen's principle, superposition of light waves, interference, Young's experiment, Fresnel's bi-prism, interference from multiple reflection, Newton's rings, rectilinear propagation of light based on wave theory. Diffraction—Fresnel and Fraunhofer diffraction, diffraction by single slit, double slit, diffraction grating. Polarisation—polarisation by reflection and refraction, polarisation by double refraction, Nicol prisms, polarimeters.

Modern Physics—Atomic structure—Thomson and Rutherford atom models and their drawback. Bohr's atom model, nature of the electronic orbits, orbital energy, origin of the spectral lines, different series of spectral lines of hydrogen, orbital and energy level diagrams of hydrogen atom. Radioactivity—introduction to laws of radioactive disintegrations, half life, mean life, laws of successive disintegrations, practical application of mass-energy relation and its practical evidences. Nuclear Physics—binding energy, fission and fusion processes. Law of gravity, escape velocity.

Chem 101 Chemistry

3 hours per week 200 marks

Part A

Atomic structure and periodic table, aqueous solution, solubility and concentrations, solutions of gases and liquids, properties of dilute solutions and colloids.

Part B

Inert gases, chemical bond, thermochemistry, electrochemistry, chemical equilibrium, pH concept.

CE 101 Surveying

1 hour per week 50 marks

Part A

Calculations of areas and volumes, reconnaissance survey, chain survey, traverse surveying.

Part B

Plane table surveying, levelling and contouring, problems on heights and distances.

EE 101 Basic Electrical Engineering

3 hours every alternate week 100 marks

Part A

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

Part B

Alternating currents, R. L. C. series and parallel circuits, magnetic concepts and magnetic circuits.

ME 101 Basic Mechanical Engineering

3 hours every alternate week 100 marks

Part A

Study of fuels, steam generating units (boilers), their accessories and mountings, their performance study. Reciprocating steam engine, its study and performance. Steam turbine—their study and performance.

Part B

Gas turbine—study and performance. Internal combustion engines, Otto cycle and Diesel cycle—their study and performance, their accessories. Study of refrigeration—compression and absorption type. Production flow line study of a few products.

Math 101 Mathematics Paper I

2 hours per week 150 marks

Part A

Differential Calculus—Limit, continuity, differentiations—simple, successive and partial with allied theorems. Rolle's theorem and mean value theorem for one or two variables. Expansion of functions by Taylor's series, Maclaurin's series and by differentiation and integration methods. Tangent, normal, subtangent, sub normal in cartesian and polar forms, indeterminate forms, maxima and minima for functions of one and two variables, curvature, asymptotes, evolute, involute, curve tracing.

Part B

Infinite series, convergence and divergence, sets, subsets, basic set operations, mappings and relations, definitions of group, ring and field. Co-ordinate geometry (two dimensions)—transformation of co-ordinates, pair of straight lines, circle and system of circles, equations of parabola, ellipse, hyperbola in cartesian and polar co-ordinates. Tangent normal, asymptotes, director circles.

Math 101 Mathematics Paper II

2 hours per week 150 marks

Part A

Integral Calculus—Integration by various methods, definite integrals, reduction formulae, improper integral, beta functions, gamma functions. Lengths of curves, areas bounded by plane curves, volumes and surface areas of solids of revolution.

Part B

Integral Calculus—Jacobians, multiple integrals with applications, ordinary differential equations. Formation of differential equations, solutions

of equations of first order by various methods, solution of general linear equations of second and higher orders with constant coefficients. Solution of homogeneous and linear equations of first order and of higher degrees with applications.

Hum 101 English and Economics

2 hours per week 150 marks

One has to pass English and Economics separately.

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 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, economics and diseconomics. Economics of development and planning, basic concepts—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.

CE 102 Practical Surveying

3 weeks field survey 100 marks

Three weeks field works on different types of surveying based on CE 101.

CE 104 Civil Engineering Drawing

3 hours every alternate week 50 marks

Projections : Drawing of Civil Engineering structures.

EE 102 Basic Electrical Engineering (Laboratory)

3 hours every alternate week 50 marks

Experiments based on EE 101.

ME 102 Basic Mechanical Engineering (Laboratory)

3 hours every alternate week 50 marks

Laboratory works based on ME 101.

ME 104 Mechanical Engineering Drawing

3 hours every alternate week 50 marks

Sessional class on mechanical engineering drawing.

Phys 102 Physics (Laboratory)

3 hours per week 100 marks

Experiments based on Phys 101.

Chem 102 Chemistry (Laboratory)

3 hours per week 100 marks

Experiments based on Chem 101.

Sh 102 Carpentry Shop

3 hours every alternate week 50 marks

Practical work in Carpentry shop

Sh 104 Foundry Shop

3 hours every alternate week 50 marks

Practical work in Foundry shop

Sh 106 Welding and Metal Shop

3 hours every alternate week 50 marks

Practical work in Welding and Metal shop.

108 Machine and Fitting Shop

3 hours every alternate week 50 marks

Practical work in Machine and Fitting shop.

Faculty of Architecture and Planning

The faculty of Architecture and Planning consists of the following departments :

1. Architecture
2. Urban and Regional Planning
3. Humanities

The Courses offered lead to the examinations awarding degree of Bachelor of Architecture (B Arch) and higher degrees.

The B Arch courses extend over five years, divided for the purpose of academic program.

Admission Regulations

Candidates for fresh admission into the B Arch program must have passed the Higher Secondary Certificate (HSC) Examination in Science group or Humanities group of any of the Secondary Education Board of Bangladesh or they must have equivalent qualifications from abroad. The rules for admission are framed by the Academic Council every year. The usual number of fresh entrants for B Arch degree is 30.

Details of admission regulations and procedures may be obtained from the Registrar of the University.

Examinations and Promotions

Two examinations are held in each year : Part A and Part B, carrying equal weight. Part A examinations are held in the middle of an academic year and Part B examinations are held at the end. The results of examinations are published by calculating the total marks obtained by the students in both Part A and Part B examinations. The general rules of examination, promotion and grading are the same as those in the faculty of engineering.

SUMMARY OF COURSES

First Year

Hum	111	Sociology and Psychology	2—0	200
Arch	121	Climate and Design I	2—0	200
Math	122	Mathematics	2—0	200
Phys	123	Physics	2—0	200
Arch	131	Design I (Theory)	1—0	100
Arch	132	Art and Architecture I	2—0	200
Arch	141	Construction Details I	1—0	100
Sh	142	Carpentry and Metal works	0—3	100
Arch	191	Design I	0—9	450
Arch	192	Architectural Graphics	0—6	300

Second Year

Arch	211	Basic Planning	1—0	100
Arch	221	Climate and Design II	1—0	100
CE	222	Plumbing	1—0	100
Arch	232	Art and Architecture II	2—0	200
Arch	241	Construction Details II	1—0	100
Arch	243	Building and Finish Materials	2—0	200
CE	223	Structure II	2—0	200
Arch	291	Design II	0—12	600
Arch	292	Photography and Graphic Reproduction	0—3	100
Arch	293	Graphic Art and Sculpture	0—6	200

Third Year

Arch	311	Advanced Theories of Planning	1—0	100
Arch	312	Urban Design	1—0	100
EM	321	Electrical and Mechanical Equipments	2—0	200
Arch	322	Architectural Acoustics	1—	100
Arch	332	Art and Architecture III	2—0	200
CE	321	Structure III	2—0	200
Arch	342	Sepcification and Cost Estimating	1—0	100
Arch	391	Design III	0—18	900
Arch	392	Working Drawings	0—3	100

Fourth Year

Arch	414	Design IV	0—15	500
Arch	453	History of Architecture II	3—0	300
Arch	462	Physical Planning	0—4	200
Arch	463	Landscape Design	1—0	100
Art	413	Sculpture and Art Expression	0—3	100
Hum	411	Logic and Philosophy	2—0	200
Hum	413	Speaking and Seminar	1—0	100
Struc	413	Structure IV	2—0	200

Fifth Year

Arch	515	Design V	0—21	700
Arch	516	Professional Practice	1—0	100
Arch	517	Architectural Acoustics	2—0	200
*Arch	523	Physical Planning	1—0	100
*Arch	541	Contemporary Art	1—0	100
*Arch	562	Construction Management	1—0	100
Hum	516	Accounting	1—0	100
Struc	514	Structure V	2—0	200

**Electives : Two out of three*

Postgraduate Studies

Postgraduate activities are now an integral part of the university activities. Master of Science in Engineering degrees are offered in the departments of chemical, civil, electrical, mechanical, metallurgical and water resources engineering. Master of Urban and Regional Planning degree is offered by the department of urban and regional planning of the Faculty of Architecture. Facilities to offer the degree of Doctor of Philosophy exist in the departments of chemical, civil, electrical, mechanical, metallurgical and water resources engineering.

Admission Requirements

For admission to the course leading to the award of M Sc Engg in any branch, a candidate must have obtained a B Sc Engineering degree in relevant branch from this university or other recognised institution. For admission to the course leading to the degree of M U R P (Master of Urban and Regional Planning), a candidate must have Bachelor's degree in Planning/Architecture/Engineering or its equivalent or Master's degree in Sociology/Economics/Geography of any recognised University.

The minimum qualification for admission into a Ph D program is usually an M Sc Engg degree in the relevant branch.

For admission into any postgraduate program, a candidate may be required to appear at an interview by the departmental board of postgraduate studies.

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. For the degree of M Sc Engineering a student needs 32 credit hours, of which 24 hours will be in courses and 8 hours in an approved research program.

The minimum duration of M Sc Engineering course is one academic year ; the minimum for M U R P is two academic years. A student has to

earn 64 credit hours for the degree of M U R P of which 12 credit hours will be a thesis work. A candidate for Master's degree must complete all requirments within five academic years from his first enrolment.

The minimum duration of the Ph D program is two academic years from the date of enrolment. A candidate has to complete 40 credit hours in courses (including his M Sc Engineering course work) and 48 credit hours in research. Besides, a Ph D candidate has to prove his proficiency in any one of the following languages other than English in a manner prescribed by rules—German, French, Russian, Japanese, Spanish and Chinese. He must also pass a comprehensive examination consisting of both written and oral test on engineering science fundamentals in his field of study. A candidate must complete all requirements for Ph D degree within seven years from the date of his first enrolment.

Final grades for postgraduate courses are recorded as follows :

A—Excellent	3 points	80% and above
B—Good	2 points	60% to bellow 80%
C—Pass	1 point	50% to bellow 60%
F—Fail	0 point	below 50%

I—Incomplete

S—Satisfactory (for non credit courses)

U—Unsatisfactory (for non credit courses)

W—Withdrawn from course

SUMMARY OF COURSES

Chemical Engineering

ChE	6000	Thesis
ChE	6001	Transport Phenomena
ChE	6002	Advanced Thermodynamics
ChE	6003	Advanced Chemical Reactor Design
ChE	6004	Heat Transfer
ChE	6005	Mass Transfer I
ChE	6006	Polymer Science for Chemical Engineers
ChE	6007	Advanced Chemical Engineering I
ChE	6008	Nuclear Chemical Engineering
ChE	6009	Corrosion Science and Engineering
ChE	6010	Process Dynamics and Control
ChE	6011	Advanced Plant Design
ChE	6012	Fuel Science
ChE	6013	Mass Transfer II
ChE	6014	Chemical Engineering Analysis
ChE	6015	Advanced Chemical Engineering II
ChE	6016	Numerical Methods in Chemical Engineering
ChE	6017	Fluid Mechanics

ChE	6018	Electrochemical Engineering
ChE	6019	Kinetics and Catalysis

Civil Engineearing

CE	6000	Thesis

Structural Engineering and Concrete Technology

CE	6101	Theory of Elasticity
CE	6102	Matrix Methods in Structural Analysis
CE	6103	Theory of Plates
CE	6105	Plastic Design of Steel Structures
CE	6106	Elastic Stability of Structures
CE	6108	Analysis and Design of Shells
CE	6110	Computer Methods in Civil Engineering
CE	6111	Advanced Reinforced Concrete Design
CE	6113	Experimental Stress Analysis
CE	6114	Analysis of Tall Buildings
CE	6115	Bridge Engineering

Environmental Engineering

CE	6301	Theory of Water Treatment
CE	6304	Theory of Sewage Treatment
CE	6305	Biology of Sewage and Polluted Waters
CE	6309	Environmental Engineering
CE	6310	Industrial Water and Waste Treatment
CE	6311	Municipal and Rural Sanitation
CE	6312	Water Pollution and its Control
CE	6315	Water Supply Engineering Design
CE	6316	Sewerage and Drainage Engineering Design

Geotechnical Engineering

CE	6401	Soil Mechanics I
CE	6402	Soil Mechanics II
CE	6404	Earth Pressure and Retaining Structures
CE	6405	Earth Dams and Stability of Slopes
CE	6407	Soil Dynamics
CE	6408	Advanced Engineering Geology

Transportation Engineering

CE	6501	Transportation Engineering
CE	6502	Geometric Design of Highways
CE	6503	Bituminous Materials and Mix Design
CE	6505	Structural Design of Flexible Pavements
CE	6506	Structural Design of Rigid Pavements
CE	6507	Traffic Engineering

CE	6508	Railway Engineering
CE	6509	Waterways
CE	6510	Airfield Planning and Design
CE	6511	Transportation Planning

Electrical Engineering

Interdisciplinary

EE	6000	Thesis
EE	6001	Seminar
EE	6011	Engineering Analysis
EE	6012	Energy Conversion Processes

Circuits

EE	6101	Linear System Analysis
EE	6102	Network Synthesis I
EE	6103	Network Synthesis II
EE	6104	Non-Linear Circuits
EE	6105	Advanced Topics in Network Theory

Communications

EE	6201	Statistical Communications Theory
EE	6202	Information Theory
EE	6203	Telephone Traffic Theory

Computers

EE	6301	Digital Computer Theory and Design
EE	6302	Computer Science

Electronics

EE	6401	Advanced Electronics
EE	6402	Quantum Electronics
EE	6403	Solid State Devices
EE	6404	Active Circuit Design

Material Science

EE	6501	Electric and Magnetic Properties of Material
EE	6502	Electronics of Solid
EE	6503	Laser Theory

Microwave Field Theory

EE	6601	Applied E. M. Theory
EE	6602	Microwave Theory and Techniques
EE	6603	Microwave Tubes and Circuits
EE	6604	Antennas and Propagation

Control

EE	6701	Non-Linear Controls
EE	6702	Sample Data Control
EE	6703	Modern Control Theory
EE	6704	Optimal Control Systems

Machines

EE	6801	Generalized Machine Theory
EE	6802	Special Machines
EE	6803	Power Semiconductors and Modulators
EE	6804	Advanced Machine Design

Power Systems

EE	6901	Optimization of Power System Operation
EE	6902	Computer-Aided Power System Design
EE	6903	Protective Relays
EE	6904	Power System Stability
EE	6905	Transients in Power Systems

Mechanical Engineering

ME	6000	Thesis
ME	6001	Seminar
ME	6003	Problem
ME	6101	Classical Thermodynamics
ME	6103	Statistical Thermodynamics
ME	6121	Surevy of Fluid Mechanics
ME	6123	Mechanics of Inviscid Incompressible Fluid
ME	6125	Mechanics of Viscous Fluid
ME	6127	Mechanics of Inviscid Compressible Fluid
ME	6141	Advanced Heat Transfer
ME	6143	Advanced Conduction and Radiation Heat Transfer
ME	6145	Advanced Convection Heat Transfer
ME	6147	Design of Heat Transfer Equipment
ME	6149	Heat Transfer Seminer
ME	6161	Thermal Environmental Engineering
ME	6171	Advanced Dynamics
ME	6173	Mechanical Vibrations
ME	6175	Applied Elasticity
ME	6177	Theory of Plates and Shells
ME	6179	Elastic Stability of Structures
ME	6181	Experimental Stress Analysis
ME	6183	Finite Element Methods
ME	6185	Advanced Numerical Analysis
ME	6187	Computer and Programming
ME	6201	Mechanical Behaviour of Engineering Materials
ME	6203	Structure and Properties of Engineering Materials

ME	6205	Theory of Plasticity
ME	6207	Dislocation Theory
ME	6221	Principles of Engineering Production I
ME	6223	Principles of Engineerng Production II
ME	6225	Industrial Engineering Analysis
ME	6227	Industrial Management and Planning
ME	6229	Linear Programming
ME	6235	Econometric Methods

Metallurgical Engineering

MetE	6000	Thesis
MetE	6101	Advanced Metal Physics I
MetE	6103	Machine Tool Materials and Heat-treatment
MetE	6105	Applied Metal Technology I
MetE	6107	Extractive Metallurgy
MetE	6109	Industrial Alloys
MetE	6201	Advanced Physical Metallurgy
MetE	6205	Advanced Metal Technology II
MetE	6207	Fuel Technology
MetE	6209	Metallurgical Thermodynamics
MetE	6211	Furnace Technology

Water Resources Engineering

WRE	6000	Thesis
WRE	6101	Advnnced Fluid Mechanics I
WRE	6102	Advanced Fluid Mechanics II
WRE	6103	Advanced Open Channel Flow
WRE	6201	Advanced Hydrology
WRE	6202	Hydrometeorology
WRE	6203	Statistical Methods in Hydrology
WRE	6204	Advanced Groundwater Engineering
WRE	6205	Advanced Irrigation and Drainage Engineering
WRE	6206	Flow Through Porous Media
WRE	6301	River Mechanics
WRE	6302	Sediment Transportation
WRE	6303	River Training and Bank Protection
WRE	6304	Waterpower Engineering
WRE	6305	Fluvial Geomorphology
WRE	6401	Design of Hydraulic Structures
WRE	6402	Planning of Water Resources Systems
WRE	6403	Modelling Techniques and Similitudes
WRE	6404	Project Investigation and Planning
WRE	6405	Application of Photogrammety in Water Resources

WRE	6501	Advanced Coastal Engineering
WRE	6502	Tidal and Estuarine Hydraulics
WRE	6600	Special Studies in Water Resources

Urban and Regional Planning

Note : *The three numbers after the title of the course show (a) lecture hours per week (b) studio or sessional hours per week and (c) number of credits, respectively.*

First Semester

Course No		Subject		Marks
PLAN	6101	History of Planning	2:0:2	200
PLAN	6102	Planning and Social Sciences	2:0:2	200
PLAN	6103	Urban Planning and Design Fundamentals	2:0:2	200
PLAN	6104	Nature and Principles of Human Settlements	2:0:2	200
PLAN	6105	Traffic and Transportation Planning	2:0:2	200
PLAN	6106	Quantitative Method in Planning Analysis	2:0:2	200
PLAN	6107	Studio : Graphic Techniques and Representation	0:6:2	200
PLAN	6108	Introduction to Surveying Techniques and Research Methods	0:6:2	200

Second Semester

PLAN	6201	Theories of Planning (Urban and Regional)	2:0:2	200
PLAN	6202	Principles of Land Use and Land Economics	2:0:9	200
PLAN	6203	Urban Planning and Design Fundamentals	2:0:2	200
PLAN	6204	Regional Development Planning and Resource Use	2:0:2	200
PLAN	6205	Housing and Community Development	2:3:3	300
PLAN	6206	Rural Planning	2:0:2	200
PLAN	6207	Studio: Urban Planning	0:6:2	200
PLAN	6208	Studio: Rural Planning	0:3:1	100

Third Semester

PLAN	6301	Planning Laws and Administration	2:0:2	200
PLAN	6302	Housing and Site Planning	1:0:1	100
PLAN	6303	Landscape and Urban Design	2:3:3	300
PLAN	6304	Regional Development Planning and Resource Use	2:0:2	200
PLAN	6305	Studio: Housing and Area Planning Techniques	0:6:2	200
PLAN	6306	Seminar (2 Credits)		200

PLAN	6000	Thesis (4 Credits)		400

Fourth Semester

PLAN	6401	Planning Laws and Administration	2:0:2	200
PLAN	6402	Traffic Planning and Planning of Utility Service	2:0:2	200
PLAN	6403	Studio : Regional Pianning	0:6:2	200
PLAN	6000	Thesis : (4 to 8 credits)		400 to 800
*PLAN	6404	Planning Process and Systems Analysis	2:0:2	200
*PLAN	6405	Quantitative Method In Planning Analysis	0:6:2	200
*PLAN	6406	Rural Planning	2:0:2	200
*PLAN	6407	Advanced Theories of Urban Planning	2:0-2	200

***Electives :** *2 to 6 credits from these courses (Prerequisite : Approval of the Head of the Department).*

Departments

Department of Chemical Engineering

Staff

Professor and Head

Iqbal Mahmud, *B Sc Engineering (Chemical), M Sc, Ph D*

Professor

Nooruddin Ahmed, *B Sc Engineering (Chemical), M Sc, Ph D*

Associate Professors

Jasimuz Zaman, *B Sc Engineering (Chemical), Ph D*
M, Nurul Islam, *B Sc Engineering (Chemical), Ph D*
A.K.M. Abdul Quader, *B Sc Engineering (Chemical), Ph D*

Lecturers

Abu Ahmed, (Abroad), *B Sc Engineering (Chemical), Ph D*
Md. Farroque, (Abroad), *B Sc Engineering (Chemical)*
Md. Sabder Ali, (Abroad), *B Sc Engineering (Chemical)*
A.T.M. Rashidul Hasan, (Abroad), *B Sc Engineering (Chemical)*
M. Najmul Karim, (Abroad), *B Sc Engineering (Chemical)*
K. Ikhtyar Omar, (Abroad), *B Sc Engineering (Chemical), M Sc*
Md. Shahabuddin, (Abroad), *B Sc Engineering (Chemical)*
Tapantosh Chakravorty, (Abroad), *B Sc Engineering (Chemical)*
Md. Nazmul Haq, *B Sc Engineering (Chemical)*
Mirza Wahiduzzaman, *B Sc Engineering (Chemical)*
Mahmudul Karim, *B Sc Engineering (Chemical)*

Chemical engineering as a separate branch of engineering was introduced in the then Ahsanullah Engineering College in 1948. The first batch of chemical engineering graduates came out in 1952. For a number of years, a basic preoccupation of chemical engineering students and chemical engineers was to explain to people what chemical engineering is all about and why it is needed. However, the department now has moved far away from that situation. It now occupies a bulk of the old Ahsanullah Engineering Collage academic

building, has got an excellent teaching staff trained locally and in advanced countries and has an undergraduate population of about 100. Extensive laboratory facilities are available for undergraduate students and the degree offered by the department is recognised by institutions at home and abroad. Graduates working in the country are making important contribution to the economy of the nation. Further, the department as well as the country is benefited by the graduates who return from abroad with advanced training and useful experiences.

Since its inception, chemical engineering has been difficult to define concisely, but the following definition is usually accepted :

'Chemical engineering is a technology or applied science which involves the application of scientific principles (particularly chemistry, mathematics and physics) to the design, operation and management of industrial equipment in which matter undergoes a chemical or physical change'.

The study of chemical engineering makes a challenging demand on the students. The course includes a basic training in chemistry, engineering and mathematics. It then goes for an overall grasp of the principles of chemical engineering and applies them to the design of equipments and plants for economic operation.

Chemical engineers find employment in a wide variety of industries such as chemical and allied industries, food processing, fuels, petroleum and metallurgical industries. Chemical engineers are also found to make very interesting careers as sales executives, managers, bankers and planners, the quantitative approach of chemical engineers to design and economic operation being of much help in such cases.

Emphasis on postgraduate traning strarted in 1962 when Ahsanullah Engineering College was converted to a university. The M Sc course in chemical engineering was formally started in 1966. Suitably qualified students from universities or similar institutions in Bangladesh or abroad may be admitted into the postgraduate program, based on course work and research.

Research experience, with its training in logic and critical thinking, is necessary for many senior positions in industry ; it is particularly valuable to those who plan to make their careers in research institutes, industrial research, teaching or university life.

Student Activities

The students participate in a variety of extracurricular activities held under the auspices of the University Central Students' Union of which all BUET students are members. There is also a departmental Chemical Engineering Association which organizes seminars, cultural events, interdepartmental sports activities, industrial visits and lectures by visiting personnel.

Degree Courses

Chemical engineering is a four year course. It is so designed that the students receive a basic education in chemical engineering which permits them to be received into any aspect of professional activity. Science subjects such as fluid mechanics, heat, mass and momentum transfer, thermodynamics as well as management subjects such as economics, plant design, process optimization, etc. are covered. In the final year opportunity is given for the study of specialised subjects in more depth in the form of electives.

The undergraduate course has been modified several times in the past in keeping up with the changing situation in industry and requirements of a developing country as well as a modern world concerned about energy, environment and pollution.

The main objectives for the course have been :

a. An understanding of the fundamentals of mathematics, physics, chemistry, fluid mechanics, thermodynamics, etc. which are of direct relevance to chemical engineering.

b. Solid foundation in the skills and disciplines required of a professional engineer.

c. Exposure to related areas of knowledge such as environment, pollution and energy to enable them to be conversant with the current problems of mankind. The undergraduate course in each of the four years is given in detail in the following pages and consists of lectures, laboratories, problem classes, seminars and project work.

Project Work

Students in their final year of their academic program are allowed to undertake a project work supervised by members of the staff. The projects are usually of a practical nature involving design, fabrication, installation and operation of equipments in areas of interests to the staff or in areas having direct relevance to the needs of the country. The primary purpose of the projects is to generate initiative and leadership among the students and help them develop engineering judgement and capability to work on their own. Some of the projects carried out by the students have been incorporated as regular laboratory work, some work have helped the development of new undergraduate laboratory and there are still others which have been pursued at postgraduate level.

Laboratory Work

The need for laboratory work for a fuller understanding of the different physical and chemical processes covered in class room lectures is

obvious. Especially, during the initial phases of the study of chemical engineering, the laboratory classes help the students in their orientation and in their appreciation of the role of laboratory work in building up the theories resulting in equation which they use for the design of physical systems. It has been found that laboratory work consolidates the theoretical background of the students. Discussion of the reports with the staff clarifies the role of experiment and design and is a good training in communication which is so important in real life.

Vacation Work in Industry

The department usually arranges a practical training program for undergraduate students for at least six weeks in the industries at the end of the third year i.e., at the end of two years in the chemical engineering department. The employer is requested to look after the performance of the students. At the end of the training program, the students submit a written report to the company employing them. This report is subsequently examined by the staff in the department and the students are again examined by an oral board.

Postgraduate Studies and Research

Postgraduate studies are now an integral part of the departmental activities. Facilities are available for a variety of operational studies concerned with the applications of various heat and mass transfer operations, reaction kinetics, corrosion studies, etc.

The field of current research interests is wide but may be summarised under the following headings :

1. Mass transfer in packed column
2. Mathematical modelling of chemical engineering systems
3. Ion exchange kinetics
4. Combustion in fluidized bed
5. Electrochemical mass transfer studies
6. Corrosion studies
7. Chemical reaction engineering
8. Process development in areas like manufacture of synthetic aggregates, production of methanol and carbon black from natural gas, bio-gas generation from cow-dung and vegetable wastes, etc.

Some of the current research projects have been undertaken by postgraduate students for their thesis requirement while others have been sponsored and supported by University Grants Commission and Bureau of Research, Testing and Consultation of BUET.

Details of Undergraduate Courses in Chemical Engineering

Second Year

ChE 201 Chemical Process Principles

3 hours per week 250 marks

Part A

Introduction to material and energy balances, assembly and separation operations, recycle and bypass processes, operations involving vaporization, humidity charts, psychrometry, phase diagrams ; material balances on one and two component systems and chemical processes, consideration of yield and rate.

Part B

Energy concepts, mass and energy flow in processes, energy balances on physical operations, enthalpy composition diagrams. Energy balances on chemical processes, heats of combustion, adiabatic processes, fundamentals of combustion, flame temperature, ultimate CO_2, optimum excess air.

ChE 203 Transport Processes I

4 hours per week 300 marks

Part A

Fluid statics, shell momentum balance, Navier Stokes equation and application, mechanical energy and macroscopic momentum balance, design of pipe line, flow measuring devices, dimensional analysis, pumps.

Fourier's law of heat conduction, thermal conductivity, resistances in series, heat flow through cylinder ; radiation.

Part B

Boundary layer flow, fluidization and sedimentation, packed bed, cyclone separator, filtration, crushing, grinding and size separation ; flow in network of pipe lines.

Heat transfer by convection, heating and cooling of fluids inside and outside of tubes ; natural convection ; heat and momentum transfer analogy ; condensation of vapours, boiling of liquids ; evaporation, heat exchange equipments.

ChE 204 Chemical Engineering Problems and Laboratory

5 hours per week 200 marks

Laboratory work based on ChE 203 and Problems based on ChE 201, ChE 203 and ChE 205.

ChE 205 Process Equipment Design

2 hours per week 150 marks

Part A

Stress and deformation, stress and strain, modulus of elasticity, temperature stresses, stresses to axial loads—additional cases, mechanical properties of materials, pressure vessels, types of joints, efficiency of a joint, rivet failures ; beams—equilibrium of beams, shear and bending moment diagrams of beams.

Part B

Stresses in beams, the flexure formula derivation and application, limitations of the flexure formula, derivation of unit shearing stress, applications. Torsional stress, belts and pulleys, balancing, gear drives, transmission of power.

Third Year

ChE 301 Chemical Process Industries-I

3 hours per week 300 marks

Part A

Water conditioning, fuels, energy, coal chemicals, fuel gases, industrial gases, industrial carbon, phosphorous and nitrogen industries, soaps and detergents, suface coating industries, sulfur and sulfuric acid, cement, calcium and magnesium compounds, glass industries.

Part B

Pulp and paper industries, leather, gelatin and adhesives ; oils, fats and waxes ; plastic industries, chior-alkali industries, sugar and starch industries, rubber industries, nuclear industries, explosives, toxic chemical agents, propellants.

ChE 302 Chemical Process Analysis (Sessional)

2 hours per week 100 marks

Problems based on ChE 301

ChE 303 Glass Technology-I

3 hours per week 300 marks

Part A

Chemistry of glasses—The main glass forming elements, conditions for glass formation, detailed study of silica glass (properties and manufacture), properties of B_2O_3, GeO_2 and P_2O_5 ; the effect of additions of network modifiers (alkaline and alkaline earth oxides) on the properties of oxide glasses, detailed treatment of durability, both as regards methods of testing and experimental results, boric oxide anamoly ; effect of addition of other oxides and elements on the properties of glass. Transition elements and other colouring oxides, redox equilibria in glass.

Part B

Physics of glass—Elasticity, measurement of elastic constants of glass, elastic properties of glass. Viscosity, variation of viscosity of glass with temperature and composition. Strength—factors affecting the strength of glass, theoretical strength. Griffith flows, strength of glass fibres, methods of improving strength. Electrical properties —electrolytic conduction, effects of temperature and composition, dielectric constant and dielectric loss of glasses.

Optical properties—refractivity, dispersion, optical glass, refraction, absorption, spectrophotometry, specification of colour types of coloured glass and colouring agents. Devitrifiction, effect of composition on devitrification. Annealing, roughening and thermal expansion of glasses.

ChE 305 Transport Processes II

3 hours per week 300 marks

Part A

Phase equilibria, finite equilibrium and differential stage mass transfer operations. Distillation—flash and differential distillation, continuous distillation with reflux, batch distillation with reflux, principles of calculation of distillation equipment, plate efficiency. Gas absorption—principles of diffusion, two film theory of mass transfer, principles of absorption tower calculations, HTU and NTU concepts.

Part B

Humidification, theory of wet bulb temperature, use of humidity chart, principles of simultaneous heat and mass transfer equipments. Extraction—liquid-liquid extraction, use of triangular diagram to represent equilibria, single and multiple contact with completely immiscible and partially miscible solvent, leaching and washing of solids.

ChE 306 Chemical Engineering Problems and Laboratory

6 hours per week 200 marks

Laboratory work based on ChE 203 and ChE 305. Problems based on ChE 305 and ChE 309.

ChE 307 Chemical Engineering Thermodynamics

3 hours per week 300 marks

Part A

Introduction, first law of thermodynamics and other basic concepts, ideal gas, PVT relations of fluids, heat effects, the second law of thermodynamics, properties of fluids, thermodynamics of flow processes, production of work from heat (simple steam power plant cycle).

Part B

Production of work from heat, refrigeration, liquefaction processes, thermodynamic analysis of processes, phase equilibria, chemical reaction equilibria.

ChE 308 Chemical Engineering Thermodynamics (Sessional)

3 hours every alternate week 50 marks

Problems based on ChE 307.

ChE 309 Chemical Reaction Engineering

2 hours per week 200 marks

Part A

Kinetics of homogeneous reaction, variables affecting rate, elementary and nonelementary reactions, types of reactors, interpretation of laboratory reactor data, design of reactors, multiple reactors systems, recycle reactor, autocatalytic reactions. Temperature and pressure effects, equilibrium calculations, adiabatic operations, nonadiabatic operations, general graphical design procedure, optimum temperature progression, treatment of multiple reactions.

Part B

Kinetics of heterogeneous reactions, mechanism of catalysis, types of catalysts, preparation and properties of catalysts, external heat and mass transport processes, internal heat and mass transport processes. Experimental reactors and treatmeant of data. Design of packed bed reactors, staged adiabatic packed bed reactors, design of reactors for uncatalyzed heterogeneous reactions.

Fourth Year

ChE 400 Project/Thesis

6 hours per week 200 marks

With the assistance of a teacher the student will select a problem in any field of chemical engineering. The problem must require experimental work and not be merely a paper thesis, and must be sufficiently limited in scope so that the student can expect to attain a satisfactory solution in one year of work. The purpose of this course is to make the student responsible for planning and carrying out an engineering project and presenting his work as an acceptable engineering report.

ChE 401 Chemical Process Industries II

2 hours per week 200 marks

Part A

Environmental engineering—Introduction; atmospheric and water pollution—nature, source, measurement, prevention, control, law ; management of solids, liquid and gaseous wastes product. Principles and practice of the following unit operations—mixing, size separation, crushing and grinding, crystallization and drying.

Part B

Project engineering— (a) definition (b) responsibilities of project engineer (c) details of function (d) real life of projects ; maintenance of

chemical process equipments ; industrial hazards ; fertilizer and other chemical industries in Bangladesh.

ChE 403 Transport Phenomena

2 hours per week 200 marks

Part A

Viscosity : thermal conductivity and diffusivity ; the mechanism of momentum, energy and mass transport, shell balance for momentum energy and mass, velocity distribution in laminar flow, temperature and concentration distribution in solids and laminar flow, the equations of change for isothermal, non-isothermal and multicomponent system, velocity and temperature distribution with more than one variable.

Part B

Velocity, temperature and concentration distribution in turbulent flow, interphase transport and macroscopic balances for isothermal, non-isothermal and multi-component systems, momentum, energy and mass transfer analogy equations of Reynolds, Prandtl, Von Karman, etc.

ChE 405 Economics and Management of Chemical Process Industries.

3 hours per week 300 marks

Part A

Principles of economic balance; interest and investment costs; taxes and insurance ; depreciation ; profitability ; alternative investment and replacements; project evaluation; cost accounting ; analysis of financial statements.

Part B

Optimizing techniques, linear programming, transportation alogorithm, queuing and inventory models ; analysis of human and organizational behaviour ; principles of management ; production management ; marketting management ; personnel management.

ChE 407 Materials Science and Corrosion Engineering

3 hours per week 300 marks

Part A

Engineering requirements of materials; interatomic attractive forces ; the arrangement of atoms in materials, metallic phases and their properties ; ceramic phases and their properties, organic materials (polymers) and their properties. Multiphase materials, equilibrium relationships, phase diagrams, Fe-C phase diagram. Modification of properties through changes in microstructure, heat treatment.

Corrosion—definition and improtance, electrochemical mechanisms, corrosion tendency and electrode potentials, polarization and corrosion rates, passivity, Pourbaix diagrams, behaviour of iron and steel.

Part B

Effect of stress, atmospheric corrosion, soil corrosion, oxidation and high temperature corrosion, stray current corrosion, cathodic and anodic protection; metallic, inorganic and organic coatings, inhibitors and passivators, boiler corrosion and water treatment.

Corrosion resistance of metals and alloys. Stainless steels, copper and copper alloys, aluminum, magnesium, lead, nickel and nickel alloys, Ti, Zr, Ta, Si-Fe and Si-Ni alloys. Industrial environments and appropriate materials.

ChE 409 process Design and Economics for Chemical Engineers

2 hours per week 200 marks

Part A

Introduction, process design developmnt, aspects of design considerations, cost estimation, interest and investment cost, taxes, insurance, depreciation, profitability, alternative investments and replacements, optimum design, design report.

Part B

Materials and fabrication selection, materials transfer, handling and treatment equipments, heat and mass transfer equipments—their design, cost and statistical analysis in design.

ChE 410 process Design (Sessional)

5 hours per week 200 marks

Extensive problem work based on ChE 409, Integrated design of chemical plant and equipment of particular importance in the scheme of national development from the view point of both chemical engineering and economics.

ChE 411 process Control

2 hours per week 200 marks

Part A

Laplace Transforms, transfer functions for first order systems, physical examples of first order systems, response of first order systems in series, higher order systems, transportation lag. Closed loop systems, controllers and final control elements, block diagrams, closed loop transfer functions, transient response of simple control systems, concept of stability, stability criteria, Routh test for stability.

Part B

Frequency response methods, control system, design by frequency response, closed loop frequency by frequency response methods, Nyquist stability criterion. Controller mechanism, measuring instruments, transducers and transmitters. Control of complex processes, experimental

dynamics of complex processes, theoretical analysis of complex processes.

ChE 413 Technology of Petrochemicals and Refinery Engineering

2 hours per week 200 marks

Part A

Refinery Engineering—Chemicals from petroleum ; refinery products and derivatives ; production, distribution and consumption of various petroleum products of ERL in Bangladesh ; unit operations and unit processes ; fractionation, thermal and catalytic cracking, stabilization, alkylation, isomerization, hydrogenation, dehydrogenation and also the equipments of petroleum refining ; analysis of petroleum products.

Part B

Petrochemicals—Various feed stocks for petrochemicals ; manufacture of acetylene, ethylene, propylene, butadiene, isoprene, methanol, vinyl acetate and acetic acid. Plastics—polymerization processes and mechanism, production, properties and uses of polyethylene, polypropylvinyl chloride, PVC, styrene and polystyrene, technology of plastic processing. Synthetic resins—urea formaldehyde, melamine formaldehyde, phenol formaldehyde, and synthetic fibres.

ChE 414 Petroleum (Laboratory)

3 hours every alternate week 50 marks

Laboratory work based on ChE 413.

ChE 419 Technology of Fuels and Gases

2 hours per week 200 marks

Part A

Introduction : energy situation in Bangladesh ; fuel analysis—sampling, tests, significance ; essential properties of fuels ; solid fuels—types, purification, storage, combustion, burners, secondary fuels and utilization ; liquid fuels—types, composition, purification, combustion, burner, utilization.

Part B

Gaseous fuels—types, purification, distribution, combustion, burners, utilization ; choice of fuels and their efficient utilization, energy economics ; furnaces ; refractory and insulation materials ; boilers and other appliances.

ChE 420 Fuels and Gass (Laboratory)

3 hours per week 50 marks

Laboratory work based on ChE 419

ChE 432 Applied Mathematics for Chemical Engineers (Sessional)
3 hours per week 100 marks
Application of mathematical techniques to chemical engineering problems.

ChE 434 Instrumental Methods of Analysis (Laboratory)
3 hours per week 100 marks
An introduction to the instrumental methods of analysis with special reference to industrial application ; principles and practices of paper and gas chromatography, flame photometry, colorimetric methods, electrometric pH determinations, spectrochemical analysis ; design and use of on-line industrial gas analysis of CO, CO_2, O_2 etc.

ChE 436 Seminar
2 hours every alternate week 50 marks
Students will be required to present an oral discussion on current topics of chemical engineering interest.

ChE 438 Chemical Engineering Problems and Laboratory
3 hours per week 100 marks
Advanced laboratory work and problems based on transport phenomena, process control, etc.

Details of Postgraduate Courses in Chemical Engineering

ChE 6001 Transport Phenomena
3 hours per week
An analysis of the theory of mass, heat and momentum transfer processes.

ChE 6002 Advanced Thermodynamics
3 hours per week
Estimation of thermodynamic properties, feasibility of reactions, application to industrial problems.

ChE 6003 Advanced Chemical Reactor Design
3 hours per week
Design of homogeneous and heterogeneous reactors for isothermal and nonisothermal operation, analysis of rate data transport processes in heterogeneous catalytic systems.

ChE 6004 Heat Tranfer
3 hours per week
Design problems involving conductive, convective and radiant heat transfer.

ChE 6005 Mass Transfer I
3 hours per week
A study of mass transfer operations with emphasis on theoretical aspects. Topics will include phase equilibria, molecular and turbulent diffusion, mass transfer coefficients and transfer units, two-film theory, penetration theory, and plate efficiency.

ChE 6006 Polymer Science for Chemical Engineers
3 hours per week
Polymer solutions, measurement of molecular weight and size, crystalline polymers, rheology and the mechanical properties of polymers, polymerization, properties of commercial polymers, polymer processing.

ChE 6007 Advanced Chemical Engineering I
2 hours per week
Study and review of current chemical engineering literature.

ChE 6008 Nuclear Chemical Engineering
3 hours per week
Selected topics in nuclear chemical engineering beyond ChE 423.

ChE 6009 Corrosion Science and Engineering
3 hours per week
Principles of corrosion and oxidation, Pourbaix's diagrams, applications, Economics of protection. Review of current literature on selected topics beyond ChE 407.

ChE 6010 Process Dynamics and Control
3 hours per week
Analysis and simulation of chemical engineering systems, process identification techniques, sampled data and computer control.

ChE 6011 Advanced Plant Design
3 hours per week
Application of scientific and engineering methods to the design of chemical processes. A number of proposed processes will be analyzed for technical feasibility and profitability, the designs will be optimized to the extent justified.

ChE 6012 Fuel Science
3 hours per week
Mechanism of combustion reactions, flame propagation, ignition and inflammability limits, design of furnaces. Review of current literature on selected topics.

ChE 6013 Mass Transfer II

3 hours per week

A study of simultaneous mass transfer and chemical reaction and simultaneous heat and mass transfer, review of current literature on mass transfer.

ChE 6014 Chemical Engineering Analysis

3 hours per week

Application of mathematics to chemical engineering problems with emphasis on operator methods.

ChE 6015 Advanced Chemical Engineering II

3 hours per week

An advanced treatment of selected chemical engineering topics of current interest to staff and students.

ChE 6016 Numerical Methods in Chemical Engineering

3 hours per week

Solution of problems in staged operations, reaction kinetics and heat transfer, statistical methods, design of experiments and model building.

ChE 6017 Fluid Mechanics

3 hours per week

A review of basic fluid mechanics with an advanced treatment of the macroscopic momentum and mechanical energy balance equations and treatment of specific chemical engineering problems (viz. estimation of rising velocity of drops in a liquid, percolation of fluid through porous media, effect of flow on the dissolution rate of particles immersed in a flowing fluid, etc.). Non-Newtonian fluids ; classifiction of fluids, characterization of fluids, laminar flow, turbulent flow and boundary layer theory (with special reference to tube flow).

ChE 6018 Electrochemical Engineering

3 hours per week

Electrochemical thermodynamics, theory of over-voltage, irreversible electrode kinetics, mass transfer at electrode surfaces. Recent application in the areas of corrosion, batteries, fuel cells, chemical synthesis, molten electrolytes.

ChE 6019 Kinetics and Catalysis

3 hours per week

Chain reactions, kinetics in liquid solutions, characterization of catalysts, heterogeneous catalysts.

Department of Civil Engineering

Staff

Professor and Head

Jamilur Reza Choudhury, *B Sc Engineering (Civil), M Sc, Ph D*

Professors

Abul Hasnat, (Abroad), *B E (Civil), M S, Ph D*
S.H.K. Eusufzai, (on leave), *B Sc Engineering (Civil), M S, Ph D*
M.H. Khan, (Abroad), *B Sc Engineering (Civil), M S, Ph D*
Sohrabuddin Ahmed, (Abroad), *B Sc Engineering (Civil), M Sc, Ph D*
Alamgir Habib, *B Sc Engineering (Civil), M S, Ph D*

Associate Professors

A.F.M. Abdur Rauf, *B Sc Engineering (Civil), M E*
Syed Noor-ud-deen Ahmed, *B Sc Engineering (Civil), M Sc*
Md. Shamim-uz-Zaman, (Abroad), *B Sc Engineering (Civil), M Sc*
M. Feroze Ahmed, *B Sc Engineering (Civil), M Sc*
Md. Alee Murtuza, *B Sc Engineering (Civil), M Sc*

Assistant Professors

Shafiqul Islam, (Abroad), *B Tech, M Sc (Tech), Ph D*
Delwar Hossain, (Abroad), *B Sc Engineering (Civil), M Sc*
Md. Mizanul Huq, (Abroad), *B Sc Engineering (Civil), M Sc*
Md. Abul Mansur, (Abroad), *B Sc Engineering (Civil), M Sc*
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A.M.M. Shafiullah, (Abroad), *B Sc Engineering (Civil), M Sc*
Md. Hossain Ali, *B Sc Engineering (Civil)*
A.K.M. Golam Sarwar, *B Sc Engineering (Civil)*
Md. Humayun Kabir, *B Sc Engineering (Civil)*
Ahmed Habibur Rahman, *B Sc Engineering (Civil)*

Lecturers

Md. Shaheed Hossain, (Abroad), *B Sc Engineering (Civil), M Sc*
Md. Azadur Rahman, (Abroad), *B Sc Engineering (Civil), M Sc*

Mahmud Hassan, (Abroad), *B Sc Engineering (Civil)*
Jalaluddin Khandaker, *B Sc Engineering (Civil)*
Musharrafuzzaman, *B Sc Engineering (Civil)*
Md. Abdur Rouf, *B Sc Engineering (Civil)*
Aminul Islam, *B Sc Engineering (Civil)*
Mustaq Ahmed Nasim, *B Sc Engineering (Civil)*
Faruque Mahmud Anam Siddiqui, *B Sc Engineering (Civil)*
Nripendra Kumar Shaha, *B Sc Engineering (Civil)*
Md. Omar Faruque, *B Sc Engineering (Civil)*
Shah Md. Yunus, *B Sc Engineering (Civil)*
Hossain Monjur Morshed, *B Sc Engineering (Civil)*
Nur Yazdani, *B Sc Engineering (Civil)*
Ahsanul Kabir, *B Sc Engineering (Civil)*

Civil Engineering is the oldest of the fields of Engineering and the Department of Civil Engineering at BUET is also the oldest and attracts the largest number of students.

The field of Civil Engineering embraces a very wide variety of applications. Civil Engineers plan, design and supervise the construction of all types of buildings, bridges, dams, transportation facilities including highways, railways, waterways, airports, pipe lines and harbour works, power facilities, offshore structures, water works, waste water disposal facilities and similar essential attributes of modern society. With the increase in population, the growing complexity of industries and burgeoning urban centres, the Civil Engineer's task-applying sciences to the control and utilization of man's environment represents a challenge unsurpassed in all engineering.

Undergraduate Program

In order to equip the future Civil Engineer to handle this broad spectrum of problems, the four-year undergraduate program at BUET offers a curriculum founded upon the fundamentals of science and mathematics. Following the basic grounding in the first year the student is introduced to mechanics of materials, construction materials, details of construction, fluid mechanics and geodetic engineering. The courses in the third and fourth years include a more detailed study of structural analysis and design, geotechnical engineering, transportation engineering, water resources engineering and environmental engineering. Besides, the student is introduced to the applications of digital computer in the solution of Civil Engineering problems. The students are also introduced to research techniques and methodology in their 4th year class, where they have to work on a research project and write a thesis on it. Thus, an effort is made in the program to train the students in such a way that they are properly equipped to play their vital role as leaders in nation building.

Postgraduate Program

Recent advancements in all the branches of Civil Engineering have broadened the vistas of knowledge so much that it has become almost impossible to incorporate all these in a four year program. Specialization at the postgraduate level enables the Civil Engineer to concentrate on one of the major branches.

The postgraduate courses in Civil Engineering which lead to the M Sc Engineering (Civil) Degree are now available in the following four major branches of study :

Structural Engineering and Concrete Technology

Environmental Engineering

Geotechnical Engineering

Transportation Engineering

A wide range of subjects is offered in each of these branches and it is possible for students to choose a combination of subjects from these courses of study. Every student has to select to pursue one of the major branches of civil engineering. A student is required to successfully complete courses of at least 24 units in addition to a thesis. Of the 24 units, not less than 16 and not more than 18 units shall have to be from the group of his choice and the thesis shall be from this group. The remaining units shall be chosen from the other group or groups and Mathematics.

The department is at present working on different research projects which are mainly concerned with civil engineering problem of vital national importance, e.g., the design of cyclone shelter, water pollution and its control, water supply and rural sanitation, evalution of quality of ground and surface water resources, behaviour of available building and road materials, performance of flood embankment, engineering soil properties of various regions etc. Besides, some of the projects are of a more fundamental nature, e. g., behaviour of shear wall structures, optimum design of highway bridge, behaviour of composite materials.

The department also accepts research problems offered by the outside agencies which are of immediate national importance and of sufficient scientific and technological interest.

The department of Civil Engineering has five well-equipped laboratories under four major branches. Facilities for compression, tensile, bending, shear, and torsional tests, prestressing, testing of structural models, photoelastic investigations, analysis of water, waste water, solid waste,

testing of road materials and testing of soil properties are available in the five laboratories.

In addition to the normal teaching and research, the department offers expert advice to government departments and industries to overcome major problems and difficulties that they face in their projects. Research projects, sponsored by international agencies like UNESCO, UNICEF and WHO are currently in progress. The teachers of the department through the Bureau of Research, Testing and Consultation offer consulting services to outside agencies in civil engineering design problems. This interaction with industry and outside agencies provides the teachers an opportunity of acquiring first hand knowledge of the practical problems which helps in the improvement of the quality of teaching as well as research. The department also provides testing and standarisation facilities to outside agencies on agreed terms. The department thus extends its efforts beyond the University and directly participates in national development, simultaneously fulfilling its primary function of educating engineers of quality, comparable to best international standards.

Details of Undergraduate Courses in Civil Engineering

Second Year

CE 201 Mechanics of Materials

3 hours per week 250 marks

Part A

Fundamental concepts of strain and stress :
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 center.

Part B

Torsional stresses in shafts ; Helical springs ; Thin pressure containers ; Principal stresses ; Deflection of beams ; Columns ; Unsymmetrical bending.

CE 202 Strength of Materials (Laboratory)

3 hours per week 100 marks

General discussion and problems on stress, strain and mechanical properties of materials : 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 203 Engineering Materials

3 hours per week 250 marks

Part A

Properties and uses of bricks, cement, aggregates, cement and lime mortars, concrete, corrosion and its prevention, paints, varnishes, lacquer, metallic coating.

Part B

Design of concrete mix ; Atomic structure and bonding ; Crystal structure, mechanical properties, yielding, fracture, elasticity, plasticity, cement chemistry ; Properties and uses of rubber, timber and plastics.

CE 204 Materials (Laboratory)

3 hours per week 100 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. Resistance to abrasion of coarse aggregates, effect of water-cement ratio upon compressive strength and consistency of concrete of uniform mix, concrete mix design.

CE 207 Geodesy and Photogrammetry

2 hours per week 150 marks

Part A

Techeometry : Introduction ; Principles and problems on Techeometry. Curves and curve ranging ; Transition curve ; Vertical curves.

Geodetic surveying : Introduction ; Field procedure ; Correction for base line ; Signals ; Extension of base line : Problems on geodetic surveying.

Part B

Astronomical surveying : Definition ; Instruments ; Astronomical corrections ; Systems of time.

Photogrammetry : Introduction ; Terrestrial photography ; Aerial Photogrammetry ; Reading of photo mossaic, scale. Project surveying. Errors in surveying.

CE 210 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 ; Thremal insulation and acoustics.

Part B

Estimating of masonry, reinforced concrete, timber and steel structures ; Analysis of rates ; Detailed estimate of all items of work of a building, bridge truss, road, highway sections and other constructions. Specifications of materials for the above constructions.

CE 215 Engineering Mechanics

2 hours per week 150 marks

Part A

Resultants and components ; Coplanar concurrent forces ; Moments and parallel coplanar forces ; Non-concurrent, non-parallel coplanar forces ; Non-coplanar forces ; Maximum and minimum forces ; Centroids ; Moments of inertia of areas ; Moments of inertia of masses.

Part B

Graphical methods ; Friction ; Flexible chords ; Plane motion ; Forces systems that produce rectilinear motion; Work ; Kinetic energy ; Power, impulse and momentum.

Third Year

CE 300 Plane and Geodetic Surveying (Field Work)

4 weeks in camp 100 marks

Project surveying ; Contouring ; Techeometry ; Curve ranging ; Geodetic surveying ; Trigonometrical levelling ; Hydrographic survey.

CE 301 Structural Analysis and Design I

3 hours per week 300 marks

Part A

Analysis of statically determinate frames and trusses. Influence lines. Moving loads on beams, frames and trusses.

Part B

Portal frames and multi-storied buildings. Deflection of trusses and beams by different methods.

Basic force-deflection relationship for member element. Equilibrium, compatibility and stress-strain relationship. Space frames. Design of members and connections of steel structures.

CE 302 Structural Analysis and Design I (Sessional)

3 hours every alternate week 50 marks

Analysis and design problems based on CE 301.

CE 303 Reinforced Concrete

3 hours per week 300 marks

Part A

Fundamentals of Reinforced Concrete members : Introduction of WSD and USD ; Beams-Singly Reinforced, Doubly Reinforced and T-beam according to WSD and USD. Diagonal tension, Bond and Anchorage according to WSD and USD.

Part B

Columns, footings, two-way slabs, Retaining walls.

CE 304 Reinforced Concrete (Sessional)

3 hours per week 100 marks

Analysis and design problems based on CE 303.

CE 305 Geotechnical Engineering

3 hours per week 300 marks

Part A

Rocks and minerals. Weathering, erosion, deposition, morphology and landforms. Earthquake and structural geology. Geology of Bangladesh.

Identification and classification of soils ; Soil grain and aggregate properties, weight-volume-moisture-density relationship ; Soil structure and consistency.

Methods of soil exploration and sampling. Direct measurement of consistency and relative density ; Correlation of strength parameters with N-values. Field exploration and exploratory program.

Part B

Hydraulic and mechanical properties of soils : Permeability, seepage, flownets, capillarity. Intergranular and porewater pressure, consolidation. Stress-strain characteristics.

Slope stability, lateral earth pressure and soil stabilization. Bearing capacity and settlement.

CE 306 Geotechnical Engineering (Laboratory)

3 hours every alternate week 50 marks

Standard laboratory tests based on CE 305.

CE 309 Transportation Engineering I

2 hours per week 200 marks

Part A

Elements of transportation system; Considerations in the planning, financing and development of transportation system with special reference to Bangladesh.

Modes of transport.

Railways : General requirement, alignment, permanentway, points and crossings, stations and yards, signalling maintenance.

Part B

Highways : Highway materials and mix design ; Highway types, geometric design of highways.

CE 310 Transportation Engineering (Laboratory)

3 hours every alternate week 50 marks

Tests on subgrade, subbase and base materials. Tests on bituminous materials.

CE 311 Environmental Engineering I

2 hours per week 200 marks

Part A

Water supply engineering : Introduction ; History and development of water supply system ; Chemistry of water and waste water ; Population prediction and water requirements ; Ground and surface water sources, collection and transportation ; Water pipes ; Pump and pumping machinery ; Water quality ; Bangladesh and international water quality standards.

Part B

Sewerage Engineering: Introduction; Characteristics of sewage; Quality of Sewage ; Sewer pipes ; Sewer system ; Design of sewers ; Sewer appurtanances ; Sewer construction and maintenance ; Sewerage system and environmental sanitation ; Plumbing.

CE 312 Environmental Engineering (Laboratory)

3 hours every alternate week 50 marks

Physical, chemical and bacteriological tests of water and sewage based on CE 311.

CE 313 Computer Programming and Numerical Methods in Engineering

2 hours per week 200 marks

Part A

Computer programming : Flow diagrams ; 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.

Fourth Year

CE 400 Project and Thesis

6 hours per week 200 marks

Experimental and theoretical investigation of various topics in structural engineering, concrete technology, environmental engineering, transportation engineering and foundation engineering. Individual or group study of one or more topics from any of the above fields. The students will be required to submit a thesis at the end of the work.

CE 401 Structural Analysis and Design II

3 hours per week 300 marks

Part A

Energy theorems ; Theorem of minimum potential energy ; Principle of virtual work ; Castiglianos theorems ; Analysis of statically indeterminate structures by the method of consistent deformation ; Flexibility matrices ; Influence lines for statically indeterminate structures.

Part B

Slope deflection ; Moment distribution and column analogy methods ; Stiffness matrices.

CE 403 Structural Analysis and Design III

2 hours per week 200 marks

Part A

Prestressed concrete: Materials, prestressing systems ; Loss of prestress analysis and design of sections for flexure, shear, bond and bearing ; Beam deflection and cable layout ; Partial prestress ; Review of codes ; Frames and shear walls.

Part B

Reinforced concrete : Roof systems ; Yield line method ; Review of codes.

CE 404 Structural Analysis and Design (Sessional)

3 hours per week 100 marks

Analysis and design of concrete and steel structures such as buildings, bridges and water towers.

CE 405 Foundation Engineering

2 hours per week 200 marks

Part A

Factors determining type of foundation ; Footing and Raft foundations, Pile, Pier and Caisson foundations.

Part B

Foundation of structures subjected to lateral loads ; Foundation construction, operations and methods of construction ; Soil-Structure interaction. Case studies.

CE 407 Construction Management and Project Planning

2 hours per week 200 marks

Part A

Principles of management ; Principles of construction management ; Contract and specification ; Construction planning and scheduling : PERT CPM, Case Studies. Resource scheduling ; PERT : a cost accounting system. Linear programming.

Part B

Psychology in administration ; Materials management ; Demand forecasting ; Inventory control ; Stores management ; Procurement.

Project planning and evaluation ; Feasibility reports ; Cash flow ; Pay back period ; Internal rate of return ; Benefit-cost ratio , Construction equipments and plants.

CE 409 Transportation Engineering II

3 hours per week 300 marks

Part A

Highway planning and surveys. Economic evaluation of highways in Bangladesh. Highway drainage, highway subgrade, sub-base, base and surface courses. Highway road user and vehicle characteristics, Traffic surveys. Traffic flow and control with special reference to Bangladesh. Airways and airports.

Part B

Design of rigid and flexible pavements. Highway construction : Construction of subgrade, sub-base, base and asphaltic surface courses ; Soil stabilization and soil aggregates in Bangladesh. Brick and block pavements, cement concrete pavements ; Highway maintenance ; Waterways and terminals.

CE 410 Transportation Engineering (Laboratory)

3 hours every alternate week 50 marks

Tests on bituminous concrete. Complete design of a highway intersection, rigid and flexible pavements for highways and airports ; Geometric design of a bridge approach.

CE 411 Environmental Engineering II

3 hours per week 300 marks

Part A

Water : Impurities in water, plain sedimentation, sedimentation with coagulation, filtration, disinfection and miscellaneous water treatment methods ; Water distribution system ; Industrial water supply ; Planning and design of water treatment plant ; Water supply system in rural and urban areas.

Part B

Sewage : Biology of sewage and waste water ; Physical, chemical and biological treatment of sewage ; Sewage disposal; Sludge treatment and disposal ; Sewage treatment and disposal at unsewered areas ; Treatment of industrial waste ; Planning and design of sewage treatment plant.

Water pollution, air pollution and solid waste disposal. Pollution problems in Bangladesh.

CE 412 Environmental Engineering (Laboratory)

3 hours every alternate week 50 marks

Analysis of water, waste water, and solid waste. Design of water supply and sewerage system.

Civil Engineering Courses offered to other Departments

CE 213 Mechanics of Materials

2 hours per week 150 marks

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 214 Strength of Materials (Laboratory)

3 hours every alternate week 50 marks

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.

CE 222 Plumbing

1 hour per week 100 marks

Water supply in buildings, drainage and sewage disposal.

CE 223 Structure II

2 hours per week 200 marks

Statics—analysis of the external effects of a force system acting on a body at rest. Determination of section properties, relationship to architectural structures.

CE 307 Soil Mechanics and Foundation Engineering

3 hours per week 300 marks

Part A

Identification and classification of soils, soil grain and aggregate properties, soil structure and consistency.

Hydraulic and Mechanical properties of soil ; Intergranular and pore-water pressures : Stress-strain and consolidation properties of soils. Methods of soil exploration and sampling ; Direct measurement of consistency and relative density ; Correlation of strength parameter with N-values ; Field exploration and exploratory programs.

Part B

Factors determining type of Foundation : Footing and Raft Foundation ; Pile, Pier and Caisson Foundations. Foundations on Non-uniform soils ; Active and passive earth pressures ; Stability of retaining walls ; Slope stability analysis.

CE 308 Soil Mechanics and Foundation Engineering (Laboratory)

3 hours every alternate week 50 marks

Standard laboratory tests based on CE 307

CE 316 Structural Analysis and Design (Sessional)

3 hours every alternate week 50 marks

Sessional based on CE 301.

CE 318 Reinforced Concrete (Sessional)

3 hours every alternate week 50 marks

Sessional based on CE 303

CE 320 Strength of Materials (Laboratory)

3 hours every alternate week 50 marks

Model tests on bending of unsymmetrical sections ; Location of shear centres ; Strain measurement techniques ; Strength of riveted and welded connections ; Model anaylysis of a truss.

CE 321 Construction and Structure III

3 hours per week 300 marks

Fundamentals of strength of materials, shear and bending moments. Stress and deflections in beams, fundamentals of column design.

CE 413 Structural Analysis and Design

3 hours per week 300 marks

Part A

Analysis of statically indeterminate structures by consistent deformation, slope deflection and moment distribution methods.

Part B

Column analogy method ; Influence lines for statically indeterminate structures. Reinforced concrete roof systems. Prestressed concrete : Materials ; Prestressing system ; Loss of prestress; Analysis of design of sections for flexure, shear ; Bond and bearing ; Beam deflection.

CE 415 Structure IV

2 hours per week 200 marks

Analysis of beams and frames. Classification of trusses for roofs and bridges. Analysis of roof for wind loads. Introduction to moving loads. Reinforced concrete fundamentals. Analysis and design of slabs, rectangular beams, T-beam for flexure and shear. Design of columns and footings.

CE 501 Structure V

2 hours per week 200 marks

Slope and deflection of statically determinate beams by double integration method. Analysis of statically indeterminate beams ; Vieerendeel truss. Approximate analysis of multistoried buildings for lateral loads and gravity loads. Prestressed concrete ; Materials properties, loss of prestress. Analysis of sections and preliminary design of beams sections. Structural systems of buildings floor, two way slab, grid floor, flat slab. Classification of shells. Analysis of dome, space frame.

Postgraduate Courses in Civil Engineering

CE 6000 Thesis

CE 6101 Theory of Elasticity

3 hours per week

Stress-strain relationship ; Plane-stress and plane-strain ; Stress functions ; Two dimensional problems in rectangular and polar coordinates ; Torsion of prismatic bars ; Energy principles ; Stress and strain in three dimensions ; General theorems ; Three dimensional problems ; Thermal stresses.

CE 6102 Matrix Methods in Structural Analysis

3 hours per week

Statical and Kinematic indeterminacy ; Flexibility method : Evaluation of flexibility coefficients from energy considerations and product integrals ; Scale factor ; Transformation of axes ; Release system relations. Stiffness method : Evaluation of stiffness matrix, assembly of stiffness matrices. Computer programs for beams, trusses and frames using stiffness and flexibility methods.

CE 6103 Theory of Plates

3 hours per week

Rectanguler plates with various edge conditions ; Circular plates ; Energy methods ; Approximate methods ; Orthotropic plates ; Numerlcal methods in the solution of plate problems ; Ultimate load behaviour of plates.

CE 6105 Plastic Design of Steel Structures

3 hours per week

The concept of plastic hinges ; Collapse of beams ; Collapse of frames; Minimum weight design ; Shakedown theorems.

CE 6106 Elastic Stability of Structures

3 hours per week

Elastic buckling of beams and frames ; Stability functions ; Inelastic buckling of bars; Torsional buckling of bars ; Lateral buckling of beams; Buckling of plates and shells ; Application of numerical methods in buckling problems.

CE 6108 Analysis and Design of Shells

3 *hours per week*

Membrane theory of shells ; Bending theory of cylindrical shells and shells revolution ; Synclastic and anticlastic shells. Design of shell roofs of various shapes ; Finite difference and finite element method ; Model analysis.

CE 6110 Computer Methods in Civil Engineering

3 hours per week

Review of programming languages ; Computer solution of algebraic and transcendental equations ; Ordinary and partial differential equations ; Interpolation and curvefitting ; Numerical differentiation and integration.

Problem-oriented languages ; Optimization ; Simulation techniques. Selected problems from various branches of Civil Engineering.

CE 6111 Advanced Reinforced Concrete Design

3 *hours per week*

Properties of concrete ; Ultimate strength ; Deflections ; Yield-line analysis ; Continuous beams and frames ; Analysis and design for torsion ; Codes and specifications and their influence on design ; Recent developments on research.

CE 6113 Experimental Stress Analysis

3 *hours per week*

Dimensional analysis and model similitude ; Measurement of load, displacement and strain ; Two and three-dimensional photo-elasticity ;

Moire—fringe techniques ; Brittle lacquers ; Use of analogies in model analysis. Experiments on use of various types of strain gauges; photo-elastic analysis ; Analogue computers.

CE 6114 Analysis of Tall Buildings

3 *hours per week*

Structural forms of tall buildings ; Planning concepts using shear walls ; Approximate methods of building frame analysis. Shear wall analysis : continuous medium, wide column analogy, grid analogy, finite element and finite difference solutions. Spatial interaction of walls and frames.

CE 6115 Bridge Engineering

3 *hours per week*

Planning concepts ; Various type of bridges and their suitability for different span ranges ; Orthotropic plate decks ; Load distribution theories ; Numerical methods of solution ; Long span bridges ; Suspension and cable-stayed girder bridges. Substructures : design and construction.

CE 6301 Theory of Water Treatment

3 hours per week

Water and its Impurities. Criteria of water quality. Physical, chemical and biological treatment processes. Corrosion and corrosion control. Disinfection. Control of aquatic growths. Control of taste and odour.

CE 6304 Theory of Sewage Treatment

3 hours per week

Composition, properties and analysis of sewage. Biology and biochemistry of sewage treatment. Principles of physical, chemical and biological treatment processes. Oxidation ponds. Sludge digestion. Sludge disposal.

CE 6305 Biology of Sewage and Polluted Waters

3 hours per week

Significance of biology in water quality ; Stream pollution and sewage treatment.

CE 6309 Environmental Sanitation

3 hours per week

Application of engineering principles to the control of communicable diseases. Vector control. Insectisides and bacteriocides. Collection and disposal of municipal refuse. Housing. Milk and food sanitation. Industrial hygiene and air contamination. Plumbing. Ventilation, air-conditioning. Hospital sanitation. Camp sanitation.

CE 6310 Industrial Water and Waste Treatment

3 hours per week

Requirements of water for various industries ; Quality of Industrial water : Characteristics and volume of industrial waste ; Problems associated with industrial wastes ; Physical, chemical and biological methods of treatment ; Industrial waste problems of major industries and their methods of treatment and disposal.

CE 6311 Municipal and Rural Sanitation

2 hours per week

Principles of excretes disposal with or without water carriage ; Municipal and rural water supply ; Water borne diseases control ; Public health organizations.

CE 6312 Water Pollution and its Control

3 hours per week

Sources of pollution ; Effects on water ; Basic theory of control devices ; Pollution surveys and control programs.

CE 6315 Water Supply Engineering Design

3 hours per week

Development of design criteria for municipal and rural water sources ; Intakes, pipe-lines, distribution systems, storage facilities (overhead reservoirs) and water treatment systems ; Engineering design of water distribution systems ; Functional, hydraulic and structural design of complete water treatment plants ; Ground water resources and well design.

CE 6316 Sewerage and Drainage Engineering Design

3 hours per week

Design of collection system, pump house ; Functional hydraulic and structural design of complete sewage treatment plant and drainage systems.

CE 6401 Soil Mechanics I

2 hours per week theory and 3 hours per week practical

Stress-deformation characteristics of soil mass, ultimate strength, consolidation and settlement. Bearing capacity equation and factors. Subsoil exploration, properties of soils.

CE 6402 Soil Mechanics II

3 hours per week

The effective stress principle. Soil shear strength and the concept of cohesion, internal friction. Underground seepage and construction of flownets. Stability and analysis of dikes, dams and embankments.

CE 6404 Earth Pressure and Retaining Structures

2 hours per week theory and 3 hours per week practical

Classical and modern earth pressure theories and basis for design of retaining structures. Bracing of open cuts, anchored bulkheads, tunnels.

CE 6405 Earth Dams and Stability of Slopes

3 hours per week

Principles governing flow of water through soils, seepage in composite sections; Methods of stability analysis. Stability of slopes ; Compaction. Measurement of performance, construction, control of embankments.

CE 6407 Soil Dynamics

3 hours per week

Application of vibration and wave propagation theories to soil media. Analysis of foundation vibration. Dynamic properties of soils and methods for their determination. Design procedures for foundation subjected to dynamic forces.

CE 6408 Advanced Engineering Geology

3 hours per week

Advanced physical geology concerning transported and residual soils. Erosion and deposition ; Geomorphology. Study of the formation of delta. Engineering properties of rocks.

Geologic structures. Geologic considerations for engineering designs. Historical geology.

CE 6501 Transportation Engineering

3 hours per week

Historical development and present systems of transportation, technical and operating characteristics of highways, railways, waterways, airways and pipe lines, transportation planning and development.

CE 6502 Geometric Design of Highways

3 hours per week theory and 3 hours per week practical

Highway classification, design, control and criteria ; Elements of design, cross-section elements ; Design of intersections, grade separation and interchanges ; Highway drainage.

CE 6503 Bituminous Materials and Mix Design

3 hours per week theory and 3 hours per week practical

Origin, production, specifications, properties and testing of bituminous materials ; Analysis of bituminous paving mixtures ; Composition and design of asphaltic concrete and soil asphalt mixes.

CE 6505 Structural Design of Flexible Pavements

3 hours per week

Characteristics of pavement loads ; Stress analysis of flexible pavements ; evaluation of subgrade and base support ; Design practices, construction and maintenance.

CE 6506 Structural Design of Rigid Pavement

3 hours per week

Stresses in rigid pavements ; Theory of rigid pavement design ; Design practices, construction and maintenance.

CE 6507 Traffic Engineering

3 hours per week theory and 3 hours per week practical

Characteristics of vehicles and driver ; Traffic stream characteristics ; Traffic control and operation ; Traffic surveys ; Accident studies ; Parking ; Street lighting.

CE 6508 Railway Engineering

3 hours per week

General requirements, permanentway, alignment, gradient and curves. Railway construction and maintenance ; Theory of points and crossing, tunneling, electricity on railways, signals.

CE 6509 Waterways

3 hours per week

Historical development of navigation, navigational channels, survey of waterways, classification of waterways ; Traffic, vessels, ports and harbours, navigational aids ; Maintenance of waterways.

CE 6510 Airfield Planning and Design

3 hours per week

Basic principles of site selection for airports, field layout, capacity, drainage and fundamental considerations of design, construction and maintenance of airport pavements.

CE 6511 Transportation Planning

3 hours per week

Techniques and processes used in sloving transportation problems ; Relationship between trip generation and land use ; Collection and characteristics of base year data ; Formulation of mathematical models to simulate existing travel patterns. Forecasting procedures and evaluation of different transportation systems.

Department of Electrical Engineering

Staff

Professor and Head

A. M. Zahoorul Huq, *B Sc (Hons), M Sc, M S, Ph D, Fellow I E*

Professors

A. Matin Patwari, *B Sc Engineering (Elect), M S, M A, Ph D, Fellow I E*
Solaimanul Mahdi, (abroad), *B Sc Engineering (Elect), M S Ph D*
Shamsuddin Ahmed, *B Sc Engineering (Elect), M S, Ph D*

Associate Professors

A. H. M. Abdur Rahim, *B Sc Engineering (Elect), Ph D*
Syed Fazl-e-Rahman, *B Sc Engineering (Elect), M Sc, Ph D*

Assistant Professors

Syed Anisur Rahman, (Abroad), *B Sc Engineering (Elect), M S*
A. K. M. Mahfuzur Rahman Khan, (Abroad), *B Sc Engineering (Elect), M Sc, Ph D*
Md. Hamidur Rahman, *B Sc Engineering (Elect)*
A. H. M. Sadrul Ula, (Abroad), *B Sc Engineering (Elect), M Sc*
Habibul Murshed, *B Sc Enigneering (Elect), M Sc*
Md. Khurshid Alam, (Abroad), *B Sc Engineering (Elect), M Sc*
Md. Abul Masrur. (Abroad), *B Sc Engineering (Elect), M Sc*
Ruhul Amin Mia, *B Sc Engineering (Elect), M Sc*
Md. Abdul Mannan Mazumder, *B Sc Engineering (Elect), M Sc*
Prabir Kumar Das, (Abroad), *B Sc Engineering (Elect), M Sc*
A.N.M. Masum Chowdhury, (Abroad), *B Sc Engineering (Elect), M Sc*
Md. Shamsul Alam, *B Sc Engineering (Elect)*
Alamgir Md. Mohiuddin Khan, *B Sc Engineering (Elect), M Sc*
M. Abdul Malek Mia, *B Sc Engineering (Elect)*
Hafiz Faruq Ahmed Sharif, *B Sc Engineering (Elect), M Sc*
Md. Emdadul Huq Khan, *B Sc Engineering (Elect)*
Md. Fayyaz Khan, *B Sc Engineering (Elect)*
Md. Joynal Abedin, *B Sc Engineering (Elect)*
Sheikh Humayun Kabir, *B Sc Engineering (Elect)*
Md. Mahdiuzzaman, *B Sc Engineering (Elect), Ph D*

Lecturers

Q. I. M. Buland Akhter, (Abroad), *B Sc Engineering (Elect)*
Md. Majibur Rahman, (Abroad), *B Sc Engineering (Elect)*
Md. Bani-E-Amin, (Abroad), *B Sc Engineering (Elect), M E*
Md. Abdul Jabbar, (Abroad), *B Sc Engineering (Elect), M E*
Md. Fazlur Rahman, (Abroad), *B Sc Engineering (Elect)*
Md. Habibur Rahman, (Abroad), *B Sc Engineering (Elect), M Sc*
Chowdhury Fazlur Rahim, (Abroad), *B Sc Engineering (Elect), M Sc*
A. B. M. Siddique Hossain, (Abroad), *B Sc Engineering (Elect)*
Saifur Rahman, (Abroad), *B Sc Engineering (Elect)*
Saiful Islam, *B Sc Engineering (Elect)*
B. M. Azizur Rahman, *B Sc Engineering (Elect)*
Saroj Kanti Biswas, *B Sc Engineering (Elect)*
Md. Qamrul Ahsan, *B Sc Engineering (Elect)*
Abdullah Al-Mahmood, *B Sc Engineering (Elect), M E*

Electrical Engineering encompasses a field of great variety and scope. Its products and services directly influence the daily living of mankind in this country. It deals with the design and application of devices and systems that use, produce, control and transmit electricity and the physical laws underlying them. These laws govern electromagnetic fields, interaction of field and particles, properties of materials in solid-state and plasma, the interaction of systems and devices, information-processing. electric generators, motors and energy-processing devices to provide large quantities of power.

Electrical instruments for detecting, observing, and measuring electrical signals give them a unique role in supporting the advance of all other branches of science and engineering. It is a rapidly expanding field and includes such recently developed areas as quantum electronics, plasma, biomedical electronics, magnetohydrodynamic power generation, space communication and control. Most recently the revolution in the design of digital computer has had great influence on many areas of human activities.

Electricity as means of processing infomation and controlling energy has become vitally important in solving the problems of our society. Electrical Engneering plays an indispensable role in establishing and maintaining quickest communication between different areas of the country. It carries the responsibility of generating electricity and transmitting it to the urban industrial centres as well as the remotest villages. Electrical Engineers are employed in developmental laboratories, manufacturing facilities, government services, telephone and telegraph department, power development board and also in teaching and research.

Research

Besides giving instructions to students, who, after graduation carry out these responsibilities in the country, the department of electrical engineering is committed to a large and varied program of research in its effort to solve the problems that the country faces in the field of electrical engineering. These research activities enrich their teaching and render valuable services to the society. Some of the areas in which this department and its graduate students are currently engaged in research, are power system stability, comparative study of new and conventional methods of measuring synchronous machines 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 indigeneous materials, microwave filters, analysis, design and synthesis of electronic circuits, fabrication of solid-state diodes and transistors. The department is now also actively engaged in the field of energy research. Besides energy survey projects needed for collecting necessary data, specially rural and agricultural, investigation is under way for the determination of optimum use of electrical energy in agriculture, specially for irrigation. Projects on crop drying by solar energy, combined with agricultural waste and electricity, with an optimum combination of traditional and modern methods are also under way.

Testing and Standardization for the National Industries

In addition to the research, in most cases having direct bearing on local environment and requirements, the Electrical Engineering department has been undertaking for many years the testing and evaluation/ standardization of many kinds of electrical equipment and devices manufactured in the country, such as electrical motors, fans, batteries, chokes, transformers, power supply units etc. Various public utilities of the country frequently request this department to evaluate equipment such as motors, starters, transmission line conductors and aecessories, measuring instruments, etc. indented from foreign countries. Requests have also been received for solutions of complicated problems in the fields of operations, constructions and repair connected with large organizations in the public sector of the country.

Special research facilities include a 150 KV HV testing transformer, an automatic antenna plotter, microwave test set, a high vacuum coating unit. Services of the IBM 360/30 computer at the Bureau of Statistics are available to the faculty and students of the department by arrangemant.

Laboratory Facilities in the Department:

Laboratories that are available for experiments, research and testing include :

1. Electrical circuits laboratory
2. Electronics laboratory
3. Telecommunication laboratory
4. Microwave laboratory
5. Control systems laboratory
6. Electrical measurements and standard laboratory
7. Electrical machines laboratory
8. Power systems laboratory
9. High voltage laboratory
10. Computer science laboratory
11. Acoustics and illumination laboratory
12. Science of materials laboratory

Undergraduate Program

The department of Electrical Engineering offers undergraduate instructions leading to the degree of Bachelor of Science in Engineering (Electrical), a program of study extending over four academic years. A considerable exposure to basic sciences and mathematics is deemed desirable for this degree and almost the whole of the first year and part of the second and third years of study are thus devoted to these subjects. Beginning with the second year, electrical engineering subjects are introduced that build upon the base already formed and these include electrical circuits, machines, fields, electronics power systems, communications and control. In these courses students spend a substantial amount of time in laboratories. In a field with rapid rate of change of electric technology, the courses and laboratory experiments are designed to emphasize the basic principles. However the details of current practice are also introduced as far as possible. Each student in his final year has to complete a project under the guidance of a member oft he faculty and submit a report as part of the requirements for his Bachelor's degree. Final year students also undergo industrial training for a short period that exposes them to practical situations in the field of electrical engineering. They are also taken out to visit various industrial and utility organizations of the country as and when possible.

Graduate Program

Highly promising students who have completed their Bachelor's degree are offered the opportunity to further improve their knowledge, understanding and skill in the field of electrical engineering, Program leading to Master's and Doctoral degrees are available. A graduate student can specialize in one of these areas : circuits, communications, computer, control, electronics, material science, microwaves fields, machines and power systems. The requirements for Master's and Doctoral degrees normally include graduate instructions and classwork,

but are particularly characterized by the independent study and research that the graduate student is expected to conduct under the guidance of his supervisor. A Master's thesis aims at a modest contribution to knowledge, or a review or report on present state of knowledge, or a design in the students chosen area in the field of electrical engineering. A Doctoral dissertation is expected to make a significant and substantial contribution to knowledge and should be presented with satisfactory degree of literary skill, and should demonstrate students' ability to conduct independent research.

Details of Undergraduate Courses in Electrical Engineering

EE 203 Electrical Circuits

3 hours per week 250 marks

Part A

Single Phase circuit analysis. Q of a circuit, Wave Trap, Max. 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 Circuits (Laboratory)

3 hours every alternate week 50 marks

Experiments based on EE 203

EE 205 Electrical Machines

3 hours per week 250 marks

Part

D.C. generators : principles, construction, classification, voltage build up, Armature reactions, and commutation, performance and testing. D.C. Motor operation, types, speed. Torque characteristics, methods of speed control.

Part B

Transformers : Principle, types, equivalent circuits, performance and testing, special X-former and uses.

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

EE 206 Electrical Machines (Laboratory)

3 hours per week 100 marks

Experiments based on EE 205

EE 207 Electronics I

3 hours per week 250 marks

Part A

Electron ballistics with applications, electronic phonomenon in metals and semiconductors. Electron emissions ; Vacuum Tube/ Semiconductor diodes ; Power supplies and smoothing filters. Triode characteristics ; and analysis of triode circuits.

Part B

Multielement Tubes/Transistors : Types, characteristics, equivalent circuits, basic tube and Transistor amplifiers and their analysis. Untuned voltage and power amplifiers, phase inverter.

EE 208 Electronics I (Laboratory)

3 hours per week 100 marks

Experiments based on EE 207

Third year

EE 300 Electronic Shop

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.

EE 301 Electronics II

3 hours per week 300 marks

(Vacuum Tube and Transistor circuits to be treated)

Part A

Effects of feed back on amplifier characteristics ; Types of feed back, stability. Inverse feed back circuits, Nyquist criterion. Direct coupled amplifiers. Voltage regulators. Regulated power supply. Conditions for self oscillations. Influence of mutual conductance. Study of different types of oscillators. Tuned voltage amplifiers, untuned power amplifiers. Class A ; Class AB ; Class B.

Part B

Tuned class B and Class C power amplifiers. Modulation. Amplitude modulators and demodulation. Study of superheterodyne radio receivers. Automatic gain control.

EE 302 Electronics II (Sessional)

3 hours per week 100 marks

Based on EE 301.

EE 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 circuit network.

EE 305 Electrical Machines II

3 hours per week 300 marks

Part A

Synchronous Generators :

Alternators: General outline of synchronous alternators, types of alternator ; Salient pole and non-salient pole, Armature and field cores. Winding Insulation, Cooling.

Airgap flux and voltage expressions, armature windings, alternator regulation, determination of machine parameters from tests, vector diagrams, armature reaction, concept of direct and quadrature—axis reactances, losses and efficiency, Blondel's two reaction analysis, transient conditions in alternators, concept of interconnected system of alternators ; Conditions, methods and problems of parallel operation and load sharing of synchronous generators.

Synchronous Motors :

General constructional features, theory of operation, motor terminal characteristics, mathematical sanalysis, vector diagrams, V—curves, motor tests, losses, efficiency and starting.

Part B

Generalized Energy Conversion Processes :

General principles of electromechanical 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 machine ; 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.

EE 306 Electrical Machines (Sessional)

3 hours per week 100 marks

Based on the contents of the course EE 305.

EE 307 Electrical Measurements

2 hours per week 200 marks

Part A

Measurement of resistance, inductance and capacitance. Measurement of conductivity of bulk materials. Magnetic measurements, ballistic galvonometer, flux meter. Measurement and seperation of iron losses. Illumination measurements, high voltage measurements and testing. Localization of cable faults.

Part B

Measuring instruments : Classification. Ammeters, Voltmeters and Multimeters ; Extension of instrument ranges ; Current and voltage transformers ; Measurement of power and energy : Wattmeters, watt-hourmeters and maximum demand indicators ; Measurement of speed, frequency and phase differences ; Electronic measuring instruments. V. T. V. M. Oscilloscopes, Q. meters ; Measurement of voltage, current, impedance and frequency at high frequencies.

EE 308 Electrical Measurements (Sessional)

3 hours every alternate week 50 marks

Based on the contents of EE 307

EE 309 Electromagnetic Fields

2 hours per week 200 marks

Part A

Review of Vector Analysis.

Electrostatics :

Coulomb's law, force, electric field intensity, electrical flux density, Gauss's theorem with application, electrostatic potential, boundary conditions, method of images, Laplace's and Poisson's equations, energy of an electrostatic system, conductor and di-electrics.

Magnetostatics :

Concept of magnetic field, Ampere's law, Biot-Savert law, vector megnetic 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 impedance.

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 boundaries ; Dispersion in dielectrics, liquids and solids, plane wave propagation through the ionosphere. Introduction to radiation.

EE 311 Transmission and Distribution of Electric Power

3 hours per week 300 marks

Part A

Inductance of Transmission Lines :

Flux linkages ; 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 sloution. Equivalent circuit of a long line. Mechanical characteristic ; 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 ; Boosting transformers. Power factor control : Static condensers in series or parallel. Synchronous condenser, Ferranti effect. Insulators for overhead lines : Types of insulators, their constructions and performance. Potential distribution in a string of insulators. String efficiency. Mothods 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 ; Modern development : Oil filled and gas filled cables. Measurement of capacitances. Cable testing.

Introduction to Transmission Line Protection :

Overcurrent relay and time grading : Reverse power (Directional) relays. Differential protection-Merz-Price system. Pilot wire systems. Distance relays. Transient current protection. Distribution ; Districutor calculation, ring mains and interconnections.

EE 314 Electrical Design

3 hours every alternate week 50 marks

General design principles of electrical apparatus involving electric and magnetic circuits. Design and specification of chokes, transformers, startors, 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 transormers. Power supply from both mains and batteries. Typical design problems.

EE 316 Computer Techniques

2 hours per week 200 marks

Elements of Computer structures and languages. Number system. Binary arithmetic. Principles of programming. Flow charts. The FORTRAN language. Introduction of Algol and Autocode languages. Numerical

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

Fourth Year

EE 400 Project and Thesis

6 hours per week 200 marks

Study of problems in the field of Electrical Engineering.

EE 401 Control Systems

2 hours per week 200 marks

Part A

Introduction to linear dynamic system and their representation by different equations and Laplace transform. Block diagram respresentation and transfer function. Routh's criterion for stability. Frequency response 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.

EE 402 Control Systems (Sessional)

3 hours every alternate week 50 marks

Based on EE 401

EE 403 Power System Analysis

2 hours per week 200 marks

Part A

Symmetrical components and their applications to power system analysis. Positive, negative and zero sequence networks and sequence vector diagrams. Representation of power system. Solution of power system networks for symmetrical and unsymmetrical faults. Sequence networks of systems and their solution. Sequence impedances and constants of machines. Transmission line sequence impedances.

Part B

Load flow studies involving simple system. Use of digital computer and network analyser for simple studies. Power system stability involving two machine systems : limit and criteria.

EE 404 Power System Analysis (Sessional)

3 hours every alternate week 50 marks

Based on EE 403

EE 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 selection 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. Rectangular 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 performence 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.

EE 407 Semiconductors Circuits and Industrial Electronics

3 hours per week 300 marks

Part A

Semiconductors ; Review of carrier transport theory, p-n junction theory and its applications ; semiconductor devices related to p-n junction diode such at FET. The transistor as a control device ; Analysis of intrinsic transistor. Ebers-Moll equations. Hybrid parameters. Frequency dependence of transistor for common emitter and common base configurations.

Analysis of transistor circuits using graphical, peice-wise linear and small signal approximations, biasing networks. Amplifier design. Frequency characteristics of single and caseaded amplifiers. Oscillators. Transistor as a switching device.

Part B

Power rectifying devices, gas filled tubes and power transistors. Controlled rectification using Thyratrons, Ignitrons and Solid State devices.

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 application in industry.

EE 408 Semiconductor Circuits and Industrial Electronics (Sessional)

3 hours every alternate week 50 marks

Based on EE 407

EE 409 Communication Engineering

2 hours per week 200 marks

Part A

Telegraphy : Introduction ; Single current and Double current working. VET Telephone : Introduction, telephone transmitter end receiver. Basic telephone circuits ; Introduction to magnet and C.B. system. Automatic telephone. Relays design consideration. Introduction to step by step system and Strowger system. Basic Impulsing circuits, uniselectors. Trunking diagrams, subscribers line circuit (F-I system and Strowger system). Two motion selectors, group selectors and final selectors (F-I system) detailed study and function. 2nd preselector and gradings (F-I system). Distortion in telephone lines ; Loading of lines. Repeaters (A.F. and R.P.), block diagram for 3+1 carrier system. Wireless telephoney. S.S.B.I.S. Information transmission, signal transmission through network modulation.

Part B

Transmission : Simultaneous transmission of a number of signals and reception. Detailed study of S.S.B. transmitter and receivers, high accuracy crystallattice filters. Introduction to V.H.F. and U.H.F. system. Space communication ; Scatter and satellite communication, Lasers and Masers with appplication in communication. Modulation and Demodulation. Periodic sampling and pulse modulation. Noise, comparative analysis of information transmission of systems. Signal to noise ratio in PPM, PCM and qualification of noise. Statistical methods in communication. Elements of information theory.

EE 410 Telecommunication Engineering (Sessional)

3 hours every alternate week 50 marks

Based on EE 409

EE 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 photo cells ; Solar cells ; Tunneling principles, Dielectric : polar and non-polar dielectrics ; Langevin function, Clausius-Mossotti Equation, Ferro-electricity.

Part B

Magnetic properties of materials ; Magnetic moment ; Domain wall motion and coereive force in crystals ; Polycrystalline and permanent magnetic materials ; Magnetic resonance ; Testing of magnetic materials ; Super conductivity. Quantum electronics.

EE 413 Switchgear and Protective Relays

2 hours per week 300 marks

Part A

Circuit breakers ; Speed of circuit breakers. Relays. Voltage rating (high, medium, 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. Balnaced 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.

EE 414 Switchgear and Protective Relays (Sessional)

3 hours every alternate week 50 marks

Based on EE 413

EE 415 Microwave Engineering

3 hours per week 300 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 antenna analysis. Raditaion patterns. Rhombic and slot antenna. Antenna arrays. Introduction to antenna array design.

EE 416 Microwave Engineering (Sessional)

3 hours every alternate week 50 marks

Based on EE 415

EE 417 Electronics III

2 hours per week 200 marks

Part A

Computing circuits ; Logic circuits ; Wave shaping ; Switching and triggering circuits. Ionospheric propagation of radio waves.

Part B

Radar. Principle of operation. Magnetorns, Pulsers ; TR and T TR Tubes. Duplexers. Radio aid to navigation. LORAN and I L S military and weather application of radar.

Television Engineering. Introduction and principles of operation. Image orthincon and vidicon tubes. Synchronizing pulses. Television transmitters and receivers. Introduction to colour television.

EE 418 Electronics III (Sessional)

3 hours every alternate week 50 marks

Based on EE 417

EE 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 ganerators ; Measurement of high voltages. Transmission line design based on direct strokes, Insulation Co-ordination. Lightning arresters and protector tubes.

EE 420 High Voltage Engineering (Sessional)

3 hours every alternate week 50 marks

Based on EE 419

EE 421 Computer Engineering

2 hours per week 200 marks

Part A

Analog computers : Introduction. Difference amplifiers. Adding circuits. Squaring circuits. Operational amplifiers and differentiators. Solution of differential equation with initial conditions. Function generator and multipliers. Miscellaneous application of electronic analog computers with reference to physical problems. Digital computer : Element of a digital computer. The number systems. Introduction to Boolean algebra and its application to switching circuits.

Part B

Basic logic circuits. Logical design principles using basic switching elements of relays, diodes and transistors. The Arithmetic element. Basic register operations. Binary half-adder, full-adder, subtractors. Shift operations, scaling etc. Memory element. Magnetic core store of information. Assembly of planes. Operation and characteristic of core memories. Magnetic cores logic elements. Magnetic drum, disk and tapes. Input, output devices. Differences in business and scientific uses. Alpha-numeric codes, punched cards, card readers and tape readers. On-line and off-line operations. Different output devices. The control element of the computer. Hybrid computers.

EE 422 Computer Engineering (Sessional)

3 hours every alternate week 50 marks

Based on EE 421

EE 423 Circuits

2 hours per week 200 marks

Part A

Introductory network cocepts. Definitions 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 frequenciences of network ; Parts of a network function. (Magnitude and phase plots, Code and Nyquist diagrams). Minimum phase transfer 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. Classification 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. Filters ; Design frequency transformation. Butterworth and Schebychev response. Insertion loss. Methods of net-work analysis. Block diagrams. Signals flow graphs. State variable techniques. Lattice networks. Bartletts bisection thorem. Synthesis of Lattice net. Unbalancing of Lattice networks transmission characteristic. Signal distortions. Relationship between bandwith and rise time, and between rise time, delay time and net-functions.

EE 424 Circuits (Sessional)

3 hours every alternate week 50 marks

Based on EE 423

Electrical Engineering Courses offered to other Departments

EE 201 Electrical Technology

2 hours per week 150 marks

Part A

Balanced Polyphase circuit analysis, Single phase transformer operation, performance and testing. Polyphase transformers, D.C. machine. Principle of operation, classifications, starting and speed control ; Induction motors ; Synchronous machine ; Fractional H.P. motors .

Part B

Vacuum Tube/Semiconductor eletronics : Tubes/Semiconductor classifications and applications, simple amplifiers and oscillators. Special electron tubes and applications ; Instrumentation.

EE 202 Electrical Technology (Laboratory)

3 hours every alternate week 50 marks

Based on EE 201

EE 211 Electrical Technology

(for Mech. Engg. and Nav. Arch. and Marine Engg. Students)

3 hours per week 250 marks

Part A

Balanced Polyphase circuit analysis. Transformer ; Principle ; Equivalent circuits, performance, testing. Auto-Transformers. 3-phase transformers. D.C. machines : General principles, performance and characteristics.

A.C. machines : Induction motor ; Principle ; Equivalent circuits. Fractional H.P. motors. Synchronous machines ; Operation. Equivalent circuits, phasor diagram. Synchronous motors.

Part B

Vacuum Tubes and Transistors. types, characteristics, equivalent circuits, simple applications. Special electronic devices : Phonotron, Thyratron, Ignitron, Phase shifting circuits and uses, Oscilloscope.

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

EE 212 Electrical Technology (Laboratory)

3 hours every alternate week 50 marks

Based on EE 211

EE 231 Electrical Technology

(for Chem. Engg. & Met. Engg. Students)

3 hours per week 300 marks

Same as EE 211

EE 232 Electrical Technology (Laboratory)

3 hours every alternate week 50 marks

Same as EE 212

Details of Postgraduate Courses in Electrical Engineering

EE 6011 Engineering Analysis

3 hours per week

Professional methods of dealing with problems Methematical and Physical principles applied to problems of diverse topics in Electrical Engineering. Simulation techniques. Statistical methods.

EE 6012 Energy Conversion

3 hours per week

Energy Conversion Processes : General introduction, energy sources, principles of conservation of energy, energy balance equations.

Direct Electrical Energy Conversion : Introduction ; Magnetohydrodynamic (MHD) ; Fuel cell ; Thermo-electric ; Ferro-electric ; Photo-electric ; Photo-voltaic, electrostatic and Piezoelectric 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 conversion ; Bulk energy conversion devices ; General formulations of equations ; Co-ordinate transformation and terminal characteristics.

EE 6101 Linear System Analysis

3 hours per week

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 system ; Impulse response of non-differential linear systems ; Impedance functions. Transfer functions and their properties ; Discrete-time systems.

EE 6102 Network Synthesis I

3 hours per week

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.

EE 6103 Network Synthesis II

3 hours per week

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.

EE 6104 Nonlinear Circuits

3 hours per week

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

EE 6105 Advanced topics in Network Theory

3 hours per week

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

EE 6201 Statistical Theory of Communication

3 hours per week

Periodic and random signals. Stationary random processes. Elements of probability theory, statistical characteristics of messages and noise, Autocorrelation ; Cross-correlation and spectral analysis. Determination of correlation functions and seperation of signals from noise.

Application of correlation techniques. Optimum filter, prodictor etc. Synthesis of optimum linear systems.

EE 6202 Information Theory

3 hours per week

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.

EE 6203 Telephone Traffic Theory

3 hours per week

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 ; Chara cteristics of telecommunication network planning ; Traffic measurement, Traffic prediction ; Traffic simulation.

EE 6301 Digital Computer Theory and Design

3 hours per week

Detailed study of the computer hardware and design of a small digital computer using feerite-core memory.

EE 6302 Computer Science

3 hours per week

Relaxation methods ; Successive over-relaxation ; Convergence Criteria ; Optimization techniques ; Simulation ; Hybrid computation ; Time—sharing. Computer-aided design CAD. Application to engineering problems.

EE 6401 Advanced Electronics

3 hours per week

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

EE 6402 Quantum Electronics

3 hours per week

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.

EE 6403 Solid State Devices

3 hours per week

Solid State Diodes and Triodes ; Solid state microwave devices, Integrated electronic circuits.

EE 6404 Active Circuit Design

3 hours per week

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

EE 6501 Electric and Magnetic Properties of Materials

3 hours per week

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

EE 6502 Electronics of Solids

3 hours per week

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 ; Intergrated electronic circuits.

EE 6503 Laser Theory

3 hours per week

Quantum Electronics applied to electronic energy level transitions. Classical radiation and absorption by electrons. Narrow band spectra of solids. Principles of Gaseous and solid state Laser devices. Laser rate equations.

EE 6601 Applied EM Theory

3 hours per week

Generallized approach to field theory : Introduction to reaction concept ; Wave propagation through isotropic anisotropic and gyrotropic media. Scattering of EM waves. Microwave antennas—theory and design. Advance topics in EM Theory.

EE 6602 Microwave Theory and Techniques

3 hours per week

Microwave oscillators and amplifiers : Principles of generation of milimeter and sub-millimeter waves ; Detailed analysis of Klystrons, Magnetrons and TWT amplifiers and backward-wave oscillators. Harmonic generators, Guun-effect devices. Microwave Circuits : Microwave

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.

EE 6603 Microwave Tubes and Circuits

3 hours per week

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

EE 6604 Antennas and Propagation

3 hours per week

Definitions. Antenna as an aperature ; Arrays of point sources ; Review of dipole, 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. Babinet's principle and complementary antennas ; Select and Horn antennas. Lens and other types of antennas. Application of reaction concept and variational principle 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.

EE 6701 Non-Linear Control Systems

3 hours per week

General Introduction :

The phase plane; Method of Isoclines; Linenard's method; Pelts method ; Common Non-Linearities ; Transient response from phase trajectory ; Describing functions and their applicants ; Relay servo-mechanism ; Liapunov's method.

EE 6702 Sampled-Data Control Systems

3 hours per week

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.

EE 6703 Modern Control Theory

3 hours per week

General Introduction ; 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.

EE 6704 Optimal Control Systems

3 hours per week

The optimal control problem. Cost functionals. Use of Calculus of variations in optimal control. Optimization by Pontrygin's maximum Principle and dynamic programming. Applications. Linear Regulator problems. Computational methods of solving two-point boundary value problems.

EE 6801 Generalized Machine Theory

3 hours per week

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 motors ; 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.

EE 6802 Special Machines

3 hours per week

Courses will be broadly on current research topics on Electrical Machines and devices. The following areas will be covered :

Permanant magnet machines, hysteresis machine, eddy current forgue devices, Homopolar machines, PAM motors, and reluctance machines.

EE 6803 Power Semiconductors and Modulators

3 hours per week

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 and semiconductors. Power frequency multipliers.

EE 608 Advanced Machine Design

3 hours per week

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.

EE 6901 Optimization of Power System Operation

3 hours per week

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 generation.

EE 6902 Computer Aided Power System Design

3 hours per week

General review of network 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.

EE 6903 Protective Relays

3 hours per week

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 and 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.

EE 6904 Power System Stability

3 hours per week

The stability problem 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.

EE 6905 Transients in Power Systems

3 hours per week

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 characteristic. Effect of arc restriking on recovery voltage. Switching surges and overvoltage arrester requirements. Overvoltages caused by sudden loss of load and by open conductor.

Department of Mechanical Engineering

Staff

Professor and Head

Musharrif Husain Khan, *B Sc Engineering (Mech), M S, Ph D*

Professors

Md. Shamsul Alam, (Abroad), *B Sc Engineering (Mech), M S, Ph D*
Obaidul Islam, *B Sc Engineering (Mech), M S, Ph D*
Ing. Md. Anwarul Azim, *B Sc Engineering (Mech), Dipl Ing, Dr Ing*

Associate Professors

Md. Wahhajuddin, (Abroad), *B Sc Engineering (Mech), Ph D*
A.M. Azizul Hoque, *B Sc Engineering (Mech), M Sc, Ph D*
A. F. M. Anwarul Huq, *B Sc Engineering (Mech), M Sc, Ph D*

Assistant Professors

Abu Taher, *B Sc Engineering (Mech)*
Malik Md. Abu Taha, (Abroad), *B Sc Engineering (Mech), M Sc, Ph D*
Abu Taher Ali, (Abroad), *B Sc Engineering (Mech), M Sc*
A. K. M. Iqbal Hossain, (Abroad), *B Sc Engineering (Mech), M Sc, Ph D*
Hyder Shahabuddin Hossain, *B Sc Engineering (Mech), M Sc, M E*
Md. Mizanur Rahaman, *B Sc Engineering (Mech), M Sc, M Sc (Manch), Ph D*
Zakiud-Din Hossain, (Abroad), *B Sc Engineering (Mech), M Sc*
Dipak Kanti Das, (Abroad), *B Sc Engineering (Mech), M Sc*
Rabindra Kumar Chakrabarty, (Abroad), *B Sc Engineering (Mech), M Sc*
S. M. Nazrul Islam, (Abroad), *B Sc Engineering (Mech), M Sc*
A.B.M. Abdul Hai, (Abroad), *B Sc Engineering (Mech), M Sc*
Shaikh Hasan Baksh, *B Sc Engineering (Mech)*
Fazle Elahi, *B Sc Engineering (Mech), Ph D*

Lecturers

S. B. Mofak-Kharul Iqbal, (Abroad), *B Sc Engineering (Mech)*

K. B. M. Quamruzzaman, (Abroad), *B Sc Engineering (Mech), M Sc*
Md. Alamgir, (Abroad), *B Sc Engineering (Mech)*
Md. Majibul Hasan, (Abroad), *B Sc Engineering (Mech)*
Bakhtier Farouk, (Abroad), *B Sc Engineering (Mech)*
Amalesh Chandra Mandal, *B Sc Engineering (Mech)*
M. Abbas Zakir Hossain, *B Sc Engineering (Mech)*
Abu Md. Ashraf-Uz-Zaman, *B Sc Engineering (Mech)*
Md. Imtiaz Hossain, *B Sc Engineering (Mech)*
Abdur Razzaque Akhanda, *B Sc Engineering (Mech)*
Quamrul Islam, *B Sc Engineering (Mech)*
Belal Ahmed, *B Sc Engineering (Mech), M Sc*
Ali Rab Sharif, *B Sc Engineering (Mech), M Sc*
Golam Kibria, *B Sc Engineering (Mech)*

The work of the Mechanical Engineers in Bangladesh is extremely varied and consists largely of design, construction, operation, maintenance and supervision in the following fields.

Factories of all types.

Machine tools which are used to produce other machines and parts, power generation units using steam and internal combustion engines and turbines.

Transportation equipment and installations, marine, railway, roads and air.

The production processing and handling of engineering materials such as metals, wood, paper, petroleum products, plastics, chemicals, ceramics, etc.

Equipments and installations associated with irrigation, city utilities, food preservation and many other commodities to modern civilized living.

The undergraduate courses for the degree of B Sc Engineering (Mech) which is a four years degree course, has been framed to suit the above requirements and hence to suit the country's need. Of course, the syllabus is reviewed and reframed from time to time keeping in view the changing needs of the country as well as to keep pace with developments of technology.

At different stages of the 3 years of study in the department (Ist year is common for all), the students are given a broad based idea of Thermodynamics, Fluid mechanics and machinery, Design of machine elements, Manufacturing process, Internal combustion engines, Power plants, Production planning, Industrial management, Automobile engineering, Refrigeration and Air conditioning, Aerodynamics, etc.

Besides the above, some inter-disciplinary courses on Mathematics, Electrical machines, Metallurgy and Humanities are also offered. As the partial fulfilment for the degree of B Sc Engineering (Mech), a project work is to be completed and submitted in the form of a thesis in the final year.

Seminars, industrial tours are arranged, from time to time. During vacations the students are attached to certain industries, power plants or factories.

The department of mechanical engineering offers very good laboratory facilities in the fields of Fluid mechanics and Applied thermodynamics. The Applied mechanics and production laboratories are not very satisfactory but they are growing.

The department is endowed with well qualified and trained teachers. The department has a capacity of accommodating 120 students in each year of study.

Mechanical Engineering Department is carrying out many research projects through undergraduate and postgraduate programs. The problems are mainly concerned with analysis and design of equipments, instrument or development of a manufacturing process with the available raw materials in the country. Construction of low-cost manually operated pump, design and construction of jute shearing machine, design of a gear shaper etc. and investigation of management practices to improve working conditions of various industries are some of the important projects.

The Mechanical Engineering Department offers postgraduate degrees and facilities are being extended in some areas to offer the degree of Doctor of Philosophy.

Courses are offered at postgraduate level in the fields of Thermodynamics, Fluid Mechanics, Production process, Heat transfer, Theory of elasticity and plasticity and Industrial management, Air conditioning and Refrigeration.

Some of the research projects, completed by the graduate students and faculty members include study of effect of wind on roofs, optimisation of production process of industries and some basic research in Fluid mechanics and Heat transfer.

Steps are being taken to renovate and improve various laboratories with sophisticated and modern equipments so that the research facilities can be expanded more.

Details of Undergraduate Courses in Mechanical Engineering

Second Year

ME 201 Basic Thermodynamics

3 hours per week 250 marks

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 (Laboratory)

3 hours every alternate week 50 marks

Experiments based on course 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 inertia 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 204 Engineering Mechanics (Laboratory/Sessional)

3 hours every alternate week 50 marks

Solution of problems and experiments based on ME 203.

ME 205 Mechanics of Solids

3 hours per week 250 marks

Part A

Introduction and analysis of axially loaded members : Thermal stress and centrifugal stress.

Shear force and bending moment equations, shear force and bending moment diagrams, relation between SF & BM.

Various types of stresses in beams, flexure equation, radius of curvature double integration and area-moment methods of finding slopes and deflections.

Part B

Relation between shear stress and torque, h.p. and torque, angle of twist, modulus of rupture, combined stress, principal stress and planes Mohr's circle, helical springs. Columns, types of column failure, Euler's equation, straight line, Rankine and parabolic equations.

ME 206 Machanics of Solid (Laboratory/Sessional)

3 hours every alternate week 50 marks

Solution of problems and experiments based on ME 205

ME 210 Mechanical Engineering Drawing

3 hours every alternate week 50 marks

Sessional on mechanical drawing of machine parts and assembly.

Third year

ME 301 Heat transfer

2 hours per week 200 marks

Introduction to the basic modes and laws of heat transfer, Physical properties of substances related to heat transfer.

Part A

Conduction :

Law of conduction, derivation of general conduction equation in Cartesian co-ordinates and its equivalence in cylindrical and spherical co-ordinate systems ; Steady state one-dimensional conduction of heat in solids—plane wall, cylinders, sphere, composite structures, fins of uniform cross section (circular and rectangular) ; Consideration of variable thermal conductivity and systems with heat sources. Two-dimensional steady state conduction in solids—analytical solution for rectangular adiabatic plate, semi-infinite plate ; Solution by numerical method and electrical analogue. Unsteady state conduction of heat ; Transient and periodic ; Newtonian heating and cooling.

Part B

Conduction : Transient heat flow in an infinite plate with internal and surface resistance, use of Groeber and Heisler charts for plates, cylinders and spheres, solution of simple transient problems by graphical and numerical methods and electrical analogues.

Radiation : Electromagnetic wave spectrum and thermal radiation , Monochromatic emissive power and total emissive power. Wiens displacement law ; Stefan-Boltzmann law ; Radiation intensity and

Lamberts cosine law ; Kirchhoff's law, black body and gray body ; Diffuse radiation ; Angle factor, net heat transfer between two radiating surfaces, infinite parallel planes, concentric spheres and infinite cylinders ; Simple enclosure problems ; Temperature correction and radiation shield.

Convection : Different types of flow and convection, energy transport mechanism, application of dimensional analysis in forced and natural convection ; Forced convection inside tubes and ducts —laminar and turbulent flow, analogy between heat and momentum transfer empirical equations ; Forced convection over a flat plate, hydrodynamic and thermal boundary layer, approximate analysis by integral methods analogy between heat and momentum transfer. Forced convection over other surfaces—cylinder, sphere and tube bundles in cross flow. Free convection from exterior surfaces-vertical plates and cylinders, horizontal plates and cylinders, spheres and inclined plates.

Combined heat transfer : Conduction, convection and radiation. Heat transfer with change of phase ; Condensation-types of condensatoin, laminar film condensation on flat plates and horizontal cylinders, analysis by Nusselt method, effect or turbulence in the film. Evaporation and boiling-types of boiling correlations of boiling and heat transfer data.

Heat Exchangers—Basic type of heat exhcangers, logarithmic mean temperature difference, exchanger effectiveness, fouling and scaling of exchanger surface.

ME 302 Heat Transfer (Laboratory)

3 hours every alternate week 50 marks

Experimets based on ME 301

ME 303 Machanics of Machinery

3 hours per week 300 marks

Part A

Turning moment, inertia and kinetic energy of reciprocating parts and connecting rods-design of wheels.

Balancing—static and dynamic applied to rotating and reciprocating parts, partial balance of locomotives, oposed engines, multi-cylinder in-line engines, V-engines, radial engines, concept of direct and reverse cranks, balancing machines.

Undamped free vibrations of simple mechanical systems with one and two degrees of freedom, longitudinal, transverse, torsional and vibration. Damped free and steady state forced vibrations with single degree of freedom. Whirling of shafts and rotors, vibration geared

system, vibration absorption of disolation, vibration measuring instruments.

Part B

Study of cams and cam followers differenr types of follower motions cam profiles to impart definite motion to followers-cam with specified contours. Power transmission by belts, ropes and chains. Friction clutches—conical and platebrakes and dynamometers. Geometry of gear tooth profiles—involute and cycloidal tooth profiles in different types of gears. Study of gear trains—simple, compound and epicyclic.

Governors-spring and gravity control types, inertia types.

Precession and gyroscopic acceleration, gyroscopic couples, gyroscopic stabilisation and directional control.

ME 304 Mechanics of Machinery (Laboratory)

3 hours every alternate week 50 marks

Experiments and solution of problems based on ME 303

ME 305 Production Processes

3 hours per week 300 marks

Part A

Classification of production processes, a tabular representation.
Casting : Sand casting and pattern, core, metal pouring.
Classification and description of different methods of casting ;

Elementary principles of die, centrifugal, shell mould, plastic mould, croning process, metal mould and precision investment casting and their relative merits and demerits.

Chipless Metalforming Processes :

Hot and cold working process : Rolling, cold drawing, forging extrusion. Description of the related machines and tools, stamping and forming. Shearing, bending drawing, stretching, squeezing press. Synthetic materials : Moulding of plastics and its processing in mechanical Engineering.

Metal removing processes :

Chip formation and tool design ; Definition and geometry of a cutting tool ; Mechanism of chip formation and importance of such items as tool geometry, physical properties of material friction. Chip length and chip breakers. Theoretical determination of cutting forces metal cutting dynamometers. Economics of metal cutting ; Speed, feed, depth of cut, cutting fluid, tool cost and life.

Part B

Chipless Metalforming Processes :

Welding fabricating : Gas, arc and thermit welding, point and seam welding, special welding processes, gas and arc cutting, metal spraying, surfacing hard facing, brazing and soldering.

Machining : Turning process ; Lathes and lathe accessories turret and capstan lathes. Hole making, shaping, p'anning milling, sawing and filling processes and machines. Automatic and semiautomatics ; Background of automation tool movement and material flow control ; Single and multispindle automat. Screws thread and spur gear manufacturing process and the related machines. Finishing operations, reaming, honing, superfinishing grinding and grinding machines. Non-precision finishing operation ; Buffing, power brushing shot and sand balsting.

ME 306 Production Process (Laboratory/Sessional)

3 hours every alternate week 50 marks

Experiments based on ME 305

ME 307 Fluid Mechanics

3 hours per week 300 marks

Part A

Fundamental concepts and fluid as a continuum. Fluid statics—the basic hydrostatic equation, pressure variation in static incompressible and compressible fluid, manometers, pressure distribution of a fluid in a rotating system. Stability of floating and submerged bodies.

Continuity equation for a control volume, relation between system approch and control volume approach. Control volume form of the energy equation, special forms of energy equation. Application of energy equation. Flow through orific, mouthpiece, venturimeter and notch. Control volume form of the momentum equation, special forms and approximation of the momentum equation. Application of momentum equation.

Part B

Similitude and Dimensional analysis.

Cmpressible flow—the speed of sound, speed of wave propagation when the pressure rise is very high. Energy equation for isentropic and isothermal flow. Stagnation states for the flow of an ideal gas. Flow through converging-diverging nozzle, normal shock. Real fluid flow frictional losses in pipes and fittings. Introduction to open channel flow.

ME 308 Fluid Mechanics (Laboratory/Sessional)

3 hours every alternate week 50 marks

Experiments based on ME 307

ME 309 Machine Design

3 hours per week 300 marks

Part A

Approach to design, stress analysis ; Design factors, design of simple machine elements, material specifictions ; Stress concentration notch sensitivity and fatigue, combined stresses, column with axial and transverse loadings, power screws, screw fastenings and other joints ; Pressure vessels, boilers and combustion chambers ; Springs ; Journal and plane bearings and lubrication ; Roller bearings.

Part B

Shafts ; Rape, belt and chain drives ; Spur, helical, bevel and worm gearings ; Couplings and keys ; Brakes and clutches.

(Note : *Design based on the locally available materials will be stressed.*)

ME 310 Machine Design (Laboratoy/Sessional)

3 hours every alternate week 50 marks

Design of individual machine elements ; Small design projects relating to fluid machine, engines and machine tools.

ME 311 Quality Control and Materials Handling :

2 hours per week 200 marks

Part A

Quality Control :

Organisation of inspection ; Kinds of inspection, standards of length, scope and techniques for maintaining standard allowance tolerance ; Types of tolerance, grades of manufacturing accuracy. Limits and limit, form errors fits, types of fits, basic hole system and basic shaft system. Assembly. Selective and interchangable assembly. Length measurement. Linear measuring instruments for absolute and comparative length, gauging and limit gauges, Taylor's principle on limit gauges. Thread measurement elements of thread and their measurement and thread gauges. Statistical quality control, objectives of statistical quality control. Control charts : How do they function, X and R charts. Selection of rational subgroup. Control charts for number defective acceptance sampling.

Material Handling :

What is material handling ; Importance and scope of materials handling ; Classification and characteristics of materials.

Classification of conveying machines. Factors in selection of equipment, component parts in conveying machines, general theory of conveying machines ; Capacity of continuous conveying machines, resistance to motion factor, resistance power in conveying machine with a flexible

pulling member. Determination of the effective pull and motor power, and dynamic phenomena in chain conveyors. Belt conveyors.

Part B

Quality control :

Abbeys' principle ; Measuring tools for angles and tapers. Instruments for checking straightness and flatness and for alignment test. Gear measurement, errors in gears and their measurement. Individual error measurement and cumulative error measurement. Measurement of surface finish ; Definition and methods for expressing surface roughness. Measurement of surface roughness. Testing measuring instruments. Machine tool testing. Modern method of measurement ; Analogue, digital ; Absolute and relative values of measurement. Logic switches. Binary and Decadian system.

Material Handling :

Description of different conveyors, apron conveyors, filet conveyors ; V-bucket, pivoted-bucket and swing-tray conveyors, overheat conveyors, load propelling conveyors, car or platform conveyor. Bucket ; Arm and swing tray elevator screw conveyor. Roller conveyors. Oscillation and vibrating conveyors, pneumatic conveyors ; Hydraulic conveyors, Industrial truck loaders. Auxiliary equipments ; Hopper and chutes ; Manual material handling—few examples ; Human physiology, principle of maximum efficiency, principle of minimum fatigue, application of these principles in Bangladesh. Materials handling and packaging ; Different methods of packing for different situations.

ME 312 Quality Control and Materials Handling (Laboratory)

3 hours every alternate week 50 marks

Experiments based on ME 311

Fourth year

ME 400 Project and Thesis

9 hours per week 300 marks

In this course students are required to undertake a major project in engineering analysis, design, development or research. The objective is to provide an opportunity to develop initiative, self reliance, creative ability and engineering judgement. The results must be submitted in a comprehensive report with appropriate drawings, charts, bibliography, etc. along with the products if any. Use of locally available materials in manufacturing and feasibility study of local industrial unit will be emphasised.

ME 401 Applied Thermodynamics

3 hours per week 300 marks

Part A

Properties of steam ; Steam turbine cycles ; Vapour cycles (i. e. Reheat, regenerative, superposed binary cycles) ; Flow through nozzles ; Flow through blades.

Combustion charts, fuel air and real cycle ; Combustion phenomena in spark ignition engine, compression ignition engine and gas turbine, mixture requirements ; Carburetion and fuel injection ; Volumetric efficiency of 2 and 4 stroke engines including scavenging ; Performance of supercharged and unsupercharged engines ; Principles of similitude in design of ICE

Part B

Power plant economics ; Fuels and combustion ; Combustion equipments ; Gas loop ; Water loops ; Piping ; Economiser ; Evaporators ; Governing equipments, etc. Gas turbine Cycles : Wankle rotary engine, jet and rocket propulsion. Compression process, volumetric efficiency, multistage compression, intercooling ; Types of compressers for gas turbine and for supercharging in ICE.

ME 402 Applied Thermodynamics (Laboratory)

3 hours every alternate week 50 marks

Experiments based on ME 401

ME 403 Industrial Management

3 hours per week 300 marks

Part A

Organisation, fundamentals ; Organisation structure ; Organisation charts, span of control, line and staff departments, study of organisation of industrial concerns in Bangladesh ; Interrelationship of such function as production planning and control, work measurement and wage plans, quality control, facilities planning, committee, management information event. Elements of cost of products and their classifications, depreciation, amortisation, obsolescence. Fixed, variable and semivariable costs and allocation of overhead cost.

Financial structures—general objectives and policies, manufacturing policies, original planning and capital investments, shares, loan and working capital.

Industrial psychology, needs, motives and goals ; Motivation theories ; Perception and forming impression of others ; Stress, frustration, anxiety and conflict leadership.

Part B

Economics, growth and its influence on industrial sector, classification of industries consumer, intermediate and capital goods industries. The five year plans relating to industries planning. Public and private sectors ; Industrial investors ; Financial support through EPSIC ; IDBB; BSRS, equity participation fund, etc.

Sales ; Organisation and means of sales promotion, markets and marketting related to sales and purchase. Purchasing procedures.

Measure of performance, measurement and analytical problems of productivity ; Cost of management and industrial reorganisation.

Personnel Management : Definition and function of personnel management ; Personnel policies and procedures ; Sharing of policy making by workers ; Personnel development—Hiring and training ; Supervising personnel ; Job evaluation and appraisal.

Wage systems and incentives wage and salary administration.

Working conditions : Safety and health measures, etc.

ME 407 Fluid Mechanics and Machinery

3 hours per week 300 marks

Part A

Types of fluid machinery ; Rotodynamic and positive displacement machinery. Velocity diagram and Euler pump turbine equation. Impulse and reaction turbines—Pelten wheel, Francis turbine and Kaplan turbine. Dimensional analysis applied to turbines—specific speed, unit power, unit speed. Performance tests and characteristic curves of turbines. Introduction to inviscid incompressible flow to include two dimensional basic flows and Kutta-Joukowski relation.

Part B

Centrifugal and axial flow machines—Pumps, fans, blowers and compressors ; Deep well turbine pumps ; Specific speed. Performance tests and characteristic curves. Cavitation. Reciprocation pump. Hydraulic transmission, torque converter and fluid coupling. Introduction to boundary layer theory—estimation of boundary layer thickness, skin friction and drag of a flat plate.

ME 408 Fluid Mechanics and Machinery (Laboratory)

3 hours every alternate week 50 marks

Experiments based on ME 407

ME 409 Machine Tools

3 hours per week 300 marks

Part A

Requirements of a machine tools : Machine tool elements ; Drive systems, power transmission system, different types of mechanical

drives, gear box and feed box, PIV (positive infinite variable) ; Types and capacity of couplings ; Hydraulic, pneumatic and electric drives in machine tools.

Tool engineering ; Locating methods and locaters, positioning means and methods, clamping methods and clamping forces, chip control, tool guides. jigs and fixtures, examples of drill jigs, milling, lathe, grinding and other fixtures. Die design ; Piercing die, blanking die, compound die and progressive die, bending and drawing dies.

Part B

Tool engineering : Extruding die and forging machines. Bearing : ball, taper, needle bearings, hydrostatic and hydrodynamic bearings, axial and radial bearings, slide ways.

Machine tool control, copying methods. Detailed case study of machine tools : Engine lathes ; Turret and automatic lathes ; Milling machines ; Universal milling machines and bearing mills ; Gear making machines ; Grinding machines ; Breaching and press forging machines ; Numarically controlled machines ; Unconventional machines (such as spark erosion machine) ; Transfer lines. Installation of machine tools.

ME 410 Machine Tools (Laboratory)

3 hours every alternate week 50 marks

Experiments based on ME 409

ME 411 Production Planning and Control

2 hours per week 200 marks

Part A

Elements of production control ; Types of production systems. Product development and design—Product analysis ; Break even poinit and P/V ratio ; Relation between original planning and supplementary planning. Forecasting : Coordination between sales, manufacturing and purchase departments ; Techniques of forecasting. Manufacturing economics, cost reduction and cost control. Inventory : Purchase models and production models. Scheduling : Basic concept and different techniques—Gantt Charts, CPM and PERT.

Part B

Scheduling (continued from Part A) ; Index method ; Line of balance, etc. Plant Location ; Plant layout : Principles and common problems ; Evaluation of layout ; Plant budgetry control ; Time and Motion study ; Machine capacity ; Design of production system.

ME 421 Aerodynamics

2 hours per week 200 marks

Part A

Inviscid incompressible flow to include potential function, stream

function, circulation and basic flows. Kutta-Joukowski theorem. Airfoil theory and wing theory.

Part B

Drag, aircraft propulsion and propeller. Static performance problem ; Special performance problem. Introduction to stability and control ; Longitudinal stability and control ; Lateral and directional stability and control.

ME 425 Automobile Engineering

2 hours per week 200 marks

Part A

Component of an automobile ; Engine types and classification ; Engine construction.

Reducing engine friction ; Automotive engine fuels including preignition, detonation and knocking ; Measurement of antiknock valves. Fuel system including carburation and carburater circuits ; Diesel engine fuel system. Exhaust system ; Engine cooling : Ignition system.

Part B

Cranking motor system ; Clutch system and functions. Transmission, propeller shaft and differential function ; Rear axles, tyres.

Electric system ; Steering system ; Brake system ; Automotive springs and suspension. Automotive performances and efficiencies.

ME 429 Control Engineering

2 hours per week 200 marks

Theory of control systems including open loop and closed loop with emphasis on mechanical, hydraulic, thermal and pneumatic systems. Representation of control systems, block diagrams. Frequency, step function and system responses, transfer functions, characteristic fuctions. System analysis using polar plots (Nyquist diagram), logarithmic plot (Bode diagram), root locus plots : System compensation. Analogues of control systems. Application of servo mechanisms in mechanical engineering. Hydraulic control systems, Servo control valve arrangements and analysis, hydraulic pump motor analysis. Pneumatic control systems. Elements of electro mechanical and hydraulic controls.

ME 445 Operation Research

2 hours per week 200 marks

Part A

Statistics : Fundamentals and probability concepts ; Hypothesis testing ; Sampling theory and confidence interval. Markovian analysis ; Introduction to simple Queueing models ; Linear programming (simplex and transperation models); Game theory.

Part B

Simple regression models ; Introduction to probabilistic inventory models ; Scheduling ; Network analysis ; Dynamic programming ; Simulation.

ME 451 Refrigeration and Air Conditioning

2 hours per week 200 marks

Part A

Review of basic concepts and definitions. Applications of refrigeration and air-conditioning ; Vapour compression refregeration. Analysis of vapour compression cycle. Absorption refrigeration. Air-Cycle refrigeration. Steam-jet refrigeration. Vortex-tube refrigeration. Properties and numerical designations of commonly used refrigerants. Eutectic solutions of brines. Refrigeration equipments. Refrigeration control systems. Multipressure systems of refrigeration. Low-temperature refrigeration.

Part B

Psychrometry

Cooling Load calculations for various applications viz. air-conditioning, cold storage. Cooling ; Dehumidifying and clearing equipments ; Control system.

Mechanical Engineering Courses offered to other Departments

ME 207 Thermofluid Mechanics

3 hours per week 250 marks

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. Centrifugal and axial flow pumps and fans ; Reciprocating pumps.

ME 208 Thermofluid Mechanics (Laboratory)

3 hours every alternate week 50 marks

Experiments based on ME 207

Details of Postgraduate Courses in Mechanical Engineering

ME 6000 Thesis

ME 6001 Seminar

No Credit

Discussion by postgraduate students of their research project and other topics of current interest in Mechanical Engineering.

ME 6003 Problem

3 hours per week

Selected subjects related to mechanical engineering. No formal lectures ; Assigned reading and special problems arranged on an individual basis in consultation with the teacher.

ME 6101 Classical Thermodynamics

3 hours per week

Fundamentals of classical thermodynamics, first and second law ; Concept of properties. Reversible and irreversible processes, entropy and other characteristic functions. Maxwell's relations. Equation of state and generalized co-ordinates ; Equilibrium and stability.

ME 6103 Statistical Thermodynamics

3 hours per week

Kinetic theory of gases ; Thermodynamic theory of radiation ; Maxwell-Boltzman distribution, equipartition theorem ; Mean free path. Bose-Einstein and Farmi-Dirac statistics ; Entropy transport properties ; Fluctuation. Thermodynamics of noise.

ME 6121 Survey of Fluid Mechanics

3 hours per week

Survey of principal concepts and methods of continum fluid mechanics, conservation equations for mass, momentum and energy for a control volume ; Eulerian and Lagrangian viewpoints ; Governing equations of motion of fluid in non-accelerating and accelerating co-ordinate system. Introduction to hydrodynamics and boundary layer theory.

Note : *This course is designed for those who are out of school for a long time and not familiar with the latest trend on study on Fluid Mechanics.*

ME 6123 Mechanics of Inviscid Incompressible Fluid

3 hours per week

Kinematics of a fluid medium, the fundamental hydrodynamic equations for an ideal fluid ; The simplest cases of motion of an ideal fluid ; Vortex motion of an ideal fluid ; The plane motion of a body

in an ideal fluid ; The three dimensional motion of a body in an ideal fluid.

ME 6125 Mechanics of Viscous Fluid

3 hours per week

Equations of motion for viscous fluid ; Boundary layer analysis for laminar and turbulent flow ; Theories of turbulence ; Jets, wakes and seperated flows.

ME 6127 Mechanics of Inviscid Compressible Flow

3 hours per week

Shock waves ; Analysis of subsonic, supersonic and hypersonic flow fields, characteristic method and perturbation technique ; Compressible flow in closed conduit.

ME 6141 Advanced Heat Transfer

3 hours per week

Modes of heat flow and basic laws of heat transfer ; General conduction equations, steady and unsteady heat conductions ; Analytical and numerical analysis. Thermal radiation phenomena and heat exchange by radiation, convection ; Forced and natural, external and internal flows, analytical and experimental results, condensation and evaporation, combined heat transfer.

ME 6143 Advanced Conduction and Radiation Heat Transfer

3 hours per week

Steady and unsteady state conduction, solutions by analytical, numerical and analogue methods. Thermal radiation processes and evaluation of heat exchange by different methods.

ME 6145 Advanced Convection Heat Transfer

3 hours per week

Convection fundamentals. Forced convection, natural convection, transport equations, differential similarity, boundary layer and pipe flow solutions. Transport in rarefied gases. Condensation and evaporation, Convective mass transfer.

ME 6147 Design of Heat Transfer Equipment

3 hours per week

Forced convection, natural convection, heat exchange theories ; Application to the design of heat transfer devices. Different types of heat exchangers, analysis and design.

ME 6149 Heat Transfer Seminar

2 hours per week

Discussion of current topics in heat transfer, consideration and summarization of major recent works.

ME 6161 Thermal Environmental Engineering

3 hours per week

Refrigerants ; Mechanical vapour compression refrigeration systems and details of their components ; Absorption refrigeration system and cycle analysis ; Miscellaneous refrigeration processes ; Cryogenics ; Refrigeration applications with special reference to food preservation ; Psychrometry ; Direct contact transfer processes between moist air and water including evaporative cooling ; Heating and cooling of moist air by extended surfaces ; Condensation of vapour within walls ; Heat transmission in buildings and solar radiation effects upon structures ; Air conditioning applications ; Air conveying and distribution systems.

ME 6171 Advanced Dynamics

3 hours per week

Lagrange's equations ; Small oscillation ; Dynamics of rigid bodies in three dimensions ; Gyroscopic motion ; Introduction to Hamiltonian mechanics.

ME 6173 Mechanical Vibrations

3 hours per week

Single degree of freedom system ; Coupled two-mass systems. Energy methods. Forced vibration. Different types of damping. Polar plots. Vibration isolation. Effects of coupled modes. Multidegree of freedom systems. Shock loading. Normal modes of continuous systems.

ME 6175 Applied Elasticity

3 hours per week

Three dimensional stress system ; Governing equations. Assumptions to reduce three dimensional to two dimensional stress system ; Stress functions. Stress concentrations, st, Venant's principle. Concentrated and line loads. Superposition. Composite bodies. Energy methods for solution. Principle of stationary potential energy. The reciprocal theorems of Maxwell and Betti.

ME 6177 Theory of Plates and Shells

3 hours per week

Classical theory of plates ; Large deflection theory of plates : Membrane theory of shells ; Bending theory of shells applied to shells of and cylindrical shells.

ME 6179 Elastic Stability of Structures

3 hours per week

General stability theory : Discrete and continuous systems. Introduction to calculus of variations. Approximate methods, Buckling of column frames, flexure elements, plates and shells,

ME 6181 Experimental Stress Analysis

3 hours per week

Resistance strain gauges and associated circuits ; Strain gauge rosettes. Semiconductor strain gauges. Other electrical, mechanical, pneumatic, and optical strain measuring devices. Recording of dynamic strain measurements. Stress probing. Residual stress. Principles of photoelasticity. Isoclinic and isochromatic fringes. Compensation techniques. Stress freezing. Oblique incidence and scattered light methods, Photoelastic coating techniques. Brittle lacquer technique. Analysis of experimental results.

ME 6183 Finite Element Methods

3 hours per week

A review of variational methods and energy theorems. The displacement method. The design of elements for plane stress and plane strain. Three dimensional and axisymmetic elements. Plates and shells. Vibrating elements. The development of a finite element program.

ME 6185 Advanced Numerical Analysis

3 hours per week

Computer programming ; Components of a digital computer and their functions ; Computer programming in FORTRAN.

Numerical Analysis : Evaluations of determinants, matrix operations ; Eigen-value and eigen-vectors ; Solution of algebraic and transcendental equations. Ordinary differential equations ; Initial value problems of linear and non-linear system of equations ; Boundary-value problems of linear and non-linear system of equations ; Finite-difference technique of solving ordinary differential equations ; Multisegment method of solving unstable system of equations. Partial differential equations, finite-difference method of solving of both the linear and non-linear partial differential equations.

ME 6187 Computer and Programming

3 hours per week

Schematic diagram and components of a computer. Peripheral units of a computer. Modes of storage in computers, computer memory. Access time for different data storage system. Soft ware of a computer : Executive, Macros, library system, monitoring and

editing of a program. Batch processing, time sharing, paging. Computer languages.

ME 6201 Mechanical Behaviour of Engineering Materials

3 hours per week

Deformation, elastic behaviour, plastic behaviour, creep and creep-rupture ; Anelastic behaviour, fatigue fracture, brittle fracture, ductile fracture.

ME 6203 Structure and Properties of Engineering Meterials

3 hours per week

Atomic forces, atomic bonding, diffusion, dislocation, motion of dislocation, kinetics of dislocation, mechanical behaviour of single crystal, mechanical behaviour of polycrystals ; Strain hardening, alloy hardening, solution hardening ; Precipitation hardening, cracks, nucleation and propagation ; Plastic wave propagation.

ME 6205 Theory of Plasticity

3 hours per week

Phenomenological nature, stress analysis, strain analysis, yield criteria of metals, stress-strain relations, strain hardening characteristics, plasticity conditions, deformation equations, buckling, necking, some methods of solving forming problems, extrusions, drawing, slip-line solutions.

ME 6207 Dislocation Theory

3 hours per week

Concept of disloctions, structures, nature and types of dislocations, stress fields and energy, line tension, multiplication, elastic interaction, superdislocations, partial dislocation, stacking fault ; separation of partials, recombination energy.

ME 6221 Principles of Engineering Production I

3 hours per week

Metallurgical fundamentals of materials and their properties ; Effective stress and strain ; Yield conditions ; Plastic potential ; Shape of yield surface ; Mechanics of chip formation work ; Three dimensional machining operations ; Build-up edge formation ; Tool wear ; Crater and wear land, tool wear geometry, mathematical derivation of crater and wear land growth ; Tool life and machinability.

ME 6223 Principles of Engineering Production II

3 hours per week

Theory of metal forming operations ; Surface finish ; Unconventional machining operations ; Machining economics : Variables, criteria and

restrictions for selecting economic conditions, economic lot size, multiple tool cost analysis ; Machine tool vibration.

ME 6225 Industrial Engineering Analysis

3 hours per week

Analysis and development of analytical techniques for the solution of problems in Industrial Engineering viz. application of statistical methods to uncertainty problems ; Linear programming, Queueing theory and their applications to maintenance, inventories and other fields. Case study of different industries.

ME 6227 Industrial Management and Planning

3 hours per week

The significance of Industrial Production and Management ; Problems of management in under developed countries ; The economic environment ; Capital financing and budgeting ; Investment decision making ; Application of operations research ; Planning.

Development Problems : The strategy of industrial development ; Capital intensity vs. labour intensity in industries ; The making of feasibility studies.

ME 6229 Linear Programming

3 hours per week

Linear Algebra related to linear programming ; An overview of simplex algorithm—Theoretical fundamentals ; Duality ; Dual simplex and post optimality analysis ; Transportation ; Primal and dual algorithms, Revised simplex ; Decomposition principle ; Network flows ; An introduction to MPSX programs.

ME 6235 Econometric Methods

3 hours per week

Linear normal regression model ; Two variable model, least-square estimators, correlation co-efficient. Analysis of variance, extensions of two variable linear model ; General linear model, least square estimators, significance test and confidence interval. Errors in variables ; Auto-correlation ; Miscellaneous single equation problems : Heteroscadisticity, lagged variable, dummy variables.

Simultaneous equation problems : System, estimation methods, limited information single equation, two stage least square, full information maximum likelihood, three stage least square. Monte Carlo studies.

Department of Metallurgical Engineering

Staff

Professor and Head

M. Ibrahim, *BE (et), Ph D*

Associate Professor

Serajul Islam, (Abroad), *B Sc Engineering (Met), M S*

Assistant Professors

Ehsanul Huq, (Abroad), *B Sc Engineering (Met)*
Shahjahan Mridha, (Abroad), *B Sc Engineering (Met), M Sc*
Md. Mohafizul Haque, *B Sc Engineering (Met), M Sc*
Abu Syed Wais Kurny, (Abroad), *B Sc Engineering (Met), M Sc*
Md, Mohar Ali Bepari, (Abroad), *B Sc Engineering (Met), M Sc*

Lecturer

A. A. M. Rezaul Haque, *B Sc Engineering (Met)*

Introduction

Metallurgy, the art and science of procuring and adapting metals to satisfy human wants, has gained tremendous importance in the recent past.

As there have been few previous graduates in this field it does not appear to be sufficiently widely known that a degree in Metallurgical Engineering may be earned in Bangladesh University of Engineering and Technology, Dacca. This is the only department offering courses in Metallurgical Engineering in Bangladesh and as such for some time to come the entire need of metallurgical engineers will have to be met by this department in BUET, Dacca.

The department of Metallurgical engineering was started in the year 1952 with two-fold objectives :

1. To provide an advance course of instruction in Metallurgical Engineering with a view to train up personnel in this field, and

2. To provide facilities for fundamental and applied research in Metallurgy with special emphasis to meet the growing need of the country.

Undergraduate Program

The department offers four year Bachelor degree course. The course is designed to provide a firm grounding in all phases of metallurgy and provides some opportunity for specialisation. The first year course in this institution is common to all students.

Their specialised work in the department not only covers the main aspects of extractive, industrial an physical metallurgy, but also includes such cognate subjects as refractories, furnaces, fuels, geology and mining. The courses are so designed as to make them fitted for careers not only in extractive metallurgical industries like steel mills but also to make them equally suitable for employment in other branches like Foundries, Dock and Ship Yard. Ordnance Factories, Rolling Mills, manufacturers of sheet and wire products, welded assemblies, and research organisations like BCSIR, Atomic Energy Centre, Central Testing Laboratory and the teaching institutions.

Postgraduate Program

The department offers M Sc degree courses to both full time and part-time students. M Sc degree course comprises advanced studies and research on a selected topic. The syllabus is so constituted as to offer ample scope for specialisation in one of the principal fields.

Facilities

The department has seven laboratories and shops.

In the ore-dressing laboratory facilities are available for the study of crushing, grinding, screening and magnetic separation of ores, fuels and minerals.

The extractive metallurgy laboratory has facilities for studies on the smelting of ores using laboratory type arc furnace and induction furnace.

The newly established Electro-Metallurgy laboratory has created facilities for studying electro-plating, electro-deposition and refining.

The analysis laboratory has facilities for the metallurgical analysis of ores, minerals, alloys, slags and refractories.

The metallography laboratory is equipped to carry out research in the constitution of stable and metastable phases. The metastable phases can be produced by using variety of quenching techniques, both

macro and microscopic studies can be done at room temperature by using convetional metallographic equipments.

The Heat-treatment laboratory has oil or gas fired and electrically operated and fully controlled furnaces.

The foundry shop has facilities for melting and casting metals and alloys by using gas, conventional coke fired and electrical furnaces

Practical Training for Students

During the stay in the department all the students have to under 6 week practical training in a big industrial concern. Arrangement exists with a number of establishment like the Chittagong Steel Mills Ltd., Narayanganj Dock and Engineering Workshop, Khulna Ship Yard to give the students Opportunity to gain practical experience and study the daily routine of the establishment.

In addition, many study tours are arranged by the department to aquaint its students with the realities in industries.

Research Activities

Development and adaptation of techniques for reducing the use of imported raw-materials, metals and alloys etc. by increasing the use of indigenous raw-materials like natural gas, scraps and wastes etc. is the main objective of research activities in this department.

Keeping in mind the technological background and requirements of the country, areas of research have been selected carefully. The areas of current interest includes :

1. Use of natural gas for melting metals in furnance like crucible cupla etc,
2. Manufacture of refractory materials (espacially acid type) from local deposits.
3. Case-carburisation by natural gas instead of conventional pack-carburising by solid carbonaceous mixtures.
4. Recovery of metals and alloys from scraps and wastes, especially lead and lead alloys.
5. Crucible less melting furnaces.
6. Heat treatment of metals and alloys etc.

Expert Services

The expertise of the Faculty members are available for consultancy on specialised topics in the fied of Metallurgy. In the recent past expert services have been provided, on special request, by the Faculty members in the field of heat-treatment, case-hardening, chemical analysis

etc. to various Govt., Semi-Govt., Autonomous and Private organisations.

Details of Undergraduate Courses in Metallurgical Engineering

Second year

MetE 201 Fundamental Metallurgy

2 hours per week 150 marks

Part A

Definition of Metallurgy. Role of Metallurgy in relation to other areas of Science and Technology. Definition of common Metallurgical terms—minerals, ores. metals ; Gangue, flux, slag ; Calcining, sintering, roasting, briqueting, etc. Forming of metals—Casting, forging, rolling, extrusion, etc. Metallurgical aspects of metal joining—Soldering, brazing, welding ; Furnaces and refractories ; Study of metallurgical fuels. Extraction of metals and their refining, study of cast irons, wrought irons, steels, alloy steel and plain carbon steels.

Part B

Brief survey of physical and chemical properties of metallic elements and alloys—hardness, ductility, toughness, plasticity, fatigue, creep, etc. Melting and solidification, cooling curves. The crystalline structure of metals. The phase rule and binary phase diagrams—their value as guide to useful alloys. Heat-treatment—definitions of annealing, normalising, quenching, tempering, carburising, age-hardening, etc. Measurement of high temperatures—thermometers, indicating colours, indicating cones, thermocouple. optical, radiation pyrometers, temperature corrections.

MetE 202 Fundamental Metallurgy (Sessional)

3 hours per week 100 marks

Part A

Physical study of ores and minerals, comparative study of hardness of some pure metals and alloys, study of Moh's scale. Preparation of micro-specimen and study of metallurgical microscope, study of microstructure of some ferrous metals.

Part B

Making of some alloys like Brass, solder, white metals, etc., casting of some simple parts, study of the sieve shakers, and analysis of foundry sand, study of heating and cooling curves, study of corrosion in different environments.

MetE 203 Geology and Mineralogy

2 hours per week 150 marks

Part A

Geology :

Physical Geology—A general view of earth denandation by weather, rivers, glaciers and sea. Transportation, deposition and consolidation of debris. Volcanoes and volcanic products, classification of rocks igneous rocks, sedimentary rocks, the metamorphic rocks and their subdivisions. The geological age, the relation of rocks and their ages. Earth quakes, the earth's interior ; Mountains and related land reforms.

Part B

Mineralogy :

Occurrence and association of minerals ; Rock-forming minerals, veins and vein minerals. Gem minerals, ornamenal minerals ; Ore minerals of iron, copper, zinc, tin, aluminum, antimony, etc. Cleavage parting and fracture, hardness, tenacity, specific gravity properties depending upon light. Electrical and magnetic properties.

MetE 204 Metallurgical Analysis and Assaying

3 hours per week 100 marks

Part A

Determination of the common metals in solutions of their simple salts, Analysis of non-ferrous alloys such as Brass, Bronze, Bearing metals, etc. for the determination of copper, lead, tin, zinc, antimony, etc.

Part B

Analysis of ore minerals of common non-ferrous metals. Estimation of graphitic carbon in cast iron. Identification of slags for the information of silica, lime, magnesia, iron oxide, etc.

MetE 207 Fuels and Refractories

2 hours per week 150 marks

Part A

Fuels : Definition and classification of fuels, solid, liquid and gaseous. Origin of coal, manner of occurrence and deposition of coal fields. Different types of coal by rank with their C. value and uses. Carborization of coal—high temperature and low temperature. Manufacture of coke, recovery of by-products, pulverized coal and briquetts. Petroleum and its prospect in Bangladesh. Distillation product of petroleum, composition, characterisation and blending properties of fuel oil, the knocking charaterisation of motor fuel, etc. Natural gas and its prospect in Bangladesh. Manufacture of gaseous fuel, producer gas, water gas, town gas, coal gas, etc. their composition, C. value and uses.

Part B

Refractories : Physical and chemical requirements of refractory materials ; Applications, classification ; Properties; Raw materials and poduction of silica brick, firebricks, magnesia brick, chrome brick, graphite brick and other synthetic refractory material. Study of expansion, contraction, specific heat, corrosivity, permeability thermal and electrical conductivity of refractories.

Third year

MetE 301 Elements of Mining Engineering

2 hours per week 200 marks

Part A

General information on rock and minerals, prospecting for a mineral deposits and providing it.

Mine workings : Mining work, mining with hand tools. General information on the mechanisation of mining, mining machinery.

Exploration : Mining shafts, techniques of shaft-sinking, shaft-sinking machines, open-casts or quarries.

Mine Maintenance and safety rules : Mine drainage, ventilation lighting, mining safety rules, reasons for underground fires, prevention and extinguishing underground fires, mine rescue work.

Part B

Extraction of mineral deposits : Deposits of minerals, capacity and life of the mine, factors affecting the choice of working, extraction of coal, ore and other deposites and study of their seams; Effects of underground work on the surface. Mining transport : Rail transport, Rail-free transports, transport of men, shaft hoisting.

MetE 302 Chemical Analysis of Metals and Minerals

3 hours per week 100 marks

Part A

Systematic analysis of the pig-iron, cast iron, plain carbon steels and alloy-steels for the determination of carbon, silicon, phosphorous, sulphur, manganese, etc.

Part B

The determination of the common alloying elements such as nickel, chromium, tungsten, etc. in alloy steels. Analysis of ferro-alloys : ferrosilicon, etc. Analysis of ore-minerals of common ferrous metals.

MetE 304 Furnace Design and Drawings

3 hours per week 100 marks

Part A

This includes practical study and testing of refractories ; Design and drawing of different types of metallurgicsl furnaces : Kilns, pit-furnace, the foundry-cupola and converters.

Part B

Making sketches of Open Hearth furnace and electric furnace.

MetE 305 Metal Physics and Physical Metallurgy

2 hours per week 200 marks

Part A

The atom, the periodical table of elements, quantum numbers and energy levels. The ionic bond, the co-valent bond, the vander wall's bond, the metallic bond, the atomic diameter.

Crystallography and the external symmetry, common unit cells, identification of crystallographic planes, directions in a lattice.

Diffraction ; X-ray diffraction in cubic crystal, forbidden reflections, Debyescherrer technique, Laue technique, rotating crystal method, electron and neutron diffraction.

The three states of matter—change of state, thermodynamic considerations, mechanism of solidification, nucleation and growth, crystalline imperfections. Mechanism of deformation, slip and twinning, effect of type of bond on the possibility of slip, slip planes and slip directions, dislocation theory of strain-hardening.

Part B

Thermal, electrical, magnetic, optical and elastic properties of metals in relations to temperature, their origin in terms of electron energies. Nuclear properties of metals and the selection of metals for use in nuclear reactors. Strength hardness, ductility, malleability, fatigue, damping, creep etc. Tests for determining mechanical properties, destructive tests, non-destructive tests, special metallurgical tests.

Important binary phase diagrams, coring, diffision, peritectic and solid state reactions, atomic ordering, property trends in binary alloy.

Fick's law of diffusion, self-diffusion, inter diffusion, mechanism of diffusion, Volume, surface and grain boundary diffussion. Heat treatment based on diffusion, changing soild solubility, entectoid reactions, ordering and other internal re-arrangement in the solid state.

MetE 307 Ore-dressing and Extractive Metallurgy.

2 hours per week 200 marks

Part A

Ore-dressing : Aims and advantages of separating valuable minerals. Communication, screening and classifying. Beneficiation : Gravity based

concentration, froth-flotation, magnetic and electro-static separation. Leaching and other supplementary processes, evaluation of ore-dressing methods. Preparation of flow-sheets and specification of beneficiation plant.

Part B

Extractive Metallurgy : Mineral ore. Different types of ore, extraction of metals from different types of ore. Different methods of extractive metallurgy.

(a) Pyro-metallurgy : Roasting, calcining, smelting, sintering, different methods and furnaces, drying.

(b) Hydro-metallurgy : Leaching, different types of leaching, leaching solution, leaching curves.

(c) Electro-metallurgy : Chemical principles stoichiometry, calorific power, calorific intensity ; High temperature reactions, chemical affinity, the CO-CO_2 equilibrium, dissociation tension, reaction velocity.

MetE 308 Metallurgical Calculations (Sessional)

3 hours per week 100 marks

Part A

The chemical equations, combustions of solid and gaseous fuels. Calorific power and calorific intensity of fuels and air calculations. Heat losses in exhaust. Heat energy and heat content, calculation of develo ped heat content (sensible heat), details calculations of manufacture of coke, producer gas and water gas,

Part B

Calculation of heat of formation and heat of reaction of different metallurgical reactions. The charge balance of Cupola, blast furnace, converter steel-making, furnaces. Crushing and grinding of ores and preparation of sieve analysis report. The roasting of particular ore and effect of temperature on the nature of product.

MetE 309 Foundry Engineering

2 hours per week 200 marks

Part A

Pattern design and layout ; Moulding patterns—study of wooden and metallic patterns. Shrinkage allowance for various castings. Moulding sand—their origin, grading, selection and uses. The constituents and characteristics of clay bond sand. The preparation of moulding sands—green, dry, lean etc. Foundry sand control and testing. The phenomenon of solidification, crystallisation, aggregation, shrinkage, etc. Directional solidification and its prevention. Gating design and application of Bernaullis theorem in metal castings. Casting defects and remedies.

Part B

Iron founding—the study of pig iron. The foundry cupola construction, maintenance and operation. Different grades of cast iron, i.e. white, grey, chilled, malleable, nodular, alloy cast iron etc. The effects of carbon, manganese, silicon, phosphorous, sulphur, copper, nickel, etc. on cast iron.

MetE 310 Foundry Engineering (Sessional)

3 hours per week 100 marks

Part A

Practical study of various constituents of moulding sand. Study of core and core making, making of moulds for various casting. Preparation of moulding sand for ferrous and non-ferrous castings etc. Study and making of patterns.

Part B

Making of ferrous castings and its alloys. Preparation of brass, bronze type-metal, etc. Micro-study of various castings and their solidification and crystallisation.

Fourth Year

MetE 400 Project and Thesis

3 hours per week 300 marks

For each academic session the departmental Board of Studies will draw up a list of available projects and announce whether these are to be undertaken by individual student or by a group of students. The projects will be from the following areas.

Metallurgical plant design and layout :

Projects may cencern design and construction of equipments like Cerrifugal casting machine, Gas-fired melting and heat-treating furnaces, Automatically controlled muffle-furnaces etc.

Design and manufacturing process studies :

An item comprising of several part will be examined to determine the mode of manufacture and to investigate possible lines of improvement. This includes studies in Powder Metallurgy, different methods of casting ferrous and non-ferrous metals and alloys, making of Emery papers and Refractory materials from local deposits etc.

Study of metallurgical phenomenon of Industrial interest :

A small investigation will be conducted in which the effects of certain factors in a process e.g. Case-hardening, heat-treatment of metals and alloys including alloy-steel, tool-steels etc. Prevention of corrosion by electro-plating, alloying, measurement and control of temperature, etc, will be studied.

MetE 401 Ferrous Metallurgy

3 hours per week 300 marks

Part A

The course embraces the production of pig-iron and the manufacture of different types of steel.

Production of pig-iron : Iron ores : beneficiation and agglomeration ; The iron blast-furnace and auxiliary plant items ; Logistics of operation ; High air pressure and fuel injection ; Chemistry of the process, material, heat balance, charge burden, pig casting, slag disposal and by-products. Production of pig-iron by alternative processes—electric smelting, low-shaft furnances, making of sponge iron, solid state reactions etc.

Production of steel—Steel manufacture before 1855. Steel making by selective oxidation ; Pnematic processes, Bessemer and side blown converter ; Oxygen processes—L.D, Rotor etc.

Open-hearth steel making in acid and basic hearth furnaces, charging procedure : Material and heat balance and use of oxygen in open-hearth furnaces, deoxidation, recarburization, cold and ingot casting.

Part B

Grading of pig iron—Foundry pig, Bessemer pig, making of different grades of cast iron—Nodular cast iron, malleable cast iron, alloy cast iron, high duty cast iron, etc. Bearing metals, cast iron bearing, gears etc. Production of Ferro-alloy and steel alloying elements, effect of alloying elements on the properties of plain carbon steel, low alloy structural steel, high alloy tool steel, change of physical prepertias by heat-treatment.

MetE 403 Non-Ferrous Metallurgy

3 hours per week 300 marks

Part A

Details of the metallurgy of copper, zinc, antimony, aluminium, nickel, magnesium. Their ores and individual dressings, the smelting of concentrations. The crude non-ferrous metals, their pyrometallurgical and electro refining. The metallurgy of gold : Sources of gold, extraction of gold from its ores, the amalgamation and the chlorination processes. The cyanide process of gold extraction—Chemistry of the process, preparation of ore, sand leaching of gold ores, continuous counter-current decantation process, melting and refining of the gold bullion.

The non-ferrous alloys : Definition of alloys, necessity and utility of alloys. The brasses ; the bronzes, the modified brasses and bronzes. The copper-nickel alloys, the monels, the coinage alloys, the constantat. the Eurak, Nimonic alloys etc.

Part B

Details of the metallurgy of tin and lead. The making of cadmium, bismuth, arsenic, cobalt, mercury, etc. The production of ferrous alloys ; extracting of chromium, vanadium, tungsten, molybdenum and their alloys with iron and steel.

Silver : Ores of silver, different processes for the extraction of silver, refining solutions.

Recovery of metals of the platinum group : From anode slimes of copper cells from lead baths, from nickels cells, and from gold and silver slimes.

The aluminium alloys : Importance of aluminium alloys, the copper-alluminium alloys, the aluminium-silicon alloys, the aluminium magnesium alloys, the wrought alloys of alluminium and magnesium, the duralumins, the Y-alloys, and the R-R alloys.

The lead-antimony alloys : type metals, bearing and anti-friction alloys. requirements for good bearing alloys, the copper-lead tin antimony bearing alloys.

The soldering and brating alloys ; the thermocouple alloys.

MetE 407 Physical Metallurgy

3 hours per week 300 marks

Part A

Binary thermal-equilibrium diagrams—their construction and interpretation, some industrially important alloy series. The complete iron-carbon diagram, the solidification and cooling of various carbon steels. Structures produced—the heat-treatment of steels, annealing, spherodising, normalising.

Hardening, the structure of martensite, tempering.

T-T-T diagrams—austempering, martempering and isothermal annealing Hardenability and ruling section. The variables that determine the hardnebility of a steel, austenitic grain size, slack quenching, the Jiminy test. Ternery alloys, composition triangle and space models, isothermal sections of solid solutions, eutectic and other types of ternery diagrams, Pseudo-binary and other vertical sections ; Some industrially important tennery systems. Limitation of phase rule approach.

Part B

Reaction of metals and alloys with gases, decarburisation, carburisation, nitriding, chromising etc. and with liquid metals hot-dip galvanising, tinning, etc.

Hydrogen in steels—heat-treatment for its removal. Surface hardening—flame, electrolytic bath and induction hardening. The effects of

composition and rate of cooling on the stracture of cast-Irons, the micro-strcuture of cast irons. Growth of cast irons. Heat-treatment of common non-ferrous metals and alloys—of copper, aluminium, etc.

MetE 408 Metallogrphy and Heat-treatment (Sessional)

6 hours per week 200 marks

Part A

Preparation of microspecimen and study of the metallurgical microscope. Study of wrought iron, white, gray and malleable cast irons. Etching—Study of different types of plain carbon steels and estimation of carbon from micro-structure. Hot and cold worked specimen of steels, annealed and normalised.

Part B

Study of carburised steels, stainless steels as steels and tool-steels. Preparation and study of bearing alloys, brass and bronze. Heat-treatment of some common non-ferrous metals and alloys. Study of welded structures ; Methods of dealing with thin strips, sheets and wires. Micro-study of rolled, forged steels, brass and bronze and cast irons. Study of micro and macro-photographs ; preparation of specimen, photography, processing and developing of micro-structures of various metals and alloys.

MetE 409 Metal Tachnology

3 hours per week 300 marks

Part A

Difference between Mechanical and Chemical Technolcgy. Mechanical properties of metallic materials. Theory of plasticity and Elasticity. Relationship between Elastic modulus, Fission's ratio, stress/strain diagrams, complex stresses etc. Technological theories applicable to various metal working processes, conventional castings and special castings methods. Definition of Electroforming , merits and demerits of the process and its versatile industrial uses. Details of welding, brazing and soldering, etc.

Part B

Metallurgical effects on mechanical working of metals mainly recrystallization and grain growth etc. on cold and hot working operations. Details of rolling, forging and extrusion etc., their advantages and disadvantages and also their uses. Differences between coining and embossing, shot peening and shot blasting, hobbing and stacking, Cladding, electroplating, galvanizing and other metallic coating methods, etc,

Powder Metallurgy : Production of metallic powders and making of tools, carbide tools etc. and their special uses and properties.

Metallurgical Engineering Courses offered to other Departments

MetE 205 Metallic Materials

2 hours per week 150 marks

Part A

Definitions of industrially significant properties including malleability, ductility, toughness, fatigue resistance ; mechanical and non-destructive tests applicable to metals. Binary phase diagrams, their origin and interpretation, relation of structures and properties of metals and alloys in equlibrium. Definition of common metallurgical terms, metallurgy, metals, minerals, ores, calcination, roating, sintering, smelting, slag, flux, etc. Alloys, furnace and refractories. Pig-Iron—Preparation, and uses ; Wrought iron-preparation and uses : Cast-irons—preparation, types, effects of impurities on cast-irons, production of nodular and malleable cast-irons. Steels, types, cement, crucible, Bessemer, open-hearth steels, etc. ; Preparation and uses. Distinction between plain carbon and alloy steels ; Alloying elements. Different types of alloy steels, characteristic of tool steels ; Bearing metals, properties, types, light alloy, types of light alloys—properties and uses. Common metals and their alloys.

Part B

Crystal structure of metals and alloy phases : Method of study of crystalline structure, solidification as a process of crystallisation and growth. Effects of temperature on mechanical properties of metals, diffusion and precipitation processes, age hardening. Importance of electronic factors, crystal structure and defect structure in determining properties and application of metallic materials. Heat-treatment : different types of heat-treatment, effects, furnaces and control of temperatures ; Surface hardening—purposes, methods of surface hardening, case-hardening etc. Oxidation and corrosion-types of corrosion, mechanism, the effect of metallurgical variables on corrosion, protection against corrosion. Powder Metallurgy—metal powders, characteristics, welding of powders, sintering, shrinkage, hot-pressing.

MetE 206 Metallic Meterials (Sessional)

3 hours every alternate week 50 marks

Part A

Preparation of micro specimen for study by grinding, polishing, and etching. Study of the metallurgical microscope. Recognition of various ferrous and non-ferrous materials by metallographic study. Photo-micrography, Micro and macro-study of castings and forgings, examination of cold worked and annealed metals.

Part B

Practical study of heat-treatment of steels, furnaces, controlled atmospheres, measurement and control of temperatures, quenching baths, tempering facilities. Conducting of normalising, annealing, hardening, case-carburising and hardening and tempering operations of steel specimen, followed by metallographic examination of the pieces so treated.

MetE 209 Shipbuilding Materials

3 hours per week 250 marks

Part A

Places of metals as material of construction. Definitions of familiar metallurgical terms. Metallurgy, metal, minerals, ores, gangue, flux, slag, calcination, roasting, sintering, briquetting, refractories, etc. Definitions of industrially significant properties of metallic materials including malleability, hardness, toughness, fatigue, creep, yield point, elastic limit, etc. Metallurgy in foundry : Pig iron—Production and uses ; Wrought iron—production, properties and uses ; Cast irons—Production, types, properties and uses ; Effect of metalloids on C.I. Steels—Production, properties, uses of carbon steels.

Metal casting processes—Casting defects and remedies ; Measurement and control of temperature.

Powder metallurgy—Importance of power metallurgy in tool making industries, technique of making metallic powders, Effect of powder metallurgy in the field of ceramics.

Phase rule and phase diagrams of Industrial alloys : Structure and properties of metals and alloys ; Manufacture, types, properties and uses of non-ferrous alloys—Brass, bronze, bearing metals soldering and brazing alloys, etc.

Theories of corrosion and Methods of its prevention, Protective metallic inorganic coatings and organic coatings including paints for marine atmosphere.

Part B

Ferrous alloys ; Plain carbon steels, alloy steels, alloying elements, tool steels, stainless steels, heat resisting and creep resisting steels, low temperature high strength steels.

Metal working processes : Hot working and cold working ; Rolling, forging, extrusion, tube drawing and wire drawing and sheet metal forming, etc.

Heat-treatment of metals and alloys. Iron and Iron carbide thermal equilibrium diagram ; Annealing, Normalizing, quenching and tempering ; T.T.T. diagram, austempering and martempering.

Case hardening of steel : Carburizing, cyaniding, nitriding etc.

Cement, ferro-cement, timber, rubber, glass, plastics and lubricants.

MetE 210 Shipbuilding Materiels (Laboratory)

3 hours per week 100 marks

Part A

Reccgnition of various metallic materials ; Study of metallurgical microscope and preperation of macro and micro specimen by grinding, polishing and etching. Micro-study of various ferrous and non-ferrours meterials. Photo-micro-graphy. Macro and micro-study of cold worked and annealed metals.

Part B

Practical study of heat-treatment of steels : Conduct of annealing, normalizing, tempering, and hardening by quenching and carburizing on steel specimen, followed by matallographic examination of the pieces so treated.

Making of brass, bronze and bearing metals and study of micro-structure of heat-treated brass and bronze.

Metallography of melted and heat-treated specimen of steel and non-ferrous alloys.

Study of physical properties of different heat-treaated metals and their alloys.

Details of Postgraduate Courses in Metallurgical Engineering

MetE 6000 Thesis

MetE 6101 Advanced Metal Physics

3 hours per week

Statistical mechanics : Fundamentals of quantum mechanics. Thermodynamics of solids ; Free energy and phase equilibria ; Order disorder phenomena. Necleation in growth theory, recovery, recrystallisation. Crystal imperfections. Atomic mechanism involved in deformation of metals, alloys and non-metallic solids. Detailed relationship between structure and properties of metals. Electronic structure of metals ; Free electron theory ; Band theory of solids, thermal and electrical conductivity of solids. Surface emission, cohesion and other characteristics of metals. De-magnation, paramagnetism, ferromagnetism, ferri-magnetism and anti-ferro-magnetism. Magnetic properties of metals and alloys. Crystal structure of solids. Application of X-ray deffraction techniques to the study of crystal structure.

MetE 6103 Machine Tools Materials and Heat Treatment

3 hours per week

The composition, structure, heat treatment and selection of tools steels. An analytical study of the machine tools, cutting tools and work piece system and the metal cutting parameters which influence the system performance. Engineering considerations involved in the design of special tools for economical mass production. Study of tool steel namely water hardened tool steel, shock resistance tool steel, heat resistance tool steel, high speed tools steel etc. Power metallurgy and synthetic tool steel.

MetE 6105 Advanced Metal Technology I

3 hours per week

Analysis of the general state of stress and strain in solids. Elements of theory of elasticity and plasticity and their application in the field of metal forming ; Residual stresses; Theory of dislocations etc. Mechanism of fatigue and creep ; Yeilding at fracture. A study of unit process of hydrometallurgy and Electro-metallurgy. The metallurgy of materials for nuclear reactions : their extraction and fabrications. Production, pressing and sintering of metal powders ; Application of the powder metallurgy products. Effect of particle size, friction, die design on pressed densities. The metallurgical aspect of forging ; Raw materials and fabrication of pressed and dropped forging including inspection, finishing and calculation of energy consumption. Relation between structure and hot workability of alloys ; Deoxidation and solidification of metals and alloys. Structure and property of high conductivity–high strength copper alloys.

MetE 6107 Extractive Metallurgy

3 hours per week

A detailed study of current practive in the preparation of metals using pyrometallurgical and hydrometallurgical processes. Thermo chemical properties in metallurgical systems and analysis of metallurgical processes ; Diffusion and interface controlled reaction in metallurgical systems. Heterogeneous reaction in solid, liquid and gas solutions.

MetE 6109 Industrial Alloys

3 hours per week

The iron carbon diagram and modification introduced with alloying elements. The perlite, bainite and martensite reactions. Hardenability, tempering, and properties of alloyed steels. Surface treatment. Physical metallurgy and extractive metallurgy of light metals and their alloys. Thermodynamics of alloys based on iron. Solidification mechanism of alloys. Study of high permeability chemically deposited magnetic alloys of nickel and cobalt. Mechanism of preparation

of solid solutions, external friction, residual stresses. Age hardening alloys. Heat treatment and property of alloys steels. Electronic structure and characteristic properties of solid solutions and other alloy phases. Industrial alloys based on copper, zinc, nickel, cadmium etc. and their physical and mechanical properties.

MetE 6201 Advanced Physical Metallurgy

3 hours per week

Diffusion in solids, free energy and phase equilibria ; order disorder phenomena. Nucleation and growth theory, recovery, recrystallisation and transformation including, eutectoid, martensitic precipitation. Introduction to slip and its application to the understanding of structure and properties of materials. Dislocation theory ; Nature and properties of dislocations ; dislocation motion and interaction. Construction and interpretation of binary and ternary phase diagram. Factors controlling equilibria ; Hume Rother's Rule, phase transformation of equilibrium diagram.

MetE 6203 Refractory Materials

3 hours per week

Raw materials and properties ; Reaction between refractories and slag ; Behaviour of refractories specially at elevated temperature. Mechanism of dissolution of crystals and glass in melts, diffusion process and sintering in solid. Ceramics materials and their structure and properties ; Their fabrication and application to high temperature and special services. Solid state studies ; Diffusion and gas permeability of ceramics ; Hot pressing ; Reaction sintering and pyrolytic deposition ; Fabrication study of pure nitride ; Oxide, carbide and clay based ceramics ; Electrical and mechanical properties of ceramics at high temperature ; Constitution and drying behaviour of clay and refractory materials. Interaction between gases and clean metals surfaces ; Vapour deposition of ceramic film, disiocation structure in ceramics. Preparation and properties of nitrade and phosphate. Stability relationship at high temperature. Imperfections and texture in ceramics and glass, flow, fracture and effect of temperature and time theory.

MetE 6207 Fuel Technology

3 hours per week

Introduction to combustion theories ; Combustion reaction, dissociation, vapourization and ignition. Determination of combustion efficiency, heating values and their variables. Gaseous, liquid and solid fuels. Physical and chemical properties of fuels ; combustion processes ; Mass and energy balance. Application of thermodynamic principles and

chemistry to combustion reactions. A study at an advanced level of important reactions of aliphatic and aromatic compunds. Steroism and the relation of structure of chemical reactions. Combustion applications to heating equipments, internal combustion engines and propulsion systems. Fluid dynamics of reacting systems. Ignition, propagation and stability of flames. Detonation, self ingition properties of fuels. Fundamental relationships, combustion, ignition and flame fronts.

MetE 6209 Metallurgical Thermodynamics

3 hours per week

Thermodynamics necessary to understand a large portion of metallurgical phenomena. An atomistic and macroscopic thermodynamics approach to the various properties of solids. Statistical thermodynamics with applications to metallurgical systems. The principles and laws of thermochemical and thermodynamics ; Thermodynamic functions, phase equilibria, heat effects and equilibrium reactions. Solutions and electrolytic cells.

Department of Naval Architecture and Marine Engineering

Staff

Head

Musharrif Hossain Khan, *B Sc Engineering (Mech), M S, Ph D*

Assistant Professors

Momtazuddin Bhuiyan, *B E (Naval Arch), M E*
Gazi Md. Khalil, *B Tech (Hons) (Aeronautics), M Sc*

Lecturers

Mohiuddin Choudhury, (Abroad), *B Sc Engineering (Mech)*
Md. Refayet Ullah, (Abroad), *B Sc Engineering (Naval Arch and Marine)*
Khabirul Haque Chowdhury, *B Sc Engineering (Naval Arch and Marine)*

The Department of Naval Architecture and Marine Engineering was estabilished in September, 1971 under the Faculty of Engineering. At present this department is offering only the undergraduate course which covers the entire engineering function for the design and construction of ships and their machinery.

Within the short period of 5 years the department has been able to establish the Ship Design Laboratory. the Ship Motion and Hydrodynamics Laboratory and the Marine Engines Laboratory out of the local resources and some foreign assistance. A land of 1.4 acres quite near from the University campus has been purchased to establish the Ship Model Testing Towing Basin and other necessary laboratories over there.

This department has so far undertaken two major research projects which are ' The Mechanization of Country Boats of Bangladesh' and 'Ferro-Cement Boat Building'. Both the projects are under progress and by this time, encouraging results have been obtained.

Details of Undergraduate Courses in Naval Architecture and Marine Engineering

Second Year

NAME 201 Strength of Materials I

2 hours per week 150 marks

Part A

Introduction : Analysis of stress and strain. Mechanical properties of materials ; Riveted and welded joints ; Pressure vessels ; Bending moment and shearing force ; Beam theory.

Part B

Torsion ; Deflection of statically determinate beams ; Theory of columns, Combined stresses : Strain energy and impact,

NAME 203 Fluid Mechanics

2 hours per week 150 marks

Part A

Fluid properties ; Static pressure of a fluid ; Buoyancy of a fluid ; Flow of a fluid ; Orifices and mouthpieces ; Notches and weirs ; Impact of jets ; Friction and flow through open channel.

Part B

Dimensional analysis ; Dynamic similarity and model testing ; Compressible fluid ; The aerofoil and its application ; The boundary layer ; Hydraulic machines ; Cavitation ; Reciprocating pumps and centrifugal pumps.

NAME 205 Welding Engineering for Ship Construction

2 hours per week 150 marks

Part A

Development of ship welding ; Methods and principles of cutting ; Methods of welding ; Physics and metallurgy of welding ; Weldability of steel ; Standard welding symbols ; Shielded metal arc welding ; Gas shielded arc welding, Submerged arc welding, Electroslag welding.

Part B

Resistance welding ; Spot and stud welding ; Electron Beam welding, Laser welding. Residual stress and distorsion in welding ; Welding inspection and non-destructive testing of welds, Brittle fracture of ships and other welded structures ; Sound welding design for ship construction.

NAME 207 Elements of Merchant Ships and Ship Calculation

2 hours per week 150 marks

Part A

Introduction ; Kinds of ships ; Structure of ships ; Calculation of area,

volume and coefficients related to ship, Centre of gravity, centre of buoyancy ; Displacement sheet ; Wetted surface, Stability of ships ; Metacentres and metacentric diagrams, Centre of floatation ; Moment of inertia.

Part B

Metacentric height by experiment ; Stability of wall-sided vessel ; Free-surface effect on stability ; Longitudinal metacentre and effect of loading, unloading and flooding on trim ; Hydrostatic curves ; Statical Stability at large angles and dynamical stability ; Launching calculations.

NAME 208 Elements of Ship Drawing (Sessional)

3 hours per week 100 marks

Elementary ship drawings based on NAME 207.

Third Year

NAME 301 Strength of Materials II

2 hours per week 200 marks

Part A

Bending moment and shearing force of continuous beams ; Combined stresses, unsymmetrical bending, thick cylinders, curved beams.

Part B

Torsion of thin walled sections ; Beams on elastic foundations ; Theories of failure ; Introduction to plate and shell, stress concentration.

NAME 303 Hydrodynamics, Ship Vibration and Dynamics of Ship Motion

3 hours per week 300 marks

Part A

Equation of continuity ; Two dimensional and standard patterns of flow ; Rotational and irrotational flow ; Stream functions ; Velocity potential functions ; Euler's equation of motion ; Bernoulli's equation ; Velocity and pressure distributions ; Boundary layer ; Laminar and turbulent flow, Conformal transformation ; Lift on an infinite aerofoil ; Tidal waves and surface waves ; Vibrations—natural, forced and damped. Effect of added mass on ship vibration.

Part B

Calculations of natural frequencies of a ship's hull. Measurement of ship vibration. Empirical formulae for calculating hull frequencies. Calculation of hull response to exciting forces ; Propeller excited vibration ; Machinery excited vibration ; Remedy of ship vibration ; Motions of a vessel in still water ; Linear theory of rolling, heaving and yawing. Theory of coupled pitching and heaving motions of a vessel in a seaway. The effect of added mass, course and forward velocity of the

vessel on ship motions. Fundamentals of the non-linear theory of ship motions ; Motions stabilizers. Experimental methods of studying ship motions.

NAME 304 Hydrodynamics, Ship Vibration and Dynamics of Ship Motion (Laboratory)

3 hours every alternate week 50 marks

Experiments based on NAME 303.

NAME 305 Details of Ship Construction

2 hours per week 200 marks

Part A

Development of ship's structures ; Classification societies ; Framing systems, Details of structural members and fittings. Hull materials, Piping system ; FRP and Ferro-Cement boat building.

Part B

Detailed process of ship construction ; Network analysis ; Numerical control systems used in shipbuilding, Process control and quality control in ship construction.

NAME 307 Ship Design I

2 hours per week 200 marks

Part A

Introduction, ship types, hull weight, cargo capacity, preliminary calculations of principal dimensions ; Freeboard and tonnage. The general arrangement ; Hydrostatic curves. The design of ship's lines.

Part B

The weight equation in ship design. Effect of metacentric height due to small changes in dimensions. Ship specifications ; Cost estimation ; Crew and passenger accomodation. Scantlings ; Preliminary design considerations of fittings. Cargo-handling arrangements, Mooring and towing arrangements.

NAME 308 Ship Drawing I (Sessional)

3 hours per week 100 marks

Ship drawings based on NAME 307.

NAME 311 Marine Engineering I

2 hours per week 200 marks

Part A

Heat Transfer : Steady and unsteady state conduction. Natural and forced convection ; Radiaton.

Power Generation : Boilers and fuels ; The steam engine ; Steam turbines ; Gas turbines ; Nuclear power plants ; Turbine and steam engine auxiliaries, heat-balance, lubricating and fuel oil systems.

Part B

Internal combustion engines : Gasoline engines, diesel engines, horse power, fuel consumption ; Weight-Power ratio ; Air-starting system, Fuel oil injection system ; Cooling-water system ; Lubricating oil system; Exhaust piping ; Materials for diesel engines ; Thrust bearings, installations ; Diesel engine auxiliaries ; Muffler ; Waste-heat boilers ; Superchargers ; Oil coolers.

NAME 316 Shipyard Practice I (Practical)

3 hours every alternate week 50 marks

(Concentrated in 3 weeks)

Ship Construction : Mold loft, gas cutting, welding, fabrication ; Sub-assembly, assembly, field assembly, erection, launching, cut-fitting, delivery trial.

Fourth Year

NAME 401 Strength of Ships

2 hours per week 200 marks

Part A

The forces acting upon a ship at sea ; Longitudinal bending. The buoyancy and the weight curves. The load, shearing force and bending moment curves. Approximations to maximum bending moment and maximum shearing force. Dynamic effects ; Calculation of the section modulus. Experiments on longitudinal strength of ships. Deflection of ship hull girder ; Submarine pressure hull design.

Part B

Transverse strength ; Methods of analysis ; Torsional problems; Strength of plating, bukiheads, decks and tank-tops, foundations. Grillages, composite construction ; Superstructures.

NAME 402 Strength of Ships (Sessional)

3 hours every alternate week 50 marks

Sessional work based on NAME 401.

NAME 403 Resistance and Propulsion of Ships

2 hours per week 200 marks

Part A

The resistance problem ; Wave-making resistance ; Wave interference phenomena ; Analysis of wave phenomena and wave-making resistance of some bodies with simple forms. Some approximation methods of determining the position of humps and hollows. Frictional resistance. The work of William Froude ; Power estimation.

Part B

Effect of form and principal dimensions on wave-making and frictional resistance. Resistance at restricted water depth and width. Introduction to the theory of propulsion. Propeller types, design of screw propeller. The velocity field behind the ship ; Nominal and effective wake ; Cavitation ; Screw design according to the circulation theory for a uniform wake. Screw series diagrams calculated with the aid of the circulation theory. Trial and service predictions.

NAME 404 Resistance and Propulsion of Ships (Sessional)

3 hours every alternate week 50 marks

Sessional work based on NAME 403.

NAME 407 Ship Design II

2 hours per week 200 marks

Part A

Design of special ships like tug boats, Tankers, Fishing boats, Fighting vessels.

Part B

Design of special ships like ferry boats, dredgers, river steamers, coasters, research vessel, training vessel, container ship.

NAME 408 Ship Drawing II (Sessional)

3 hours every alternate week 50 marks

Ship drawings based on NAME 407.

NAME 411 Marine Engineering II

3 hours per week 300 marks

Part A

Outline of Navigation and Shipping Laws ; Fire fighting equipment. Deck machinery : Steering gears ; Rudder ; Steam and eletric windlasses ; Chain and chain stoppers ; Wildcats ; Steam and electric winches ; Capstans and gypsies ; Towing machines ; Marine pumps ; Marine refrigeration.

Part B

Marine Electricity : D.C. generators and motors ; A.C. generators and motors ; Transformers ; Synchronous converter ; Electric drives ; Rectifiers ; Switchboards ; Electron tube and radio ; Automatic control ; Marine radar ; Wireless equipment. Marine Airconditioning ; Central, twin duct and re-heat airconditioning systems ; Airconditioning with direct expansion refrigeration ; Heating and ventilating systems ; Air treatment in cargo spaces.

NAME 412 Marine Engineering (Laboratory)

3 hours every alternate week 50 marks

Experiments based on NAME 311 and NAME 411.

NAME 415 Shipyard Facilities, Ship Repairing and Marine Structures

2 hours per week 200 marks

Part A

Shipyard Facilities : Layout of a shipyard ; Mold loft floor ; Material stock ; Fabrication and assembly shop ; Field assembly ; Building berth and building deck ; Fitting shop and quay facilities ; Repairing facilities. Ship Repairing : Causes of wear and damage of a ship ; Determination of wear and defects of parts ; Repair of ship's hull ; Repair of ship's boiler ; Repair of main engine and auxiliary machinery ; Repair of shafting and propeller ; Repair of ship's electrical installations.

Part B

Marine Structures : Marine ports ; Breakwaters ; Wharves ; Piers ; Bulkheads ; Dolphins ; Moorings ; Oil drilling rigs and other offshore marine structures ; Navigational aids.

NAME 416 Shipyard Practice II (Practical)

(Concentrated in 3 weeks)

3 hours every alternate week 50 marks

Ship Design : Basic design ; Estimation ; Hull design ; Piping and equipment design ; Shell expansion ; Detailed construction design.

NAME 400 Project and Thesis

6 hours per week 200 marks

Major fields of Project and Thesis are as follows

(a) Ship Design
(b) Ship Construction
(c) Strength of Ships
(d) Material Testing and Fracture Problems
(e) Ship Motion
(f) Resistance and Propulsion of Ships
(g) Marine Engines and Ship Vibration.

Department of Water Resources Engineering

Staff

Professor and Head

A. K. M. Hamidur Rahman Khan, *B Sc Engineering (Civil), M Hydrological Engineering, Ph D*

Professors

Abdul Hannan, (Abroad), *B Sc Engineering (Civil), M S, Ph D*
M. Shahjahan, (Abroad), *B Sc Engineering (Civil), M S, Ph D*

Assistant Professors

Md. Khurshed Alam, *B Sc Engineering (Civil), M Sc, Ph D*
Ain-Un-Nishat, *B Sc Engineering (Civil), M Sc*
Abdul Halim, *B Sc Engineering (Civil), M Sc*
Shahjahan Kabir Choudhury, (Abroad), *B Sc Engineering (Civil), M Sc*
Md. Fazlul Bari, *B Sc Engineering (Civil)*
A. K. M. Zahiruddin Choudhury, *B Sc Engineering (Civil), M Sc*
Jobaid Kabir, (Abroad), *B Sc Engineering (Civil), M Sc*

Lecturers

Md. Monwar Hossain, *B Sc Engineering (Civil)*
Saleh Ahmed Wasimi, *B Sc Engineering (Water Resources)*
Nadira Begum, *B Sc Engineering (Water Resources)*
Mir Jahan Miah, *B Sc Engineering (Water Resources)*
Abul Fazal Md. Saleh, *B Sc Engineering (Water Resources)*

Scope

The Department of Water Resources Engineering was opened on January 1, 1974 at Bangladesh University of Engineering and Technology, with the task of producing engineers specially trained in hydrology, hydraulics, river morphology, salinity instrusion, irrigation, drainage, flood control, land reclamation, bank protection, river stabilisation, ground

water and sedimentation problems. The Department has also the aim of undertaking research in the different areas of water resources engineering and related national problems. The Department offers both undergraduate and postgraduate degrees in water resources Engineering.

Role in National Activities

Water not only serves as a vital substance for human existence but also plays an important role in advancing civilization. Owing to the rapid growth of world economy and civilization, the need for the development of water resources has become more urgent than ever before. The importance and the need for planned development of the water resources of Bangladesh can hardly be over-emphasized. The heavy dependence of the economy and living conditions of people on the river behaviour and the rainfall pattern demand specially trained people in the field of water resources engineering. The Water Resources Engineers trained in the fields mentioned earlier, would be extremely useful for the proper evaluation, design and implementation of the necessary schemes for the challenging problems of the country like flood control and river training, development and conservation of water resources for irrigation, land reclamation, navigation, saline water intrusion, sediment transportation and so on.

Laboratories

The Hydraulics laboratory is equipped for conducting experimental work on open channel flow, sediment transport wave motion, hydraulic structures, turbomachinery, fluid measurements, pipe flow. At present the following facilities are available :

1. Glass-sided tilting recirculating flume 70 ft. long $2\frac{1}{2}$ ft. wide, and $2\frac{1}{2}$ ft. deep with additional facilities such as wave generating equipments, drag measuring device and model gates.
2. Glass-sided tilting recirculating flume 56 ft. long 3 ft. wide, and 13 ft. deep for studies relating to sediment transport, local scoure and various open channel problems.
3. Glass-sided tilting flow channel 40 ft. long, 1 ft. wide and 1 ft. deep for typical open channel experiments such as sluice experiments, syphon spillway, investigations of spillway design, study of critical depth, analysis of hydraulic jumps, wave experiment and hydraulic drag measurement.
4. Fluid friction apparatus.
5. Orifice, venturi and weir testing apparatus.
6. Impact of jet apparatus.
7. Permeability tank
8. Extended mobile bed and flow visualisation tank
9. Adjustable bed flow channel
10. Series parallel pump testing
11. Pipe surge apparatus.

The Irrigation and Ground Water Laboratory and the Hydromateorology Laboratory are presently in the developing stage. Equipment and working models for the laboratories are being procured from abroad and some are also being made locally.

Library

The department devotes considerable effort to the development of a library of its own to supplement the needs of teaching and research programs. The departmental library is housed along with the department's office complex. Its facilities, which are supplementary to those of the university library, are available to the faculty members and postgraduate students of this department. At present the library has a good collection of reference books, proceedings, journals, and technical reports. Continual efforts are being made to further develop this facility.

Details of undergraduate courses in Water Resources Engineering

Second Year

WRE 201 Fluid Mechanics

3 hours per week 250 marks

Part A

Fluid properties, fluid statics, kinematics of fluid motion, energy consideration in steady flow, basic hydrodynamics, viscous effects and fluid resistance.

Part B

Fluid flow measurements, closed conduit flow, pipes in series and parallels, pipe networks, similitude and dimensional analysis.

WRE 202 Fluid Mechanics (Sessional)

3 hours per week 100 marks

Sessional based on WRE 201

WRE 203 Surveying

2 hours per week 150 marks

Part A

Route surveying, tachecmetric surveying, triangulatcn, errors in surveying.

Part B

Engineering astronomy, photogrammetry and photo interpretation, hydrographic surveying.

WRE 204 Constuction Methods and Estimating

3 hours per week 100 marks

Sessional on construction methods and estimating

WRE 207 Construction Materials

3 hours per week 250 marks

Part A

Properties and uses of bricks, cements, aggregates, cement and lime mortars ; Corrosion and its prevention ; Paints, varnishes, lacquer.

Part B

Concrete, design of concrete mix, structure of solid materials, mechanical behaviour of solid materials, cement chemistry, properties and uses of timbers, rubber and plastics.

WRE 209 Mechanics

2 hours per week 150 marks

Part A

Concept of force, mass and length, units, Newton's laws of motion, addition and subtraction of force vectors, couples, free-body diagrams, graphical methods, Bow's notation, resultant of force systems, internal forces in a truss, non-coplanar forces, location of centroids, centre of pressure, cables, friction.

Part B

Moments of inertia, plane motion, angular velocity and acceleration, relative motion, curvilinear motion, rigid body motion, work, energy, power and efficiency, impluse and momentum.

Third year

WRE 301 Open Channel Flow

3 hours per week 300 marks

Part A

Open channel flow and its classification, velocity distribution in an open channel, velocity distribution co-efficient, pressure distribution in an open channel, energy and momentum principles, critical flow, its computation and applications, uniform flow concept and computation.

Part B

Design of channels for uniform flow, gradually varied flow, hydraulic jump, dimensional analysis and model technique.

WRE 303 Hydraulic Machinery

2 hours per week 200 marks

Part A

Dynamic action of fluid, impulse-momentum equation, impact of jets, whirling flow, dimensional analysis, similar flows and unit quantities. Water turbines, development of water turbines, hydro-electric plants, types of turbines, models and selection of turbines.

Part B

Pumps, centrifugal pumps, reciprocating pumps, other pumps and water lifting devices, testing of hydraulic mechines, hydraulic measurements, testing and characteristics of turbines and pumps, hydraulic systems.

WRE 305 Geomorphology

2 hours per week 200 marks

Part A

Minerals and rocks, folds, faults, and fault blocks, erosional processes, 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 patterns and the river basin geomorphology of Bangladesh.

WRE 401 Irrigation and Drainage Engineering

2 hours per week 200 marks

Part A

Irrigation and its effects, soil-plant-water relationship, irrigation methods, water requirements for crops, consumptive use of water, irrigation efficiency,

Part B

Irrigation scheduling, irrigation structures, problems of over irrigation, water resources development for irrigation, drainage of irrigated lands in humid deltaic areas with tidal and non-tidal flooding.

WRE 403 River Mechanics and Flood Control

3 hours per week 300 marks

Part A

Bed forms and resistance characteristics of alluvial rivers, stable and regime channels, theory of regime channels, sediment discharge in a river, its computation and measurement, channel pattern and its classification, river flood plain and its formation.

Part B

Definition of flood and damages caused by it. Causes of flood, different methods of flood protection and flood control.

WRE 405 Water Supply and Sewerage

3 hours per week 300 marks

Part A

Water supply and sewerage, consumption of water, quality of water, sources of water supply, sewerage and distribution of water.

Part B

Sewerage treatment, communicable diseases, principles of excrete disposal, septic tank, imhoff tank, disposal by dilution and sewerage farming plumbing.

Sewerage : Sewer system, appurtenances, construction and maintenance, sewage treatment, sewage disposal, house plumbing, surface drains, planning and design of sewage treatment plants, pollution and pollution control.

WRE 407 Hydrology

2 hours per week 200 marks

Part A

A study of the hydrologic cycle, physics of the air flow precipitation, stream flow, infiltration and soil moisture, evaporation, transpiration, run-off, hydrographs.

Part B

Rainfall-runoff relations and the way these factors affect utilization and conservation of water resources, unit hydrograph concept and its application, flood routing, statistical methods.

WRE 409 Ground Water Engineering

2 hours per week 200 marks

Part A

Ground water in hydrologic cycle, occurrence of ground water, ground water movement, basic principles and fundamental equations, well hydraulics.

Part B

Water wells, ground water exploration, well design criteria, construction, production tests and maintenance of wells, investigation and recharge of ground water, basin-wide ground water development, sea water intrusion in coastal aquifers, ground water potential of Bangladesh.

WRE 411 Coastal Engineering and Land Reclamation

2 hours per week 200 marks

Part A

Generation, prediction and measurement of waves ; Wave theory ; Refraction, reflection and breaking of waves ; Wave diffraction.

Part B

Wave forces, design of coastal and harbour structures, tides and tidal oscillations in the open ocean ; Land reclamation.

Water Resources Engineering Courses offered to other Departments

WRE 221 Fluid Mechanics and Hydraulics

3 hours per week 250 marks

Part A

Fluid properties, fluid statics, kinematics of fluid motion, energy consideration in steady flow, basic hydrodynamics, viscous effects and fluid resistance.

Part B

Fluid flow measurements, closed conduit flow, pipes in series and parallels, pipe networks, similitude and dimensional analysis.

WRE 321 Open Channel Flow and Hydraulic Machinery

3 hours per week 300 marks

Part A

Open channel flow and its classification, velocity distribution in an open channel, velocity distribution co-efficients, pressure distribution in an open channel, energy and momentum principles, critical flow—its computations and applications, uniform flow concept and computation.

Part B

Design of channels for uniform flow, gradually varied flow, impact of jets, water turbines, reciprocating pumps, centrifugal pumps.

WRE 322 Open Channel Flow and Hydraulic Machinery (Laboratory)

3 hours every alternate week 50 marks

Standard laboratory experiments based on WRE 221 and WRE 321.

WRE 421 Water Resources Engineering

3 hours per week 300 marks

Part A

Hydrology : Hydrologic cycle, weather and Hydrology, precipitation, evaporation and transpiration, stream flow, hydrographs, unit hydrographs, hydrographs of overland flow.

Irrigation and Flood Control : Irrigation and its effects, soils, irrigation methods. water requirements of crops, consumptive use of water. Stability of rivers, flood, methods of flood control, bank protection and river training.

WRE 422 Water Resources Engineering

3 hours every alternate week 50 marks

Analysis and design problems based on WRE 421. Design of hydraualic structures.

Details of Postgraduate Courses in Water Resources Engineering

WRE 6000 Thesis

WRE 6101 Advanced Fluid Mechanics I

3 hours per week

Dynamic effects of pressure, shear, and gravity on a fluid particle ; One-dimensional methods of analysis ; Drag on submerged bodies Flow in pipes and channels ; and boundary layer theory.

WRE 6102 Advanced Fluid Mechanics II

3 hours per week

The Navier-Stokes and energy equations and their solutions ; Theory of laminar boundary layers ; Stability and transition of turbulent flow ; Equations of mass, momentum, and energy conservation of turbulent flow ; Turbulent boundary layers, and diffusion.

WRE 6103 Advanced Open Channel Flow

3 hours per week

Uniform flow in open channels : Gradually varied flow ; Spatially varied flow ; Hydraulic jump and surges ; Subcritical and supercritical flow around bends and through transitions ; Unsteady flow in open channels.

WRE 6201 Advanced Hydrology

3 hours per week

Stream flow ; Run-off measurement ; Evaporation and transpiration ; Hydrograph analysis ; Unit hydrograph ; Flood routing ; Hydraulics of overland flow ; Flood frequency analysis ; Applications of hydrologic problems ; Flood estimation and flood forecasting.

WRE 6202 Hydrometeorology

2 hours per week

The hydrologic cycle ; Weather and hydrology ; Precipitation ; Evaporation ; Transpiration ; Probable maximum precipitation and rainfall frequency ; Weather modification.

WRE 6203 Statistical Methods in Hydrology

2 hours per week

Prerequisite WRE 6103 :

Statistical and probability analysis and their application to hydrologic problems.

WRE 6204 Advanced Groundwater Engineering

3 hours per week

Occurrence and movement of groundwater ; Storage and exploration ; Basic principles of groundwater flow ; Hydraulics of well ; Well design ; Construction ; Production tests, and maintenance of wells ; Groundwater recharge ; Safe yield of a basin ; Water quality ; Sea water intrusion in coastal aquifer ; Interference of wells ; Management of groundwater basin.

WRE 6205 Advanced Irrigation and Drainage Engineering

3 hours per week

Determination of consumptive use ; Soil-water-plant relations ; Infiltration ; Crop irrigation, farm delivery and diversion requirements ; Irrigation techniques ; Irrigation efficiencies ; Water management in irrigated lands ; Salinity problems ; Relation between irrigation and drainage ; Surface and subsurface drains ; Drainage systems and their design.

WRE 6206 Flow Through Porous Media

3 hours per week

Mechanics of fluid movement in porous media ; Darcy's law ; Steady and unsteady flow in wells ; Confined and unconfined flow in aquifers ; Analogue and digital models for aquifer systems study.

WRE 6301 River Mechanics

3 hours per week

Generalized and load characteristics of river channels ; Bedforms in alluvial channels ; River patterns ; Flood plain and formations ; Effect of sediment transportation on river morphology and channel pattern ; Rivers in Bangladeah.

WRE 6302 Sediment Transportation

3 hours per week

Sediment transport mechanics ; Suspended load ; and Bed load transportation theories ; Transport of sediment in canals and rivers ; Effects of sediment on irrigation canals ; Reservoirs, and structures ; Sediment transport and navigation ; Effects of erosion control structures ; measurement of sediment transportation ; Sediment load in the rivers of Bangladesh.

WRE 6303 River Training and Bank Protection
2 hours per week

The behaviour of natural water courses ; Fluctuations both in alignment and cross section of rivers ; Morphological aspects of river development ; River training ; Principal methods of river bank protection and their effectiveness : Case studies relating to Bangladesh problems.

WRE 6304 Waterpower Engineering
2 hours per week

Water power development ; Hydraulic and topographic surveys ; Stream flow data and water estimate, sub—surface exploration, preliminary investigation and design. Economics of development ; Layout of dams, powerhouses, tunnels, canals, spillways, surge-chambers, and penstocks ; Selection of turbines ; Construction practices.

WRE 6305 Fluvial Geomorphology
2 hours per week

Systems of fluvial denudation ; Weathering ; Stream bed and its description ; Geomorphic works of rivers ; River course changes and their causes.

WRE 6401 Design of Hydraulic Structures
3 hours per week

Hydraulic design of structures used in the storage and control of water ; Channels and flumes ; Spillways stilling basins ; Transitions and control structures ; Locks and breakwaters ; Use of models in hydraulic design.

WRE 6402 Planning of Water Resources Systems
3 hours per week

General principles of water resources development planning ; Application of systems approach ; Optimization techniques ; Economics of water resources projects ; Regional and social considerations.

WRE 6403 Modelling Techniques and Similitudes
2 hours per week

Principles of similitudes ; Laws governing models ; Design of experiments ; Materials and methods of construction ; Equipment in models.

WRE 6404 Project Investigation and Planning
2 hours per week

Different aspects of feasibility study ; Study of alternatives ; Complete design of a water resources project for a selected area.

WRE 6405 Application of Photogrammetry in Water Resources
2 hours per week

Principles of photogrammetry : Use of aerial photography ; Land form analysis ; Interpretation of drainage patterns ; Geomorphological and hydrological features ; Surface soils ; Vegetation ; Land use ; Airphotos in the planning and designing of water resources projects.

WRE 6501 Advanced Coastal Engineering
3 hours per week

Generation, prediction, and measurement of waves ; Wave theory ; Refraction, reflection and breaking of waves ; Wave diffraction and attenuation by structures ; Wave forces and design of marine structures ; Hydraulic model analysis.

WRE 6502 Tidal and Estuarine Hydraulics

2 hours per week

Tidal oscillations in the open ocean. coastal margins and rivers ; Effluent disposal ; Ocean currents ; Modelling of stratified flow ; Wave force on structures and estuarine engineering problems.

WRE 6600 Special Studies in Water Resources Engineering
1 to 4 credits per semister ;

Study of selected problems in Water Resources Engineering.

Department of Chemistry

Staff

Associate Professor and Head

Abdul Quadir Chowdhury, *B Sc (Hons), M Sc (Chem), Postgraduate Dipl In Chemical Engineering*

Assistant Professors

Enamul Huq, *B Sc (Hons), M Sc (Chem), Ph D*
Md. Nurul Islam, *B Sc (Hons), M Sc (Chem)*
Serajul Huq, *B Sc (Hons), M Sc (Chem)*
A. K. M. Matiur Rahman, *B Sc (Hons), M Sc (Chem)*

Lecturers

Md. Manwarul Islam, *B Sc (Hons), M Sc (Chem)*
Manimul Huq, *M Sc (Chem)*
Fazlul Alam, *B Sc (Hons), M Sc (Chem)*
Md. Habibullah, *B Sc (Hons), M Sc (Chem)*
Kazi Mokhlesur Rahman, *B Sc (Hons), M Sc (Chem)*

This department came into existence as a separate department detached from Chemical Engineering Department of the erstwhile Ahsanullah Engineering College when the college was upgraded to the status of the present University in 1962. The department offers course in Chemistry to the first year Engineering students and also to the second year Chemical, Mechanical and Metallurgical students.

The topics of the first year Chemistry course have been so selected that the graduate engineer by going through the course can, besides discharging his professional duties effetively, also appreciate the significance of the properties of the materials he has to handle in the course of his professional life and hence, can employ the various materials efficiently and economically. It is expected that such a knowledge

of fundamentals will also help the young engineering to correlate the data of his experimental work in a more sensible way and give a better explanation of his research results. Such a study will also enable him to get his curiosity regarding anomalies in the properties of matter satisfied.

The second year course of Chemistry for Mechanical and Metallurgical Engineering sutdents comprises corrosion and properties of engineering materials.

The department maintains a good staff-strength. Besides teaching work, teachers of the department has been doing research work of national interest, for example a work on "Evaluation of Bangladesh Natural Water for Steam Generators and Heat Exchangers and its treatment has been completed. Other research works namely "Rosin Extraction" from Black Liquors of Paper Mills and Natural Rubber of Bangladesh are in progress.

Details of Courses in Chemistry

Chem 201 Organic and Inorganic Chemistry

3 hours per week 250 marks

Part A

Organic—A comprehensive study of aliphatic and alicyclic compounds with particular stress on their characteristic properties. structure and uses. Studies on mono-saccarides, amino acids, polypeptides and a broad concept of the mechanism of substitution, elimination and addition reactions.

Inorganic—Review of modern views on chemical bond with particular references to hydrogen bond, metallic bond, hybridisation of bond orbitals, shapes of molecules, sigma and pi-bond, bond length bond strength and bond angles. Study of different types of chemical reactions including special treatment of oxidation-reduction reactions. Study of transition elements, lanthanides and actinides. Acids and bases.

Part B

Organic—A comprehensive study of the chemistry of aromatic and heterocyclic compounds with special emphasis on their structure, properties and uses. Study of some important name reactions like Grignard, Friedel Crafts, Reimer Tiemann, Perkin, Claisen, Cannizzaro, etc. and different types of oxidation and reductions,

Inorganic—Co-ordnation compounds and complextions. Werner's theory and modern electronic interpretation of the structure, isomerism in 6-coordinated complexes. Brief study of comparative chemistry of the following group of elements—Group III, IV, V and VII. Study of oxides and

Note ; *Details of courses offered in first year Engineering are given under "Common First year Courses".*

hydroxides with stress on the oxides and oxyacids of nitrogen, P, S and halogens.

Chem 202 Organic and Inorganic Chemistry Laboratory

3 hours per week 100 marks

Laboratory work based on Chem 201

Chem 203 Physical Chemistry

3 hours per week 250 marks

Part A

Introduction to chemical thermodynamics, elementary treatment of first and second laws, chemical equilibrium, phase rule, introduction to crystallography, chemical kinetics,

Part B

Electric conductance, electromotive force, Ionic equilibria, surface phenomena, colloids, kinetics of heterogeneous system, catalysis.

Chem 204 Physical Chemistry Lrboratory

3 hours per week 100 marks

Laboratory work based on Chem 203

Chem 205 Corrosion and Chemistry of Nonmetallic Engineering Materials

2 hours per week 150 marks

Part A

Glass, ceramics, refractories, corrosion, paints, varnish, etc., metallic coatings.

Part B

Carbon, plastics and synthetic fibres, timber, rubber. Lubrication and petroleum fuels.

Chem 207 Physical Chemistry

2 hours per week 150 marks

Part A

Thermodynamics : First and second law of thermodyhamics, Concept of free energy ; Effect of temperature on free energy ; Gibb's Helmhotz and Clausius-Clapyron equation, vant Hoff's reaction. Isochore and isotherm. Chemical equilibrium and free energy computations. Thermochemistry : Heats of reaction, heats of formation and Hess's law ; Standard states, Kirchoff's equation. Chemical Kinetics : Reaction rate, order of reaction and its measurement ; Mathematical models for different types of reaction. Effect of temperature on rate, energy of activation and simple theory of unimolecular reaction.

Part B

Electrochemistry : Faradays law, conductance, equivalent conductance, ionic mobilities, activity and activity and co-efficient. Ionization constant and pH, Galvanic cells, Thermodynamic of galvanic cells, standard electrode potential, application of E. M. F. measurement. Over voltage polarisation, principles of electrodeposition, electrorefining of Cr and Cu etc.

Corrosion : Different typs of corrosion and its theory. Method of protection and inhibition of corrosion.

Materials : Plastics, Glass, timber, rubber etc. their composition, properties and industrial application.

Department of Mathematics

Staff

Associate Professor and Head

Md Ali Ashraf, *B Sc (Hons), M Sc (Math), M Phil*

Associate Professors

Md. Iman Ali, *B A (Hons), M A (Math)*
Md. Zakerullah, *B Sc (Hons), M Sc (Math), Ph D*

Assistant Professors

A. Khaleq Hazra, *M Sc (Math)*
Md. Isa, *M Sc (Math)*
Md. Jamshed Ali Sheikh, *M Sc (Math)*

Lecturers

Md. Abdul Quddus Mia, *B Sc (Hons), M Sc (Math)*
Md. Mustafa Kamal Chowdhury, *B A (Hons), M A (Math)*

This department is offering different courses in Mathematics in different branches of Engineering in the undergraduate classes. This department also offers courses in mathematics to the first year students of Architecture department.

The M Sc students of departments of Civil, Mechanical, Chemical, Metallurgical and Water Resources Engineering are offered Advanced Mathematics courses consistent with their departmental requirments. The department also offers laboratory facilities in the field of Numerical Analysis.

Details of Undergraduate Courses in Mathematics

Math 201 Mathematics Paper I

3 hours every alternate week 125 marks

Part A

Differential equations—Solution of differential equation of higher order when the dependent and 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 ; Solution of the differential equation by the method of Frobenius ; Solution of Bessel's and Legendre's equations with properties. Laplace transforms—definition of Laplace transform ; Elementary transformations and properties, convolution, solution of differential equations by Laplace transforms, evaluation of improper integrals by Laplace transforms.

Part B

Statistics—Frequency distribution, mean, median, mode and other measures of central tendency, standard deviation and other measures of dispersion, moments, skewness and curtesis, elementary probability theory and discontinuous probability distributions, e.g. binomial, poisson and negative binomial. Continuous probability distributions, e.g, normal and exponential, characteristics of distributions, elementary sampling theory, estimation, hypothesis testing and regression analysis.

Note : Detail of courses offered in first year Engineering are given under "Common First year Course." Details Math 122 are given under "Department of Architecture,"

Math 201 Mathematics Paper II

3 hours every alternate week 125 marks

Part A

Matrices—Definition of a matrix. Various types of matrices, transpose and conjugate transpose of a matrix, submatrices, addition, subtraction, multiplication and division of matrices, adjoint and inverse of a square matrix, rank and elementary transformations of a matrix, linear dependence and independence of vectors. Solution of linear equations by matrix method, vector spaces, quadratic forms, matrix polynomials, determination of characteristic roots and vectors, null space and nullity of a matrix, characteristic sub-space of matrix.

Part B

Vector Algebra—Addition and multiplication of vectors, application to geometry and mechanics, triple products and multiple products, linear dependence and independence of vectors, differentiation and integration of vectors together with elementary applications, definition of line, surface and volume integrals. Vector calculus—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, Stoke's theorem, Green's theorem, Gauss's theorem and their applications, Laplace's equation, curvilinear co-ordinates.

Math 203 Mathematics Paper I

4 hours every alternate week 150 marks

Part A

Differential Equations ; Solution of differential equation of higher order when the dependent and independent variables are absent ; Solutions of Euler's linear homogeneous differential equation ; Solution of the differential equation by the method based on factorization of the operator ; Solution of differential equation by the method of Frobenius ; Solution of Bessel's and Legendre's equation with properties. Laplace transforms : Definition of Laplace transform ; Elementary transformations and properties ; Convolution ; Solution of differential equations by Laplace transforms ; Evaluation of improper integrals by Laplace transforms.

Part B

Vector Alegebra : Addition and multiplication of vectors ; Application to geometry and mechanics ; Triple products and multiple products ; Linear dependence and independence of vectors : Differentiation and integration of vectors together with elementary application ; Definitions of line, surface and volume integrals. Vector Calculus : 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 application. Laplace's equation ; Curvilinear co-ordinates.

Math 203 Mathematics Paper II

4 hours every alternate week 150 marks

Part A

Matrices : Difinition of a matrix ; Various types of matrices ; Transpose and conjugate transpose of a matrix ; Submatrices ; Addition, subtraction, multiplication and division of matrices ; Adjoint and inverse of a square matrix ; Rank and elementary transformation of a matrix ; Linear dependence and independence of vectors. Solution of linear equations by matrix method ; Vector spaces ; Quadratic forms ; Matrix polynomials ; Determination of characteristic roots and vectors ; Null space and nullity of a matrix ; Characteristic subspace of matrix.

Part B

Spherical Triogonal Trigonometry : 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. Astronomy : Heavenly bodies, systems of celestial co-ordinates, Kepler's laws of planetary motion, twilight, harvest moon ; Eclipses ; Siderial and solar time, equation of time.

Math 205 Mathematics Paper I

4 hours every alternate week 150 marks

(Matrices, Differential equations, Fourier series, Bessel's and Legender's equations, Partial differential equations)

Part A

Section A : (Matrices)

Definition of a matrix ; Various types of matrices ; Transpose and conjugate transpose of a matrix ; Submatrices ; Addition, subtraction, multiplication and division of matrices ; Adjoint and inverse of a square matrix ; Rank and elementary transformations of a matrix ; Linear dependence and independence of vectors.

Section B : (Matrices)

Solution of linear equations by matrix method ; Vector spaces ; Quadratic forms, matrix polynomials ; Determination of characteristic roots and vectors ; Null space and nullity of a matrix ; characteristic subspace of matrix.

Part B

Section A : (Ordinary differential equations and Fourier series)

Solution of differential equation of the higher order when the dependent and independent variables are absent ; Solution of Euler's homogeneous differential equation, solution of the differential equation by the method based on the factorization of the operation, solution of the differential equation by Frobenius method. Fourier series.

Section B : (Bessel's and Legendre's differential equations ; Partial differential equations)

Solution of Bessel's and Legendre's equation ; Properties of the solutions and expansion of functions in terms of them. Partial differential equations. Solution of wave equations.

Math 205 Mathematics Paper II

4 hours every alternate week 150 marks

(Vector Analysis and Complex variable)

Part A

Section A : (Vector Algebra)

Addition and multiplication of vectors ; Application to geometry and mechanics, triple products and multiple products ; Linear dependence and independence of vectors ; Differentiation and integration of vectors together with elementary application ; Definitions of line, surface and volume integrals.

Section B : (Vector Calculus)

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 ; Stoke's theorem, Green's theorem ; Gauss's theorem and their applications. Laplace's equation ; Curvilinear co-ordinate.

Part B

Section A : (Complex variable)

Complex number system. General functions of a complex variable. Limits and continuity of a function of complex variable and related theorems, complex differentiation and the Cauchy-Riemann equations. Infinite series, convergence and uniform convergence.

Section B : (Complex variable)

Line integral of a complex function; Cauchy's integral theorem; Cauchy's integral formula ; Liouville's theorem ; Taylor's theorem ; Laurent's theorem, singular points ; Residue ; Cauchy's residue theorem ; Evaluation of residues ; Contour integration ; Conformal mapping.

Math 301 Mathematics

2 hours per week 200 marks

Part A

Fourier series and harmonic analysis—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 equations—partial differential equations, wave equations, particular solutions with boundary and initial condition.

Part B

Complex variables—Complex number system, general functions of a complex variable, limits and continuity of a function of complex variable and related theorems, elementary functions, complex differentiation and the Cauchy-Reimann equations, mapping by elementary functions. Line integral of a complex function ; Cauchy's integral theorem, Cauchy's integral formula ; Liouville's theorem ; Taylor's theorem, Laurent's theorem, convergency, singular points, residue. Cauchy's residue theorem, evaluation of residues, contour integration, conformal mapping.

Math 303 Numerical Analysis

1 hour per week 100 marks

Interpolation—Simple difference, simple difference table, Newton's formula for forward interpolation, Newton's formula for backward interpolation. Divided differences, tables of divided differences, relation between divided differences and simple differences. Newton's

general interpolation formula, Lagrange's interpolation formula. Inverse interpolation by Lagrange's formula and by successive approximations. Numerical differentiation of Newton's forward and backward formulas, calculation of errors. Numerical integration—general quadrature formula for equidistant ordinates, trapezoidal rule, Simpson's rule, Weddle's rule, calculation of errors, relative study of the three rules. Gauss's quadrature formula, Legendre's polynomials, Newton-Cote's formula. Principle of least squares, curve fitting,

Part B

Solution of algebraic and transcedental equations by graphical method, Regula Falsi method, Newton-Raphson method, iteration method, geometric significance, 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 solution of algebraic equations. Solution of ordinary first order differential equations by Picard's method and Euler's method. Runge-Kutta's method for solving differential equations. Numerical solution of partial differential equations.

Math 304 Numerical Analysis (Sessional)

2 hours every alternate week 50 marks

Problems based on Math **303.**

Math 305 Mathematics

3 hours per week 300 marks

Part A

Solid Geometry : System of co-ordinates. distance between two points, section formula, projection, direction cosines, equations of planes and lines, angle between lines and planes, distance form point to a plane, condition of parpendicularity and parallelism of planes and straight lines, perpendicular distance from a point to a straight line, co-planar lines, shortest distance between two given straight lines, volume of tetrahedron. Standard equation of conicoids, sphere, ellipsoid, hyperboloid of one sheet, hyperboloid of two sheets ; Elliptic, paraboloid, hyperbolic paraboloid, cone, cylinder, tangent planes, normal. lines, condition of tangency.

Statistics : Frequency distribution, mean, median, mode and other measures on central tendency ; Standard deviation and other measures of dispersion : Moments, skewness and curtesis ; Elementary probability theory and discontinuous probability distributions, e.g. binomial. Poisson and negative binomials. Continuous probobility distributions, e.g. normal and exponential ; Characteristics of distributions. Elementary sampling theory ; Estimation, hypothesis testing and regression analysis.

Part B

Fourier series and Harmonic Analysis : Fourier series ; Convergence of. Fourier series ; Fourier analysis, Fourier Integral ; Introduction–Laplace equation in cartesian, cylinderical and spherical co-ordinates, cylindrical harmonics, spherical harmonics, potential of a ring, potential about a spherical surface, general properties of harmonic functions.

Section B : Partial differential equations : Partial differential equations ; Wave equation : Particular solution with boundary and initial conditions.

Math 307 Mathematics

2 hours per week 200 marks

Part A

Section A (Complex Varlables)

Complex number system, General functions of a complex variable. Limits and continuity of function of complex variable and related theorems, complex differentiation and the Cauchy-Riemann equations. Infinite series, Convergence and uniform convergence, line integral of a complex function ; Cauchy's integral theorem ; Cauchy's Integral formula, Liouville's theorem ; Taylor's theorem ; Laurent's theorem ; Singular points ; Residue ; Cauchy's residue theorem ; Evaluation of residues ; Contour integration ; Conformal mapping.

Section B (Numerical Analysis)

Solution of algebraic and transcendental equations by : Graphical method ; Regula Falsi method ; Newton-Raphson method ; Iteration method. Geometrical singnificance of Newton Raphson method and Iteration method ; Convergence of iteration and 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 Picard's method and Euler's method ; Runge-Kutta's method for solving differential equations : Numerical solution of partial differential equations.

Part B

Section A (Fourier series, and Partial differential equation and Harmonic analysis)

Fourier series ; Convergence of Fourier series ; Fourier analysis ; Fourier integral ; Introduction—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 equations ; Wave equations : Particular solution with boundary and initial conditions.

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 differences and simple differences. Newton's general interpolation formula ; Lagrange's interpolation formula. Inverse interpolation by Lagrange's formula and by successive approximations. Numerical differentiation of Newton's forward and backward formulas ; Calculation of errors. Numerical integration : General quadrature formula for equidistant ordinates, trapezoidal rule. Simpson's rules. Weddle's rule ; Calculation of errors, relative study of the three rules. Gauss's quadrature formula. Legendre's polynomials. Newton Cote's formula. Principles of the least squares, curve fitting.

Math 308 Mathematics (Sessional)

3 hours every alternate week 50 marks

Sessional classes on the courses prescribed for Part A and Part B of Math 307.

Math 309 Mathematics

2 hours per week 200 marks

Part A

Section A : (Laplace transform and partial differential equation) Definition of Laplace Transform ; Elementary transformations and properties ; convolution ; Solution differential equations by Laplace transforms ; Evaluation of improper integrals by Laplace transforms. Partial differential equations ; Wave equations ; Particular solution with boundary and initial conditions.

Section B : (Fourier series and Harmonic analysis) Fourier series, Convergence of Fourier series, Fourier analysis, Fourier integral. Introduction—Laplace equation in cartesian, cylindrical and spherical co-ordinates. Cylindricai harmonics ; Spherical harmonics, Potential of a ring, Potential about a spherical surface, General properties of harmonic funtions.

Part B

Section A : (Statistics)

Frequency distribution, mean, median, mode and other measures of central tendency, standard deviation and other measures of dispersion ; Moments ; Skewness and curtesis ; Elementary probability theory and discontinous probability distributions, e.g. binomial, Poisson and negative binomials.

Section B : (Statistics)

Continuous probability distribution, e.g. normal and exponential ; Characteristics of distributions, elementary sampling theory, estimation, hypothesis testing and regression analysis.

Details of Postgraduate Courses in Mathematics

Math I

3 hours per week

Partial differential equations and their solutions. Multiple integrals.

Math II

3 hours per week

Fourier series and boundary value problems.

Math 1101

3 hours per week

Multiple integrals, advanced vector analysis, convergence of Fourier series, Fourier integral, Fourier transform.

Math 1201

3 hours per week

Boundary value problems, set theory, mathematical logic

Department of Physics

Staff

Assistant Professor and Head

K. M. Saha (On deputation from Govt. Service), *B Sc (Hons), M Sc (Phys)*

Associate Professors

Giasuddin Ahmed, (Abroad), *B Sc (Hons), M Sc (Phys), Ph D*
Md. Ali Asgar. *B Sc (Hons), M Sc (Phys), Ph D*

Assistant Professors

S. M. Nurul Momen, (Abroad), *B Sc (Hons), M Sc (Phys)*
Tofazzal Hossain, (Abroab), *B Sc (Hons), M Sc (Phys)*
Md. Asadullah Khan, *B Sc (Hons), M Sc (Phys)*
Dil Afroze Ahmed, *B. Sc (Hons), M Sc (Phys)*
Nazma Zaman, *B Sc (Hons), M Sc (Phys), Ph D*

Lecturers

Swapan Kumar Gayen, *B Sc (Hons), M Sc (Phys)*
Md. Razaul Karim Siddique, *B Sc (Hons), M Sc (Phys)*

The department in the University provides the basic knowledge in Physics to the undergraduate students of both engineering and architecture faculties. This is carried out through theoretical and experimental courses. This department also provides courses in Metal Physics to postgraduate students of Metallurgical Engineering Department.

The department is well-staffed and also maintains adequate laboratory facilities. The teachers of the department are engaged in many research projects. There is special collaboration in the field of solid state physics between the department and the Atomic Energy Commission and Dacca University. A research programme for the development of magnetic materials is now being pursued. Teachers of this department have published several standard text books.

Details of courses offered in the Faculty of Engineering and Faculty of Architecture are given under Common First year Course and Department of Architecture, respectively.

Department of Architecture

Staff

Associate Professor and Head

M. A. Muktadir, *B Sc Engineering (Civil), B Arch, Ph D*

Associate Professors

Meer Mobashsher Ali, *B Sc Engineering (Civil), B Arch, M Phil*
Md. Habibur Rahman, *B Arch, M Phil*
Iftekharuddin Mohammad Choudhury, *B Arch, M Phil*

Assistant Professors

Shamsul Wares, *B Arch*
Md. Khairul Enam, *B Arch*
Teenkari Barua, *B Arch*
Rafiqul Hussain, *B Arch*
Md. Mostafa Kamal, *B Arch*
Faruq Ahmadullah Khan, *B Arch*
Haroon-ur-Rashid, *B Arch*
Khaleda Rashid, *B Arch*

Lecturers

Shaheen Choudhury, (Abroad). *B Arch*
Abu Hyder Imamuddin, *B Arch*
Syeda Zarina Uddin, *B Arch*
Iftekhar Mazhar Khan, *B Arch, Postgraduate Dipl*
Shaheda Rahman, *B Arch*

The Department of Architecture, is the only one of its kind in Bangladesh imparting formal education and training in architecture, in performing a very significant role in the life of the nation. The contribution of the Bangladesh University of Engineering and Technology in

the national development efforts is well recognised. In 1961, the introduction of architectural education side by side with the engineering education was definitely a significant step forward in the history of this institution as well as the nation.

The department of architecture was started with only one foreign teacher and six students. Within a few months, three more foreign teachers joined the department. These four teachers continued to bear the main teaching load upto 1965 being assisted by part-time teachers in the related subjects. In the mean while seven local students, six of whom were civil engineering graduates, were sent to U.S.A. for education in architecture. In 1966, six of them returned and began to teach in the department. From then on a number of architects trained in the country and abroad came to join the department and gradually the local teachers were able to take over the entire teaching responsibility.

The present curriculum of the department lays emphasis on Humanities and Social Sciences alongwith Arts, Physical Sciences and Engineering. The understanding of human being as a social creature, his perception of the environment, his hopes, aspirations, capabilities and limitations — all these have been accepted as the principal guiding factors for creation of the built environment. Accordingly, present day architectural education is deeply concerned with studies and investigation of the determinants of architecture and objective analysis has become a very important aspects of architectural education in modern times.

The department of architecture currently offers a 5 year program in architecture leading to the degree of Bachelor of Architecture (B. Arch). From the first upto the fourth year, students are given a series of courses and design exercises aimed at developing a thorough understanding of the fundamentals of architecture and acquiring design skills through progressively complex exercises. In the fifth and final year each of the students chooses a topic of current national physical development concern and under special guidance of members of the staff prepares a proposal for detailed investigation of some chosen aspects of the topics. In about ten to twelve weeks, the investigation is completed and a report is produced which becomes the basis for a detailed design exercise.

The following are some of the projects carried out by the students of this department recently :

Cultural Institute for Tribal People, Rangamati

The Tribal Habital, Chittagong Hill Tracts Urban Squatters.

An evaluation of the Performance of the Housing for Low Income Group at Mirpur and Investigation into Possible Alternatives for Similar Project.

Women's Welfare Centre

Central Campus Area of Metropolitan Dacca.

Central Shishu Academy

Central Interdistrict Bus Terminal

Islamic Centre at Chittagong.

In each case, the project involved the development of the concept and criteria for design through investigation of the physical and socio-economic aspects of the problem and preparation of a design solution.

There is an unquestionable need for research and investigation in connection with the physical development program of the nation and the responsibility of the department of architecture in this context is heavy and grave. The current undergraduate program cannot provide for substantial research and investigation activities because of the volume of necessary course work and design exercises. For proper planning and design of the rural and urban settlements in Bangladesh, extensive research and investigations are necessary and a systematic and scientific approach of investigation is called for. To incorporate this requirement substantially and meaningfully in the architectural education in Bangladesh, it is hoped that the department will be above to open post-graduate studies in architecture with emphasis on research in the near future.

Details of the Courses in Architecture

First Year

SOCIAL AND ENVIRONMENTAL STUDIES I

Hum 111 Sociology and Psychology

2 hours per week 200 marks

Sociology : Introduction to sociology, principles of human relations, contribution of biology, geography, group life and culture to development of 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.

ARCHITECTURAL SCIENCE I

Arch 121 Climate and Design I

2 hours per week 200 marks

Introduction, global climatic factors, elements of climate, measuring the elements and recording the data ; Classification of climates, tropical climate, site climate.

Math 122 Mathematics

2 hours per week 200 marks

Differential calculus, integral calculus, co-ordinate geometry, solid geometry.

Phy 123 Physics

2 hours per week 200 marks

Fundamentals of mechanics and properties of matter ; Heat, sound, electricity and light.

THEORY AND HISTORY OF ARCHITECTURE I

Arch 131 Design I (Theory)

1 hour per week 100 marks

Architecture, design, elements of design, principles of design, philosophies of architecture, design methods.

Arch 132 Art and Architecture I

2 hours per week 200 marks

A general survey of world art and architecture. Study of the various arts and their relationships to architecture through the ages.

CONSTRUCTION AND STRUCTURE I

Arch 141 Construction Details I

1 hour per week 100 marks

Simple constructions ; Foundations, floors, walls, roofs, doors and windows.

Sh 142 Carpentry and Metal Works

3 hours per week 100 marks

Use of hand tools and machines for basic wood framing and simple cabinets of wood and other materials, making of simple furniture.

STUDIO WORK I

Arch 191 Design I

9 hours per week 450 marks

Freehand drawing in various media, basic design problems, room arrangements, single-cell building design.

Arch 192 Architectural Graphics

6 hours per week 300 marks

Relationship of mechanical and free hand drawing, study of scale, composition, drafting, lettering, execution of mechanical and free hand perspective, shadows and reflections in perspectives both mechanical and freehand.

Second Year

ENVIRONMENTAL STUDIES II

Arch 211 Basic Planning

1 hour per week 100 marks

History of settlements ; Basic planning theories, introduction to community, city and regional planning; Problems of planning in Bangladesh.

ARCHITECTURAL SCIENCE II

Arch 221 Climate and Design II

1 hour per week 100 marks

Sun-built form relationships, wind-built form relationships, precipitation-built form relationships, design applications.

THEORY AND HISTORY OF ARCHITECTURE II

Arch 232 Art and Architecture II

2 hours per week 200 marks

Art and Architecture in the Indo-Pak-Bangladesh subcontinent—ancient to modern.

CONSTRUCTION AND STRUCTURE II

Arch 241 Construction Details II

1 hour per week 100 marks

Stair cases, bath rooms and toilets ; Introduction to large span roofs and framed buildings, economic and technical feasibility of different common structural systems, problems of water proofing.

Arch 243 Building and Finish Materials

2 hours per week 200 marks

Concrete, steel, brick and wood-nature and use. Terrazzo, plaster, roofing glass, paint, insulation and plastic—nature and use. Detail sketches.

STUDIO WORK II

Arch 291 Design II

12 hours per week 600 marks

Simple buildings with simple functions, layouts of housing, markets etc., with emphasis on circulation.

Arch 292 Photography and Graphic Reproduction

3 hours per week 100 marks

Fundamentals of photography, art of taking good photograph, developing and printing of films, principles of composing good photographs of buildings and interiors.

Arch 293 Graphic Art and Sculpture

6 hours per week 200 marks

Drawing and painting, relationship to architectural presentation. Studies in clay, wood, metal, etc.

Third year

SOCIAL AND ENVIRONMENTAL STUDIES III

Arch 311 Advanced Theories of Planning

1 hour per week 100 marks

Physical Planning as a space dimension of national economic planning ; economic development and regional growth ; economics, space, nature and principles of region.

Theories and principles of resource use and their limitations.

Arch 312 Urban Design

1 hour per week 100 marks

Development of urban spaces through history. Principles and techniques for design of the city environment with special attention to its perceptual form, circulation and urban renewal.

ARCHITECTURAL SCIENCE III

EM 321 Electrical and Mechanical Equipments for Buildings

2 hours per week 200 marks

Electrical equipments, electrical installations.
Mechanical equipments, heating, cooling, ventilation ; Vertical transportation.

Arch 322 Architectural Acoustics

1 hour per week 100 marks

The physiology of sound perception. generation and propagation of sound, behaviour of sound in closed spaces, auditorium acoustics ; Noise measurement and control.

THEORY AND HISTORY OF ARCHITECTURE

Arch 332 Art and Architecture III

2 hours per week 200 marks

Modern art and architecture in the 19th and 20th centuries.

CONSTRUCTION AND STRUCTURE III

CE 321 Structure III

2 hours per week 200 marks

Fundamental strengths of materials, types of stresses and failures, the concept of factor of safety, shear and bending moments in beams, stresses and deflection in beams, fundamentals of column.

Arch 342 Specifications and Cost Estimating

1 hour per week 100 marks

Written details answering what, where, when, how, in relation to drawn details for building construction and determining the cost of construction.

STUDIO WORK III

Arch 391 Design III

18 hours per week 900 marks

Complex building problems including large public building with technical analysis.

Arch 392 Working Drawings

3 hours per week 100 marks

Details of drawings for construction of buildings, plans, elevation, sections, large scale details, schedules, etc.

Fourth year

Arch 414 Design IV,

15 hours per week 500 marks

Urban planning and design. Planning and design of towns and satellite towns, urban renewal of city blocks, slum clearance and housing, river front development, etc.

Study and design of complex multifunctional buildings in the light of modern technology, centres for different organisations such as A E C, B I D C, etc.

Arch 453 History of Architecture II

3 hours per week 300 marks

Contemporary Architecture : 20th century. Ancient to Modern architecture in the subcontinent comprising Bangladesh, India and Pakistan.

Arch 462 Physical Planning

4 hours per week 200 marks

Advanced theories of planning. Application of principles to solve problems of small and large areas.

Arch 463 Landscape Design
1 hour per week 100 marks

Site Design. Introduction to plant materials and their use. Application to design problems.

Art 413 Sculpture and Art Expression
3 hours per week 100 marks

Studies in clay. wood, metal etc.

Struc 413 Structure IV
2 hours per week 200 marks

Analysis and design of reinforced concrete and steel structures.

Fifth year

Arch 515 Design V
21 hours per week 700 marks

Advanced Architectural problems involving socio-economic. psychological and cultural aspects.

Study, analysis and design for solutions of national problems such as Rural Development, Educational facilities development. Health. Recreation and Housing facilities development, Industrial complexes, etc.

Arch 516 Professional Practice
1 hour per week 100 marks

Professional services, professional ethics, client relationships, contract and law, procedures in office and in the field.

Arch 517 Architectural Acoustics
2 hours per week 200 marks

The basic principles of sound, its propagation and transmission. The Physiology of sound perception ; Behaviour of sound in closed spaces ; Acoustic separation of spaces. Introduction to complex acoustic problems, design of auditoriums, etc. Electronic Aids.

Arch 523 Physical Planning
1 hour per week 100 marks

Physical Planning as space dimension of national economic planning ; Economic development and regional growth ; Economics, space, nature and principles of regions. Theories and principles of resource use and their limitations. Urbanisation and economic development ; Housing and urban renewal process.

Arch 541 Contemporary Art
1 hour per week 100 marks

Principles of 20th century art expression. General characteristics of 20th century art. General characteristics of oriental art.

Arch 562 Construction Management
1 hour per week 100 marks

Basic concept and principles of management development of managerial skill. Management of organization. Decision making ; Planning and control. Basic statistics. Basic Operation Research. Developing Operations Plans, Bidding and sub-contracting. Use of Operation Research Techniques.

Struc 514 Structure V
2 hours per week 200 marks

Analysis and design of prestressed concrete structures.
Advanced studies in systems of architectural structures.

Department of Urban and Regional Planning

Staff

Associate Professor and Head

Golam Rahman, *B A (Hons), M A, M C R P*

Associate Professor

Ajmal Hayat Ahmed, *B Sc Engineering (Civil), B Arch, M Arch, M C P*

Assistant Professors

A.S.M. Mahbub-un-Nabi, (Abroad), *B Sc Engineering (Civil), M P P*
Sayed Abu Hasnath, *B A (Hons), M A (Econ), M P P*
Meer Shahidul Islam, *B Sc Engineering (Civil), M P P*
Hemayet Hossain, *M Sc (Geography), D E D*

Lecturers

A.S.M. Abdul Quayum, *(Trainee), B Sc Engineering (Civil)*
Rukunuddin Ahmed, *(Trainee), Diploma in Civil and Arch, M A (Econ)*

Department of Urban and Regional Planning as a Discipline

Urban and regional planning is concerned with the rational organisation and use of land, resources and environment, based upon a knowledge of social institution, technology and insight into man's aspiration and opportunities. It applies intelligent foresight to the development of physical environment of cities, towns, villages, regions and nation at large. It encompasses both the understanding of urban environment, primarily known as city planning as well as the recognition of economic and social forces of rural and regional development. Urban and Regional planning makes its contribution to the integrated application of knowledge from diverse fields. The design principles of architecture and civil engineering are combined with a thorough introduction to the concepts, methods and findings of these basic social sciences, such as economics, geography, sociology and government. The department of

urban and regional planning was established in Bangladesh University of Engineering and Technology in 1961 under the Faculty of architecture and planning. But the academic program began with the return of three teachers in training from abroad with eight graduate students in 1968. Offering country's first degree granting program in urban and regional planning, it is a two year school whose standard is set equal to schools of planning all over the world.

The Master of Urban and Regional Planning (M.U.R.P.) Degree

The department offers graduate work leading to the degree of Master in urban and regional planning. The department does not offer an undergraduate program at the moment. The typical graduate program requires two years full-time study divided into four semesters. The course is open to students with varying backgrounds viz, architecture, engineering, economics, sociology and geography. The candidate will usually be expected to complete satisfactorily the program consisting of 64 credit hours study including a thesis work of 8 to 12 credits.

Role and Scope in National Activities

In a country like ours where the land-man ratio is extremely low and worsening, the capacity of our land to maintain and absorb the fast increasing population in our countryside is also declining progressively. This decline in the retentive capacity of our rural areas is bound to push more people out of the rural section leading to acute urban problems of deteriorating living conditions, squatter settlements and overloading of urban services. Simultaneously, the progressively decreasing per capita availability of agricultural land will generate new problems of a considerable magnitude in the rural areas in terms of housing, housing facilities and services and utilities and other problems related to the rural component of human settlement. Thus the necessity for rational and optimum use of every inch of our land inescapably points to the need for complete physical planning coverage of the country and to the need for preparation of a national physical planning development strategy. The major tasks for physical planning institution are preparation of a national physical planning and development strategy, regional development, plans for all planning regions including metropolitan, regional, development planning and urban development plans for municipalities, urban centres and industrial complex.

The real constraint in this field is shortage of qualified technical manpower. Physical planning organisation which exist now in the form of Urban Development Directorate under the ministry of public works and urban development, physical planning and housing section in planning commission and other development authorities like DIT, KDA,

CDA, RDA etc, all are running acute shortage of trained physical planners and as a result, are not capable of handling the total physical planning problems and of attaining the objectives of physical planning. The real situation is blatantly reflected in the following statement in The First Five-year plan report of the peoples Republic of Bangladesh. "The acute shortage of qualified planners either in the public or private sector compels us to include only a minimum programme which can be handled by the local planners with possible international technical assistance."

The Five year plan also suggests that adequate and immediate steps must be taken to enhance the capabilities of the department of urban and regional planning of the university of engineering and technology, by way of obtaining teachers from abroad on a priority basis, and to encourage larger involvement, certain incentives in the form of scholarships, better job opportunities etc. are to be provided. In addition, a number of professionals in the field should be sent abroad for advance training so that they can eventually replace the foreign experts.

Details of Postgraduate Courses in Urban and Regional Planning

(The three numbers within parentheses immediately after the title of the course show (a) Lecture hours per week; (b) Studio or sessional hours per week and (c) Number of credits, respectively.)

Plan 6101 History of Planning (2 : 0 : 2)

Early human settlements. Origin and evolution of cities; Their relation to resources, trade routes and communications. Functions of governmental cities; The industrial city, the commercial city, the city as a centre of government and administration. Growth of the cities and their relation to the region. Evolution of city planning. Development and planning of cities in the (a) ancient world (b) medieval world and (c) modern world. The role of cities in civilisation, the historical origins of their institutions and physical form.

Plan 6102 : Planning and Social Sciences (2 : 0 : 2)

Physical planning as space dimension of national economic planning; Economic principles governing the structure, growth and development of living environment; The concept of urbanisation and its process of development; Urban pathoes—a systematic study; Social planning and the people's participation. Theory of location space for socio-economic and physical development. Rural urban problem, migration and settlement management. Organisation of socio-economic space in the process of comprehensive national planning.

Plan 6103 Urban Planning and Design Fundamentals (2 : 0 : 2)

Distinction between urban add rural areas. Component of urban environment, residential, commercial, industrial, recreational, institutional. Urban periphery and circulation system. Spatial organisation for development and redevelopment of residential, commercial, industrial and recreational areas. Neighbourhood planning and area planning techniques. Functional organisation of the elements of town centre.

Plan 6104 Nature and Principles of Human Settlement (2 : 0 : 2)

Nature of human ecology. Basic concepts of urban ecology ; Theories of urban ecology ; Ecology and spatial movement ; Ecology and changing residential pattern ; the growth, structure and function of human settlement from the point of view of social sciences. The rural urban fringe. The size, distribution, spacing and hierarchial orders of urban settlements. The ecological process : Segregation, decentralization, dispersion, integration, invasion and succession. Individual responses to physical socio-cultural environment. Social organization and power structure in relation to social change and social mobility. Investigation of methods of solving social problems through planning. Analysis of social stratification and community tension in urban community.

Plan 6105 Traffic and Transportation Planning (2 : 0 : 2)

Functional requirement and interrelationship of all means for the movement of people and goods as they affect the physical pattern of the community. Characteristics of transport systems—road, rail, water and air, public and private. The transport planning process. Interrelationship of land use, travel and transport system, environmental capacity. Concept and design. The urban and regional road pattern. The various types of roads and streets ; their alignment, widths, gradients construction and layout. The design of road and junctions. Derivation of design standards from traffic considerations. Parking standards, systems, policies and controls.

Plan 6106 Quantitative Methods in Planning Analysis (2 : 0 : 2)

Statistical data collection, reduction and representation. Types of observation, frequency distribution, measures of central tendency. Measures of dispersion. Shape of frequency curves. Graphical representation of statistical facts. Elementary probability. Laws of addition and multiplication. Binominal, Poisson and normal distributions. Concept of correlation and regression. Ideas of linear interpolation and extrapolation. Population projection, Newton's forward and backward formula. Simple test of significance—mean, variance and correlation co-efficient tests.

Plan 6107 Studio : Graphic Techniques and Representation (0 : 6 : 2)

Use of graphic techniques to record and to express ideas ; Freehand drawings, elementary drafting, mapping, graphic representation. Study of scale, composition, perspectives, shadows and reflections in perspectives ; Three dimensional models. The common principles underlying these techniques, and their use as tools in analysis (for entering students without background in design fields).

Plan 6108 Introduction to Surveying Techniques and Research Methods. (0 : 6 : 2)

(a) Plane surveying : Classification and importance of surveying ; Chain surveying, theodolite surveying, plane table surveying, levelling. Contouring. Study of aerial photographs. (b) Techniques of land use survey (c) Techniques of socio-economic survey : Elementary socio-economic survey methods ; Purpose, advantage and relation to planning.

Plan 6201 Theories of Planning (Urban and Regional) (2 : 0 : 2)

Basic concepts and theories of planning ; Utopian concepts of urban planning. Theory of new town planning and urban expansions. Urban planning methods and techniques ; Master plan, development plan. Subdivisional planning and zoning. Objectives and scope of comprehensive physical planning applied to urban and rural areas. The relationship of physical planning to the general theory and process of planning. The expanding role of physical planning and relationship to governmental organization for administration in developed and developing countries.

Plan 6202 Principles of Land Use and Land Economics (2 : 0 : 2)

Principles of land utilization—Demand for and supply of urban and rural land. Determinants of land use. Theories of urban growth and development. The study of urban activity systems. General principles of location requirements, location standard and space requirements.

Economics of land utilization. Land economic problems. Physical characteristics of land. Land values and appraisal. Factors influencing urban land values. Improtance of land economics in policy formulation.

Plan 6203 Urbon Planning and Design Fundamentals (2 : 0 : 2)

The design of new towns and town expansions. The urban renewal process. Methods of urban renewal and central area redevelopment, Planning of industrial estates, townships, satelite town and urban periphery. The role of plan organisation ; Spatial relations ; Symbol, scale, view, movement, panorama, light, colour, shade and details ;

Composition, scale, proportion, harmony and contrast in the creation of urban spaces, building groups and building facades.

Plan 6204 Regional Development Planning and Resource Use (2:0:2)

Definition of region and regionalism. The nature of regions. The factors determining a region. The influence of natural and cultural elements on regional development ; Climate, topographical conditions, population, land use, agriculture, industry, power and transportation, resource and soil conditions. City and region ; Urban and rurual settlements—Trends and characteristics of development.

Regional economy and regional order. Economic development vs. regional growth. Regional distribution of public investment—dispersion vs. concentration ; Balance vs. Imbalance ; Growth vs. Welfare. Examination of resource endowment and regional growth. Export activities and residentiary activities. The economic base of cities ; The basic and non-basic concept.

Plan 6205 Housing and Community Development (2 : 3 : 3)

Definition of housing—its influence on man, society and environment. The meanning and scope of housing problems ; General problems of housing in Bangladesh ; Specific problems of private enterprise, government and consumer ; Evaluation of economic, social, design, administrative and political problems. House ownership. Land values, building codes, dwelling ; Minimum standards for adequate housing, crowding and healthful housing ; Social and hygenic requirements and density in housing. Housing policies in developed and developing countries.

Plan 6206 Rural Planning (2 : 0 : 2)

Distinction between rural and urban areas. Historical background of rural settlements—Trend of development. Physical nature, characteristics, extent and component of rural environment. Rural culture, social transition and social characteristics of rural communities. Study of resources in rural areas. Land use pattern in rural areas. Physical, social and economic problems in connection with the planning of settlement patterns, land use controls, housing and basic community facilities. The concept of integrated area development in rural planning.

Plan 6207 Studio : Urban Planning (0 : 6 : 2)

Survey, analysis and design methods and practices in comprehensive planning ; Land use, circulation and other components of the city or metropolitan general plan ; Relationship of planning to implementation techniques, zoning, urban renewal, etc. Seminars, coordinating planning process with public policy and plan implementation.

Plan 6208 Studio : Rural Planning (0 : 3 : 1)

Practical application of theoretical principles for the development of rural communities. planning and development of urban villages.

Plan 6301 Planning Laws and Administration (2 : 0 : 2)

Enabling legislation ; Eminent domain ; Police power. Planning administration and laws in U. K. and other advanced countries. Development plans. The meaning of development. The control of development including planning permission, development orders, special forms of control. The enforcement of planning controls. Purchase notices. New towns development.Compensation and betterment problems including compensations for restrictions on urban development and urban renewal practice.

Plan 6302 Housing and Site Planning (1 : 0 : 1)

Principles of housing design and layout. The influence of orientation. The different types of housing and their relation to each other. The fundamentals of community buildings and the factors which influence their planning. Problems emphasizing physical development of specific sites involving population densities, public utilities, traffic, building grouping, land use and circulation

Plan 6303 Landscape and Urban Design (2 : 3 : 3)

Landscape—Influence of natural factors of geology, soil and climate. Conscious design of parks and gardens and open spaces in towns, Composition, scale, proportion, harmony and contrast in the creation of urban spaces, building groups and building facades. Principles and techniques for the comprehensive design of the city environment with special attention to its perceptual form. Development of the form of urban environment—influence of utopian and ideal concepts. The relation between city form and community objectives ; The visual plan as part of the total planning process. Basic design principles of space, scale and circulation applied to the physical pattern of cities.

Plan 6304 Regional Development Planning and Resource Use (2 : 0 : 2)

Theories and principles of resource use and their limitation in regional development. Human and non-human resources. Movable and immovable resources. Changes in the concept of resources and their uses. Problems of resource allocation and efficient distribution of activities. Review of resource use policy in the U.S.A., U.K. and some developing countries with special emphasis on Bangladesh.

Plan 6305 Studio : Housing and Area Planning Techniques (0 : 6 : 2)

Practical application of theoretical principles for the development of housing projects. Problems emphasizing physical development of specific sites involving population densities, public utilities, functioning street patterns, building grouping, land use, site engineering,

architectural forms, gardening and landscaping. Problems dealing with neighbourhood structure, community facilities and urban renewal.

Plan 6306 Seminar (2 credits

Central area Redevelopment ; Urban renewal ; Migration and squatter : Slum ; Neighbourhood planning ; New town design ; Housing layouts ; Economics of housing ; Housing policy ; Regional planning in Bangladesh ; Village planning ; Transportation planning ; Public health and public utility services ; Planning legislation ; Planning techniques ; Design making.

Note : *Each student will submit one seminar paper and participate in at least three other seminars. A start will be made on thesis.*

Plan 6000 Thesis (4 credits)

(To be continued for one full academic year)

Selection of thesis subject and preparation of thesis outline. Independent study supplemented by frequent individual conferences with staff members.

Plan 6401 Planning Laws and Administratson (2 : 0 : 2)

Planning laws, planning infra-structure and planning administration in Bangladesh. Municipal administration ordinance ; Town improvement act ; Bengal Building Construction Act ; Land Acquisition Act ; Relevance with physical planning. The meaning of development ; The control of development including planning permission ; Development orders ; Purchase notice ; Special forms of control ; The enforcement of planning controls ; Compensation and betterment problems in reference to Bangladesh.

Plan 6402 Traffic Planning and Planning of Utility Services (2 : 0 : 2)

Traffic planning studies ; Characteristics of variation of travel demand ; Prediction of future demand and variation ; Trip generation and attraction by land use ; Travel distribution ; Assignment to travel mode. Road capacities, one-way street systems and traffic management techniques, capacity restraints, highway finances, provincial and central legislation. Water supp'y, sewerage disposal and land drainage and other utilities such as electricity, gas, etc. and their relationship with general development.

Plan 6403 Studio : Regional Planning (0 : 6 : 2)

Practical application of city and regional planning theory and principles to specific and representative case studies to towns, cities and regions. Group projects regarding the physical planning of the region. Work will include field research, design, analysis and presentation of workable recommendation as to appropriate objectives and action for solutions.

Plan 6000 Thesis (4 to 8 credits)

(*Continuation from third semester*)

Independent study supplimented by frequent individual conference with staff members.

Plan 6404 Planning Process and Systems Analysis (2 : 0 : 2)

Introduction to systems approach ; Society as a system ; Urban, rural and regional system ; Need for systems analysis in planning ; Planning goal and systems structure ; The systemic planning process. Planning in the control of complex systems ; System simulation—modelling ; System guidance, control and review.

Plan 6405 Quantitative Method in Planning Analysis (0 : 6 : 2)

Demographic rate and ratio ; Population theories and projection and census study, Sampling Techniques ; Random and stratified sampling. Estimation of mean, proportion, their standard errors. Urban and rural Demographic pattern in Bangladesh. General ideas about different stages of survey operation. Extraction of data from different official records and publications, preparation of forms for recording data. Acquaintance with contents of important statistical publications of Bangladesh and of the United Nations. Introduction to different types of mathematical curves and areas under curves in cartesian and polar co-ordinates.

Plan 6406 Rural Planning (2 : 0 : 2)

Agriculture in national economy and agriculture planning. Demography—population trend and growth in rural areas. Industry in rural areas. Cooperatives, capital and the rural community. Essential prerequisites of community. Physical and economic problems in the rural community. Electricity in rural development. Better housing in the villages. Small rural towns ; Small water sheds as the unit of planning. Rural recreation ; Rural planning as basic arrangement to offer minimum urban amenities to the rural community. Village government and the planning institutions. Responsibility of the state in rural planning.

Plan 6407 Advanced Theories of Urban Planning (2 : 0 : 2)

Theories dealing with current planning problems ; Problems characteristic of the large city including traffic, transportation, redevelopment, conservation, recreation and zoning. Problems arising in sub-urban areas adjacent to cities and arterial highways. Analysis of the form of urban physical environment and effect of this form on basic human objective.

Department of Humanities

Staff

Associate Professor and Head

Momtazuddin, *M Com*

Lecturers

Sufia Khatoon, *B A (Hons), M A*
Mir Nazmul Karim, *B Com (Hons), M Com*
Khurshid Ahmed, *B A (Hons), M A*

This department offers courses in English, Economics, Sociology, Accountancy, Industrial Management and Psychology in the undergraduate classes in both Engineering and Architecture faculties. When the students graduate and join professional life, this background imparted in different humanities subjects helps them to encounter various social and management problems.

This department, in addition to its staff, often takes the help of eminent scholars through part-time teaching. The department of humanities is keen to expand and offer courses in different subjects if and when necessary.

Hum 201 Government and Sociology

2 hours per week 150 marks

Part A

Government—Some basic concepts of government and politics ; functions, organs and forms of modern state and government. Socialism ; Fascism ; Marxism ; U.N.O. Sociology—Its scope, social evolution and techniques of production, culture and civilization, social structure of Bangladesh ; Population and world resources. Oriental and occidental societies ; Industrial revolution.

Note : *Courses offered in first year engineering class are given under "Common First Year Course".*

Part B

Government—Government and politics of Bangladesh, some major administrative system of developing countries ; Local self-government.

Sociology—Family, urbanization and industrialization, urban ecology ; Co-operative and socialist movements ; Rural sociology.

Hum 203 Accounts and Sociology

2 hours per week 150 marks

Note : *This paper consists of two distinctly different subjects and it is obligatory to pass each of the subjects separately.*

Accounts

Part A

Basic Accounting principles. Different kinds of cheque. Cash book ; Petty cash book. Elements of costs. 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.

Sociology

Part A

Its scope. Social evolution and techniques of production. Culture and civilization. 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 movemetns. Rural sociology.

Hum 205 Accountancy

2 hours per week 150 marks

Part A

Basic accounting principles. Different kinds of cheques. Cash Book, Petty cash book. Cost accounting : Elements of cost accounting for direct and indirect costs ; Inventory records ; Overhead allocation : Cost sheet.

Part B

Cost-price-volume relationship ; Computation of break-even point ; Abnormal loss and gain. Standard costing : Cost variances ; Opportunity cost ; Joint and by-product costing.

Hum 301 Indurtrial Management

2 hours per week 200 marks

Part A

Authority and responsibility ; Administration, management and organisation–Scientific management and organisation ; Time and motion study ; Learning curve.

Organisation structure : Principles of organisation ; Organisation 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—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 stand-by machine, control of maintenance function. Production control in intermittent and continuous manufacturing industry ; Objectives and functions of production control ; Supplementary planning ; Scheduling ; Dispatching ; Assembly line control. Forecasting ; Utility and various methods ; Coordination between sales and manufacturing ; Manufacturing economics.

Purchasing procedure : Inventary control—Need and methods of control ; Factors affecting inventary 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 ; Allowances in production standards.

Hum 303 Development Economics and Accounts

2 hours per week 200 marks

Part A

Economics of under development, interdependence of developed and underdeveloped economics, necessity of economic development ; Underdeveloped economics, characteristics, vicious circle of poverty ; The meaning of economic development, the stages of economic growth, determinants of economic growth, economic factor, non-economic

factor ; Strategy of economic development, big push, balanced, unbalanced big push, balanced vs. unbalanced. Investment criteria, marginal social productivity, capital output ratio. Basic accounting principles, different kinds of cheques, costing, elements of costs, accounting for direct and indirect costs, inventory control and stores records, overhead allocation, preparation of cost sheets and statements.

Part B

Role of government in economic development. the welfare state, economic planning, planned and unplanned economic plan, features of a plan ; Forms of planning—Total and partial, structural and functional, centralised and decentralised ; Planning by direction and planning by inducement. Financing of economic plan, taxation, borrowing, deficit financing, objectives of planning in Bangladesh. Planning in Bangladesh, first five year plan of Bangladesh. Price-cost-volume relationships, computation of breakeven point. Budgeting and budgetary control, how to forecast, preparation of sales and production budgets ; Standard costing, computation of sales variances. Oportunity costs. joint and by product cost.

Hum 305 Industrial Law, Sociology and Accounts

3 hours per week 300 marks

(Three subjects : Each subject to be passed separately).

Industrial Law

100 marks

Part A

Industrial law in Bangladesh—Various legislation affecting labour : Factories Act ; Industrial Relations Ordinance ; Payment of wages ; Legislation regarding employment in industry, agriculture, mines.

Part B

Workman's Compensation Act ; Labour policy of the State ; ILO and other international body affecting labour welfare ; Employment of Labour (Standing Order) ; Trade union ; Employment in shops and establishment.

Sociology

100 marks

Part A

Its scope. Social evolution and techniques of production. Culture and civilization. Social structure of Bangladesh. Population and world resources, Oriental and occidental societies. Industrial revolution.

Part B

Family—Urbanization and industrialisation. Urban ecology, co-operative and socialist movements. Rural sociology.

Accounts

100 marks

Part A

Basic Accounting principles. Different kinds of cheque. Costing : Elements of costs. Accounting for direct and indirect costs. Inventory control and stores records. Overhead allocation. Preparation of cost and statements.

Part B

Price-cost-volume relationships. Computation of break-even point. Budgeting and budgetary control : How to forecast. Preparation of sales and production budgets. Standard costing : Computation of cost variances. Computation of sales variances. Opportunity costs. Joint and by-products costs.

Hum 307 Industrial Management and Government

2 hours per week 200 marks

(Two subjects ; Each subject to be passed separately)

Industrial Management

100 marks

Part A

Authority and responsibility ; Scientific management and organisation ; Time and motion study. Organisation structure ; Principles and types of organisation; Span of control ; Policies and planning ; Management and decision making ; Learning cruve. Analytical methods in management ; Linear programming ; Waiting line ; Net work analysis ; Arrow diagram and critical path. Personnel management ; Selection and recruitment of employees ; Interview and indoctrination ; Training and its types ; Industrial relations. Wage and salary administration. Job-evalution and meritrating. Statistical quality control.

Part B

Plant layout ; Layout of physical facilities ; Transportation and storage ; Material handling. Maintenance; Maintenance policy ; Planning and control of maintenance action ; Turn-around or stand-by machine. Forecasting—Utility and techniques ; Coordination between sales and manufacturing ; Manufacturing economics. Purchasing procedure ; Inventory control ; Usefulness and methods of control ; 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. Marketing and procurement function in an organisation.

Government

100 marks

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.

Hum 309 Social Studies

2 hours per week 200 marks

Sociology

100 marks

Principles of human relations with study of contributions of biology, geography, group life and culture to development of personality. Invention and social evolution.

Psychology

100 marks

Principles of human behaviour. Motivations of behaviour and mechanisms of adjustment of conflict.

Hum 311 Industrial Law, Accounts and Development Economics

3 hours per week 300 marks

(Three subjects : Each subject to be passed separately)

Industrial Law

100 marks

Part A

Industrial law in Bangladesh—Various legislation affecting labour ; Factories act. ; Industrial relations ordinance ; Payment of wages ; Legislation regarding employment in industry, agriculture, mines.

Part B

Workman's Compensation Act. ; Labour policy of the state ; ILO and other international body affecting labour welfare ; Employment of labour (Standing order) ; Trade union. Employment in shops and estsblishment.

Accounts

100 marks

Part A

Basic accounting principles. Different kinds of cheque. Costing : Elements of costs. Accounting for direct and indirect costs. Inventory control and stores records. Overhead allocation. Preparation of cost sheets and statements.

Part B

Price-cost-volume relationships. Computation of break-even point.

Budgeting and budgetary control ; How to forecast. Preparation of sales and production budgets. Standard costing ; Computation of cost variances, Computation of sales variances. Opportunity costs ; Joint and by product costs.

Development Economics

100 marks

Part A

Economics of underdevelopment. Inter-dependence of developed and under developed economics. Necessity of economic development ; Under developed economics—Characteristics, vicious circle of poverty. The meaning of economic development. The stages of economic growth. Determinants of economic growth—Economic factor, non-economic factor. Strategy of economic development. Big push, balanced, unbalanced big push. Balanced vs. unbalanced. Investment criteria, marginal social productivity, capital output ratio.

Part B

Role of Government in economic development ; The welfare state. Economic planning, planed and unplanned economic features of a plan. Forms of planning, total and partial, structural and functional, centralised and decentralised. Planning by direction and planning by inducement. Financing of economic plan-Taxation-Borrowing-Deficit financing.

Objectives of planning, objectives of planning in Bangladesh ; Planning in Bangladesh—First five year plan of Bangladesh.

Hum 411 Social Studies III

2 hours per week 200 marks

Logic

100 marks

Introduction to inductive and deductive logic. Thought, propositions, syllogisms. fallacies, cause, hypothesis, analogy.

Philosophy

100 marks

Nature of philosophic inquiry, relationship of philosophy to religion, science, history, politics and education.

Hum 413 Speaking and Seminar

1 hour per week 100 marks

Speech training for technical, professional students. Group discussions. Parliamentary procedures.

Hum 516 Accounting

1 hour per week 100 marks

Part A

Different kinds of cheques. Costing : Elements of costs. Direct and indirect costs. Accounting for direct and indirect costs. Stores procedure. Inventory control. Overheads allocation. Cost sheet.

Part B

Break-even analysis. Construction accounting. Budgeting and budgetory control. Standard costs—Computation of cost. Variances.

Workshops

Staff

Chief Foreman Instructor

Md. Fazlul Huq. *Dip-in-Mech Engineering, Dip-in-Tech Teacher's Edn*

Foreman Instructors

Akhtaruzzaman, *Overseer*
Mollah Ahmed Ali, *Dip-in-Mech Engineering, Training in I. A. S. T. T*
Zulfiqer Ali Bhuiyan, *Welding Certificate*
Nur Ahmed Khan, *Dip-in-Engineering (A. D. T.), Certificate-in-A. M. E.*

Assistant Foreman Instructors

Tofail Ahmed. *Dip-in-Mech Engineering*
Mostafa Kamal, *Dip-in-Mech Engineering*
Abdul Wadud Chowdhury, *Dip-in-Wood Working*
Fazlul Hoque Bhuiyan, *Dip-in-Mech Engineering*
Motaleb Hossain, *Welding Certificate*
Abdul Karim, *Dip-in-Mech Engineering*
Sajedur Rahman Pasha, *Dip-in-Mech Engineering*

The following are the workshops in the University

1. Machine and Fitting Shop
2. Pattern and Foundry Shop
3. Welding Shop
4. Sheet Metal Shop
5. Automobile Shop
6. Carpentry Shop

The Workshops are designed to meet the following needs :

a. Students training

b. Project work of students

c. Research work of students and staff

d. Miscellaneous jobs of the university

Besides, the workshop also undertakes specialized jobs requested by outside agencies. The workshop of this University has built up a reputation for quality work. The workshop runs under the overall supervsion of the Director of Advisory, Extension and Research Services. A new shop for repairing and maintenance of instruments and to do specialized jobs has recently been set up under this directorate.

General Information

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. Students 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.

Library

Library is the nerve center of any educational institution. The university library is housed in a four storied separate building. The library has four sections : general library, reference library, general section and rental library. The general section of the library is an issuing one, and at present has 51, 430 volumes of books in its hold. The reference library is accommodated on the first floor of the library building and has 5, 421 volumes of books and reference materials. The total number of current journals received by subscription and grants now stand at 10,000. The rental library issues text-books to students on payment of small fees.

The library is enriched by numerous special collections including a large group of proceedings of conferences on development of technical subjects. The library collects books by normal purchases and also receives donations at regular intervals from various doners e.g., Asia foundation, different embassis, etc.

Directorate of Students Welfare

The directorate of students welfare is responsible for the following activities leading to the students welfare.

a. To make arrangement for the supervision of the hostels and halls of residence for the students.

b. To supervise and arrange the program of physical education, games and sports,

c. To supervise the program of extra-curricular activities of students through the students union of halls of residences and the central students union.

d. To provide health services to students by providing the medical facilities.

e. To direct a program of counselling and guidance for students.

f. To arrange for the employment of students during vacation and placement of graduates of the university.

g. To arrange the study tours of students during vacation.

h. To organise and maintain contact with the alumni of the university.

Halls of Residence

Students of the university are provided with accommodation in five halls of residence. The halls of residence are named after five renowned personalities of the country. The names of the halls are Ahsanullah hall, Nazrul Islam hall, Sher-e-Bangla hall, Sohrawardy hall, and Titumir hall. Out of the present enrolment of 2000 students, accommodations to about 1600 students are available. To enhance the accommodation capacity more halls are expected to be constructed very soon. Already, work has started for the construction of a hall for postgraduate students and students from other countries.

All the halls of residence are provided with adequate messing and recreational facilities. Provosts are responsible for the administration of the halls and the Director of Students Welfare acts as co-ordinator of all the activities of the different halls.

Games and Sports

The athletic club of the university provides excellent facilities to students to acquire physical fitness indispensible to a professional engineer. The university maintains a beautiful play ground, squash court, tennis lawns and basket ball courts. A well equipped modern gymnasium provides ample facilities for various types of physical activities to a large number of students at a time. At present a separate Hockey field is under development and a swimming pool is in the design phase.

For improvement of the standard of games and sports, regular arrangement of coaching by experts are arranged. At present the standard of games in this university is quite satisfactory in comparison with national standard. An auditorium complex with wide range of facilities is now under constructions.

Medical Facilities

The students of the university are entitled to free attention of full-time medical practitioners. A hospital and an outdoor dispensary are maintained for the students. The out patient department is staffed with four full-time general practitioners. Serious cases of illness, if required, are referred for investigations and treatment by specialists outside.

Both the curative and the preventive aspects are attended by the medical section of the university. In the preventive side vaccination and innoculations are provided at regular intervals.

Industrial Tours and Training

In order to acquaint the students with the problems of the industry and other public works, industrial tours are arranged by all departments. A practical training scheme for a period of six weeks for students in final year engineering is also undertaken every year. University bears part of the maintenance cost of the students during the training period. Some organisations have been found to be sufficiently enthusiastic about the scheme and provide the students with maintenance allowance. The employer in all cases is requested to keep a record on the performance of the students and the students are further tested by the faculty on their ruturn from the training.

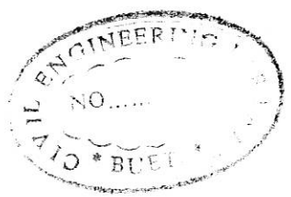
Scholarships and Awards

The university offers scholarships and stipends to deserving students. Government Scholarships awarded for Higher Secondary Certificate result are tenable at this university. Besides, students can avail themselves of other scholarships such as those offered by the Directorate of Technical Education and local councils.

The university offers prizes and medals for students who pass with distinction. Students securing highest marks in the faculty of engineering and the faculty of architecture and planning may be offered gold medals subject to satisfying other conditions.

The conditions for elligibility to different scholarships and awards may be obtained from the office of the director of students welfare or of the Registrar.

The university offers a number of fellowships and teaching assistantships for postgraduate studies leading to the degrees of M Sc MURP and Ph D. For all matters regarding these awards one can write to the Director, Advisory, Extension and Research Services.



Extension Services

Institute of Flood Control, Irrigation and Drainage Research

In recognition of the great importance of research in flood control, irrigation and drainage in the country, Institute of Flood Control, Irrigation and Drainage Research was established in July 1974. The specific aims and objectives of the Institute are :

a. to carry out basic research as applied to river mechanics, fluid mechanics, hydraulics, hydrology and pollution control.

b. to undertake research relating to behaviour of rivers including problems in connection with flood control, river training, bank protection etc.

c. to study problems relating to irrigation, drainage, ground-water, water distribution and management and agriculture.

d. to study tidal and salinity problems.

e. to provide teaching, training and research facilities at the post-graduate level (Diploma and Certificates) in Water Resources Engineering.

f. to provide short courses for the professionals.

g. to undertake studies and investigations sponsored by private organisations, Govt. and Semi-Govt. agencies and autonomous bodies.

h. to provide advisory and consulting services in fields relating to water resources to different organizations, firms etc.

I. to establish contact with organizations (both inside and abroad) working in the fields of irrigation, drainage and flood control and to organise and participate in seminars, symposia etc. for exchange of ideas and

j. to take up other program which help facilities for attainment of the aims and objetives of the Institute.

In view of the national importance of flood control and the pressing urgency for the development of efficient irrigation and drainage systems to agricultural lands for the increased production of food, emphasis in research for the first couple of years will include studies in the following areas :

a. river behaviour studies for determining effective and suitable methods of flood control,

b. expansion of irrigation in new areas and increasing irrigation effciency of existing projects and

c. evaluation of regional groundwater potential for long term supply to irrigation needs.

The Institute has already taken up a number of projects along this line and has sponsored seminars and short courses for professional engineers.

Directorate of Advisory, Extension and Research Services

The Directorate of Advisory, Extension and Research Services of the university acts to execute the policies of the unviersity for promotion of research, offers research services such as facilities of the workshops, publishes the different university publications and co-ordinates the different schemes for teachers training. The directorate also keep liasion with outside agencies specially in matters of research, publications and scholarships. Together with the Bureau of Research, Testing and Consultation which is headed by the same director, this directorate also looks after the advisory services offered by the teachers and the workshops of this university. In addition to postgraduate research, this directorate co-odinates the research projects sponsored by other agencies like the Bureau of Research, Testing and Consultation of this University, the University Grants Commission and the National Council for Science and Technology. Outside organisations, national or international, wishing to have any collaboration with the university should write to the Director of Advisory, Extension and Research Services.

Bureau of Research, Testing and Consultation

The Bureau of Research, Testing and Consultation generally known as BRTC of the University makes the expertise of the staff of the university and the laboratory facilities, available to different organisations of the country. The teachers of this university, through this Bureau, offer expert advice to government, semi-government and private organisations to overcome major problems in their projects. This interaction with industry and other agencies provides the teachers an opportunity of acquiring

first hand knowledge of the practical problems which helps in the improvement of the quality of teaching as well as research.

Any organisation wishing to take facilities offered by the teachers and the laboratories and workshops of the university should write to the Director, Bureau of Research, Testing and Consultation outlining the problem and indicating willingness to pay the required fees. The fees are charged for the expert services and facilities, and part of the fees are retained by the BRTC, after payment to the personnel carrying out the jobs. The fund thus generated is used by BRTC for the promotion of research in areas of national importance.

THE END