AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

UNDERGRADUATE BULLETIN

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1994

FACULTY OF ENGINEERING
AIN SHAMS UNIVERSITY

INTERODUCTION

The Faculty of Engineering, Ain Shams University was established in 1950. In 1950/1951 the number of undergraduate students was 1300 Whereas in 1986/1987 it was 5500. Faculty members are now 291 (professors. Associate professors and Assistant professors) plus 294 instructors and teaching assistants.

The Faculty offers programs in a wide variety of engineering fields. Four — Year Undergraduate Curricula, after a general preparatory year for all students, are offered in the following professional fields : Civil, Electrical, Mechanical and Architectural Engineering.

The Faculty is Composed of the following ten academic departments;

1. The Department of Structural Engineering.
2. The Department of Public Works.
3. The Department of Irrigation and Hydraulics.
4. The Department of Electrical Power and Machines.
5. The Department of Electronics and Computers Engineering.
6. The Department of Energy and Automotive Engineering.
7. The Department of Design and Production Engineering.
8. The Department of Architecture.
9. The Department of Urban Planning.
10. The Department of Engineering physics and Mathematics.

It is our pleasure to introduce this brief undergraduate bulletin of the Faculty. We hope it will give our english speaking students and our visitors a good idea about our Faculty.

Vice Dean
For Education & Students
Mohamed Nabil Saleh

Dean
Adel Helmy Salem

Cairo, Feb. 1988.

DEGREES

The Ain Shams University upon the recommendation of the Faculty of Engineering Council grants the following degrees : Bacheor of Engineering in the folowing fields :

1. Architectural Engineering
   A) Architecture.
   B) Urban Plannig.

2. Civil Engineering.
   A) Structural Engineering.
   B) Irrigation and Hydraulics.
   C) Public Works.

3. Electrical Engineering :
   A) Electrical Power and Machines.
   B) Electronics and Communications.
   C) Computers and Automatic Control.

4. Mechanical Engineering :
   A) Energy.
   B) Automotuve Engineering.
   C) Production Engineering.

FACULTY EDUCATION SYSTEM

The Faculty follows the «One Academic Year System.». A Mid - Year Exam is held in most courses. The student is promoted to higher level if he passes all courses or if he fails in at most two courses only. The grades are calculated as follows :

Distinction	85% and above
Very Good	75 % and above
Good	65 % and above
Pass	50 % and above
Fail (Weak)	30 % and above
Fail (Very Weak)	less than 30%

COURSES CODING SYSTEM

Department	Gode
Engineering Physics and Mathematics	PHM xxx ↑ Year
Structural Engineering	CES xxx
Public Works	CEP xxx
Irrigation and Hydraulics	CEI xxx
Electrical Power and Machines	EPM xxx
Electronis and Computers Engineering	EEC xxx
Design and Production Engineering	MDP xxx
Energy and Automotive Engineering	MEA xxx
Architecture	ARC xxx
Urban Planning	UPL xxx

CE : Civil Engineering, M : Mechanical Engineering, E : Electrical Engineering, G : General Courses.

CURRICULA

Preparatory Year

The courses in the preparatory year are served by the faculty members of the Engineering Physics and Mathematics Department and other Concerned Departments. The Preparatory year is obligatory for all students. After passing successfully this year, students are distributed among the different departments according to certain rules approved by the Faculty council.

PREPARATORY YEAR

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	
PHM 011	Mathematics	4	2	6	120	40	40	—	200	4
PHM 012	Physics	4	2	6	120	25	25	30	200	4
PHM 013	Mechanics	3	2	5	120	40	40	—	200	4
PHM 014	Descriptive Geometry	2	2	4	90	30	30	—	150	4
PHM 015	Engineering & Arch. Drawing	—	4	4	90	30	30	—	150	4
PHM 016	Chemistry	2	1	3	60	15	10	15	100	3
MDP 021	Production Engineering	1	1	2	20	10	10	10	50	2
G 021	English Language	—	1	1	30	20	—	—	50	2
		16	15	31					1100	

CIVIL ENGINEERING

Civil Engineering
First Year

Course Code	Course Title	No. Of Hours Per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
CES 101	Theory of Structures	3	2	5	120	40	40	—	200	4
PHM 105	Mechanics	3	2	5	60	20	20	—	100	4
CES 102	Properties & Testing of Materials	2	2	4	60	20	20	—	100	3
CEP 101	Plane Surveying	2	2	4	60	15	10	15	100	3
PHM 106	Mathematics	2	2	4	60	20	20	—	100	3
PHM 107	Physics	2	2	4	60	15	10	15	100	3
CEI 101	Civil Engineering Drawing	—	3	3	60	20	20	—	100	3
CES 103	Engineering Geology	2	—	2	40	—	10	—	50	2
		16	15	31					850	

Civil Engineering
Second Year

Course Code		Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
			Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
CES	201	Theory of Structures	4	2	6	120	40	40	—	200	4
CEP	201	Topographic & Photo-grammetric Surveying	2	3	5	60	15	10	15	100	4
CES	202	Properties & Testing of Materials	2	2	4	60	20	20	—	100	3
CES	203	Reinforced Concrete Structures	2	2	4	60	20	20	—	100	4
PHM	204	Mathematics	2	2	4	60	20	20	—	100	3
CEI	201	Fluid Mechanics	2	1	3	60	20	20	—	100	3
CEI	202	Irrigation & Drainage	2	1	3	60	20	20	—	100	3
MEA / EPM	220	Mechanical & Electrical Engineering	2	—	2	50	—	—	—	50	2
G	221	Law and Economics	1	—	1	50	—	—	—	50	2
			19	13	32					900	

Civil Engineering
Third Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
CES 301	Theory of Structures	3	2	5	120	40	40	—	200	4
CES 302	Soil Mechanics and Foundations	3	2	5	90	30	30	—	150	4
CES 303	Reinforced Concrete Structures	2	2	4	90	30	30	—	150	4
CES 304	Metallic Structures	2	2	4	90	30	30	—	150	4
CEP 301	Surveying & Geodesy	2	2	4	60	15	10	15	100	3
CEI 301	Hydraulics	2	2	4	60	15	10	15	100	3
CEI 302	Irrigation Design	2	2	4	60	20	20	—	100	4
ARC 322	Building Construction	2	—	2	30	10	10	—	50	3
		18	14	32					1000	

Civil Engineering
(Structural Engineering Section)
Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
CES 401	Reinforced Concerte Structures	2+2	2+1	7	120	40	40	—	200	4
CES 402	Metallic Structures	2+2	1+1	6	120	40	40	—	200	4
CES 403	Soil Mechanics and Foundations	2+1	1+1	5	120	40	40	—	200	4
CES 404	Theory of Structures	2	1	3	60	20	20	—	100	4
CEP 421	Sanitary Engineering	2	1	3	60	20	20	—	100	3
CEI 421	Irrigation Design	2	1	3	60	20	20	—	100	3
CEP 422	Railway Engineering	1	1	2	30	10	10	—	50	3
CEP 423	Highway & Airport Engineering	1	1	2	30	10	10	—	50	3
CES 450	Project	—	1	1	—	—	—	—	200	
		19	13	32					1200	

Civil Engineering
(Irrigation & Hydraulics Section)
Fourth year

Course Code	Course Title	No. Of Hours per week			Maximum marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
CEI 401	Irrigation Design	2+2	1+1	6	120	40	40	—	200	4
CES 421	Soil Mechanics & Foundations	2+1	1+1	5	120	40	40	—	200	4
CES 422	Reinforced Concrete Structures	2	2	4	60	20	20	—	100	4
CES 423	Metallic Structures	2	1	3	60	20	20	—	100	4
CEP 424	Sanitary Engineering	2	1	3	60	20	20	—	100	3
CEI 402	Hydraulics	2	1	3	60	20	20	—	100	3
CEI 403	Inland Navigation and Harbours	2	1	3	60	20	20	—	100	3
CEP 425	Railways	1	1	2	30	10	10	—	50	3
CEP 426	Highway & Airport Engineering	1	1	2	30	10	10	—	50	3
CEI 450	Project	—	1	1	—	—	—	—	200	—
		19	13	32					1200	

Civil Engineering

(Public Works Section)

Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	Final Exam. Hours
CEP 401	Sanitary Engineering	2+2	1+1	6	120	40	40	—	200	4
CEP 402	Railways	1+2	1+1	5	120	40	40	—	200	4
CEP 403	Highway & Airport Engineering	1+2	1+1	5	120	40	40	—	200	4
CES 424	Reinforced Concrete Structures	2	2	4	60	20	20	—	100	4
CES 425	Metallic Structurres	2	1	3	60	20	20	—	100	4
CES 426	Soil Mechanics & Foundations	2	1	3	60	20	20	—	100	3
CEP 404	Advanced Surveying & Geodesy	2	1	3	60	20	20	—	100	3
CEI 422	Irrigation Design	2	1	3	60	20	20	—	100	3
CEP 450	Project	—	—	—	—	—	—	—	200	
		20	12	32					1300	

Department of Structural Engineering
Description of Courses

CES 101 Theory of Structures :

Fundamentals of Plane Statics — External Loads — Types of Supports — Reactions — Internal Forces.

Plane Analysis and Calculation of Internal Forces for Statically determinate Beam, Frames, Arches and Trusses. Influence Diagrams.

CES 102 Properties and Testing of Materials :

Standard Specifications — Building Stones — Concrete Aggreates — Lime — Gypsum — Cement — Bricks — Timber — Ferrous Metals — Non — Ferrous Metals — Steel Reinforcement.

Testing Machine — Strain Gauges — Behaviour and Testing of Materials subjected to Tension, Compression, Bending, Shear and Torsion.

CES 103 Engineering Geology :

Major minerals in rocks and soils-The rock-soil cycle-Rook-weathering and Soil formation-Geolgical Maps-Water in rock and soil masses-some physical properties of landforms of Egypt.

CES 121 Theory of Structures :

Fundamentals of plane statics : Exteral loads, types of supports, reaction, internal forces (normal forces, shearing forces and bending moments).

Analysis of statically determinate beams : Simple beams, moving loads

Analysis of statically determinate plane frames and simple frames, three hinged frames.

Analysis of Statistically determinate trusses.

Properties of plane areas, Centroid and moment of inertia.

Introduction to plane stresses and strains in elastic structural members.

CES 122 Properties and Testing of Materials :

Building stones, Concrete aggregates, Gypsum, Concrete, Bricks, Timber; Ferrous and non ferrous metals, Steel reinforcements, Behavior of materials under Static loads of tension, Compression, bending and shear, testing of metals in tension, Compression, bending and non-destructive testing.

CES 123 Properties and Testing of Materials :

Engineering Materials — Strain gauges — The behavior of materials under the effect of static tension, Compression, static bending, static Shear

and Static torsion — Hardness of matals — Behavior of materials under Impact loads, Fatigue of metals, Creep of metals — Atomic arrangements — Structural imperfections — Single phase metals — Binary alloys — Iron Carbon alloys — Heat treatment of Carbon Steels — Cast iron — Copper and its alloys.

CES 124 Theory of Structures :

Static and dynamic loads, types of supports, External Stabilitp of Structures, Reactions, Internal forces, Normal forces, Shearing force, Bending moment diagrams, Geometrical characteristics of sections, Normal stresses, Simple shear stresses, Statically determinate trusses.

CES 125 Theory of Structures :

Types of Structures, Loads and Supports, Statically determinate and indeterminate Structures, plane analysis and Calculation of internal forces for statically determinate beams, frames, arches and trusses, properties of plane areas, Mohr's Circle for moment of inertia, Normal stresses and its applications, Torsion.

CES 126 Properties and Testing of Materials :

Mechanical Properties Testing, Inspection, Standardization. Testing machines, Strain gauges, Behavior and testing of materials subjected to tension, Compression, bending, shear, Torsion, hardness; fatigue and Creep; Welded joints test. Introduction to Experimental analysis of stresses.

CES 201 Theory of structures :

Properties of plane areas — Normal, Shear and Combined Stresses.

Strain and Deformations — Slopes and Deflections — Buckling.

Plane Analysis and Calculation of Internal Forces for Statically indeterminate Beams.

CES 202 Properties and Testing of Materials :

Concrete : Materials — Design of Mixes — Manufacture — Properties — Testing — Inspection — Quality Control.

Metals : Testing in Impact, Fatigue and Creep — Nondestructive tests.

Welding : Types — Defects — Testing

Experimental Stress Analysis.

CES 203 Reinforced Concrete Structures :

Properties of Concrete and Steel, Behaviour in Axial Compression. Simple Bending and Eccentric Forces.

Design According to the Working Stress : Slabs, Beams, Columns and Simple Frames Detailed Drawings of the Previous Elements.

Limit Design of Reinforced Concrete Elements.

CES 222 Reinforced Concrete and Foundations :

Calculation of reinforced concrete sections, Roof structures, Non — plane structures, Footings (Separate footings, Combined footings, raft foundation), Some details (Hinges, Concrete joints, expansion joints, setlement joints), Prefabrication.

CES 223 Metallic Structures :

Steel as a material of Construction, permissible Stresses.

Design of Compression members, design of tension members and design of beams under simple and double bending.

Rivets and Riveted Connections.

Practical Considerations in Construction.

Design and Construction of Steel buildings and frames.

Design of some truss joints, wind bracing of trusses.

Design and Construction of columns and Column bases.

Welding and welded connections.

CES 301 Theory of Structures :

Plane Analysis and Calculation of Internal Forces for Statically - Indeterminate frames by the Methods of : Virtual Work, Column Analogy, Slope - Deflection and Moment Distribution.

Statically — Indeterminate Elastic Arches — Statically Indeterminate plane.

The Effect of Temperature Changes and Support Movements.

Introduction to the Matrix Methods of Analysis.

CES 302 Soil Mechanics and Foundations :

Soil Formation : Physical Properties — Hydraulic Properties and permeability — Stress Distribution — Consolidation — Shear Strength.

Site Exploration and soil Testing.

Earth Pressure.

Shallow Foundations : Bearing Capacity — Settlement Analysis.

CES 303 Reinforced Concrete Structures :

Design of Hollow, Ribbed and Flat Slabs.

Design of Elements Subjected to Torsion — Application to Circular Beams.

Design and Working Drawings of : Continuous Beams — Frames — Vierendeel Girders — Saw Tooth Roofs — Arches — Hinges.

CES 304 Metallic Structures :

Steel as Material of construction — Permissible Stresses — Connections in steel construction : riveted, Bolted and welded connections — splices. Design of beams, purlins crane griders. Design and construction of steel Buildings and Frames — composite Construction.

CES 401 Reinforced Concrete Structures :

Cracks and Crack Control in Concrete Structures.

Circular Slabs — Cylindrical Walls — Deep Beams.

Fluid Containers : Underground & Elevated Tanks.

Membrane Structures of Surfaces of Revolution.

Introduction to Prestressed Concrete.

Special Topics Chosen from the Following :

Developed Theories for the Design and Testing of Reinforced Concrete Structure.

Construction Management.

Prestressed Concrete — Shell Roofs — Folded Plates — Prismatic and pyramidical Slabs — Yield line Theory for Slabs — Silos — Chimneys — Pre-cast Units — Bridges.

CES 402 Metallic Structures :

Types of Bridges — Loads on Railway and Road Bridges — Permissible Stresses.

Plate Girder Bridges : Design of Floors — Cross Sections — Stability of web Plates — Stiffeners — Splices — Bracings — Welded Plate Girders.

Truss Bridges : Design of Chord and Web Members — Joints — Splices — Cross and Portal Bracings — Methods of Erection.

Stability of Web Plates — Buckling of Beams.

Details of Welded Plate Girder & Truss Bridges.

Orthotropic Plate Floors — Swing Span Bridges — Composite Bridges — Beam Grid Roadway Bridges.

CES 403, 421 Soil Mechanics and Foundations :

Soil Compaction : Laboratory and Field Methods.

Stability of Slopes.

Sheet Pile Walls.

Deep Foundations : Piles — Wells — Caissons.

Retaining Walls.

Seepage Through Soil — Dewatering.

Earth Dams and Coffer Dams.

Beams on Elastic Foundations.

Machine Foundations.

Design and Construction of Underground Structures.

CES 404 Theory of Structures :

Introduction to Space Analysis of Indeterminate Structures : Plates — Cylindrical Shell Roofs — Spherical Domes — Prismatic Slab Roofs — Space Frames — Space Trusses.

Introduction to Plasticity and Limit Design.

CES 422, 424 Reinforced Concrete Structures :

Cracks and Crack Control in Concerete Structures.

Circular Slabs — Cylindrical Walls Deep Beams.

Fluid Containers : Underground & Elevated Tanks.

Membrane structures of Surfaces of Revolution.

Introduction to Prestressed Concrete.

CES 423, 425 Metallic Structures :

Types of Bridges — Loads on Railway and Road Bridges — Permissible Stresses.

Plate Girder Bridges : Design of Floors — Cross sections — Stability of Web Plates — Stiffeners — Splices — Bracing — Welded Plate Girders.

Truss Bridges : Design of Chord and Web Members — Joints — Splices — Cross and Portal Bracings — Methods of Erection.

CES 426 Soil Mechanics and Foundations :

Soil Compaction : Field Methods.

Stability of Slopes.

Sheet pile Walls.

Deep Foundations : Piles — Wells — Caissons.

Retaining Walls.

Seepage Through Soil — Dewatering.

CES 450 Project :

One of the following Projects may be Chosen :

A) Structural analysis and design.

B) Reinforced Concrete Structures.

C) Metallic Structures.

D) Soil Mechanics and Foundations.

Department of Irrigation and Hydraulics

Description of Courses.

CEI 101 Civil Engineering Drawing :

Metallic Structures : Columns and Footings — Trusses — Built — up Section — Rivited Joints.

Civil and Irrigation Structures : Earth Slopes — Retaining walls — Some Civil and Irrigation Structures.

CEI 201 Fluid Mechanics :

Properties of Fluids : Statics of Fluids — Equation of Motion in One Dimension.

Flow over Notches and Weirs — Rotary Motion of Fluids — Flow of Viscous Fluids.

Surface Resistance : Introduction to the Boundary Layer Theory — Resistance in Pipes and Conduits.

CEI 202 Irrigation and Drainage :

Water Resources — Meteorology — Hydrology — Application to Nile Projects — Modern Irrigation Systems.

Basin and Perronial Systems of Irrigation.

Drainage with an Introduction to the Underground water.

CEI 221 Fluid Mechanics :

Properties of Fluids, Fluid Statics, The flow of a fluid, Dimensional analysis, Viscous fluid dynamcis, Vortex motion, Laminar and Turbulent flow through pipes, Flow of ideal fluids.

CEI 222 Hydraulics :

Fluid Properties, Measurements and equations, design of pipelines, dimensional analysis, Applications of the momentum equations, Hydraulic machines.

CEI 301 Hydraulics :

Laminar and Turbulent Flow in Pipes — Pipelines and Tank Problems — Pipe Networks, Dimensiaral Analysis and Similitude — Hydrdulic Machines (Turbines and Pumps).

Open Channel Flow - Back Water Curves - Flow Nets With their Application — Hydrology — Reservoir Operations — Water Hammer.

CEI 302 Irrigation Design :

Canals and Drains : Classification — Synoptic Diagrams — Design of Cross and Longitudinal Sections.

Culverts : Hydraulic and Structural Design.

Small Bridges for Irrigation Works : Hydraulic and Structural Design.

Intermediate and Tail Escapes.

CEI 401 Irrigation Design :

Heading Up Structures : Overflow and Standing Wave Weirs — Head and Partial Regulators — Barrages.

Navigation Structures : Locks — Gates — Navigation Connections.

Crossing Structures : Syphons — Aqueducts — Tunnels.

Storage Structures : Dams (Aswan Dam — High Dam).

Irrigation and Drainage Projects :

Regulating Devices : Types of Gates — Calibration of Regulators and Weirs — Details of Locks.

River Training and Flood Protection.

Dams and Tunnels.

CEI 402 Hydraulics :

Hydraulics of Open Channels — Flow Through Non -- Prismatic Channels.

Hydraulic Jump and its Use as Energy Dissipator — Control of Jump — Constrictions and Obstructions.

Sediment Transportation in Open Channels.

Waves and their Motion in Open Channels.

CEI 403 INLAND NAVIGATION AND HARBOURS

Kinds of Harbours — Studies of the Natural Phenomena — Quays.

Hydraulic Model Studies — Planning of Harbours — Light Houses and Guiding Signals.

Breakwaters — Spillways — Dry Docks.

Inland Navigation.

CEI 421, 422 IRRIGATION DESIGN

Heading Up Structures : Overflow and Standing Wave Weirs — Head and partial Regulators — Barrages.

Navigation Structures : Locks — Gates — Navigation Connections.

Crossing Structures : Syphons — Aqueducts — Tunnels.

Storage Structures : Dams (Aswan Dam — High Dam).

CEI 450 PROJECT

One of the Following Projects may be Chosen :

A) Irrigation and Drainage.

B) Inland Navigation and Harbours.

Department of Public Works

Description of Courses

CEP 101 Plane Surveying :

Introduction, definitions, Types of Surveying, basic Principles, Units of Measurements — Accuracy, Precision and Introduction to theory of Errors — Simple Surveying Instruments — Scales and linear measurements— Theodolites and Angular measurements — Applications in solving Construction Surveying Problems — Levels and levelling, longitudinal and Cross sections, Earth fill and Excavations, Contour lines and Topographic maps — Areas and Volumes.

CEP 121 Surveying :

Linear Measurement, Angular Measurement (Theodolite), Traversing, Mapping, Levelling, Contouring, Earth Works.

CEP 201 Topographic & Photogrammetric Surveying :

— Indirect Distance measurements.

— Plane Table Surveying.

— Curves : Horizontal, Vertical & Transition Curves.

— Photogrammetry.

CEP 221 Sanitary Engineering :

Basic Principles, Building Sites and Underground Water, Sanitary Installations (Different Types, Design, Materials), Drainage in Towns with Public Drainage Suptens, Water Supply in Towns Left Without Supply Project, Water Distribution Inside Buildings, Hot Water Distribution Inside

Buildings, Special Installations in Some Buildings, Kitchens, Lavatories, Swimming Pools, Indrodction to municipalities.

CEP 301 Surveying and Geodesy :

— Adjustment of Surveying Measurements.

— Geometric Geodesy

— Geodetic Networks

— Practical Astronomy

CEP 401 Sanitary Engineering :

Water Supply : Sources of Water — Water Consumption — Water Treatment — Storage Works — Water Distribution system and Pump Stations.

Sanitary Sewage Collection Works — Sewage Treatment — Sludge Treatment — Wastewater Disposal.

Design of Water and Wastewater Treatment Works.

Design of Water Distribution Works.

Design of Wastewater Collection Systems.

CEP 402 Railways:

Dynamics of Rolling — Track Alignment — Railway Branches.

Design and Details of Track Parts.

Stations and Yards.

Signals — Maintenance — Renewing.

CEP 403 Highway and Airport Engineering :

Basic Design Control : Motion of Vehicles — Sight Distances — Alignment — Intersections.

Earthwork : Soil Classification — Soil Stabilization — Flexible and Rigid Pavements — Highway Drainge.

Introduction to Airport Engineering.

Materials : Bituminous Materials — Methods of Manufacture and Tests — Asphaltic Concrete and its Design.

Transportation Economy.

Airport Engineering.

CEP 404 Advanced Surveying and Geodesy :

Advanced Geodesy — Advanced Photogrammetry — Cartography Special Applications of Construction surveying — Deformation and displacement measurement — Underground and Mine surveying — Elements of Municipal and Hydrographic surveying.

CEP 421, 424 Sanitary Engineering :

Water Supply : Sources of Water — Water Consumption — Water Treatment — Storage Works — Water Distribution Systems and Pump Stations.

Sanitary Sewage : Sewage Collection Works — Sewage Treatment — Waste water Disposal.

CEP 422, 425 Railways :

Dynamics of Rolling — Track Alignment.

General Design of Track Parts.

Passenger and Freight Stations.

Signals.

CEP 423, 426 Highway and Airport Engineering :

Basic Design Control : Motion of Vehicles — Sight Distances — Alignment — Intersections.

Earthwork : Soil Classification — Soil Stabilization — Flexible and Rigid Pavements — Highway Drainage.

Introduction to Airport Engineering.

CEP 427 Traffic Engineering :

Selected Topics in Traffic Engineering to Suit the Needs of Urban Planners.

CEP 450 Project :

One of the Following Projects may be Chosen :

a) Sanitary Engineering.

b) Highway and Airport Engineering.

c) Railways.

ELECTRICAL ENGINEERING

Eletrical Engineering
First year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	
PHM 101	Mathematics	3	2	5	120	40	40	—	200	4
PHM 102	Mechanics	3	2	5	120	40	40	—	200	4
PHM 103	Physics	3	2	5	120	25	25	30	200	4
MDP 121	Production Engineering	2	1	3	60	20	20	—	100	3
CES 123	Properties. &Testing of Materials	2	1	3	60	20	20	—	100	3
EPM 101	Electric Circuit Theory	2	1	3	60	20	20	—	100	3
EPM 102	Electrical Engineering	2	1	3	60	20	20	—	100	3
CES 124	Theoryof Structures.	1	1	2	60	20	20	—	100	3
MDP 122	Electrical & Mechanical Drawing	—	2	2	60	20	20	—	100	3
		18	13	31					1200	

Electrical Engineering
Second Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
PHM 201	Mathematics	3	2	5	120	40	40	—	200	4
CEI 222	Fluid Mechanics & Hyrdraulics	3	2	5	120	25	25	30	200	4
EPM 201	Energy Conversion	2	1	3	60	20	20	—	100	3
EPM 202	Electrical Testing.	—	3	3	40	20	20	20	100	3
EEC 201	Electronic Engineering	2	1	3	60	20	20	—	100	3
EPM 203	Electric Circuits	2	1	3	60	20	20	—	100	3
MEA 221	Heat Engines	2	1	3	60	20	20	—	100	3
EEC 202	Elecctrical Materials	2	1	3	60	20	20	—	100	3
EPM 204	Electrical Measuring Instruments	2	1	3	60	20	20	—	100	
G 222	Law & Economics	1	—	1	50	—	—	—	50	2
		19	13	32					1150	

Electrical Fngineering

(Elect. Power & Machines Section)

Third year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
MEA 321	Heat Engines	2	2	4	50	15	15	20	100	3
EPM 301	Elect. Testing	—	4	4	40	20	20	20	100	3
PHM 301	Mathematics	2	1	3	60	20	20	—	100	3
EPM 302	Electric Engrgy Utlisation	2	1	3	60	20	20	—	100	3
EPM 303	Power Transmission and Distribution Lines	2	1	3	60	20	20	—	100	3
EPM 304	High Voltage Engineering	2	1	3	60	20	20	—	100	3
EPM 305	Direct curent Machines	2	1	3	60	20	20	—	100	3
EPM 306	Alternating Current Machines	2	1	3	60	20	20	—	100	3
EEC 321	Communications	2	1	3	60	20	20	—	100	3
EPM 307	Measuring Instruments	2	1	3	60	20	20	—	100	3
		18	14	32					1000	

Electrical Engineering
(Communications and Electronics Section)
Third year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	Final Exam Hours
EEC 301	Electronic Circiuts	4	2	6	120	40	40	—	200	4
EEC 302	Electrical Testing	—	4	4	40	20	20	20	100	3
PHM 302	Mathematics	3	1	4	60	20	20	—	100	3
EEC 303	Electronic Measuerments	2	1	3	60	20	20	—	100	3
EEC 304	Electronic Engineering	2	1	3	60	20	20	—	100	3
EEC 305	Communication Systems	2	1	3	60	20	20	—	100	3
EEC 306	Electrcnic Computers	2	1	3	60	20	20	—	100	3
EEC 307	Field Theory	2	1	3	60	20	20	—	100	3
EEC 308	Automatic Control	2	1	3	60	20	20	—	100	3
		19	13	32					1000	

Electrical Engineering
(Computers and Control Section)
Third year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	
EEC 309	Electronic Circiuts	2	2	4	60	20	20	—	100	3
EEC 310	Electrical Testing	—	4	4	40	20	20	20	100	3
PHM 303	Mathematics	2	1	3	60	20	20	—	100	3
EEC 311	Communication Systems	2	1	3	60	20	20	—	100	3
EEC 312	Process Dynamics	2	1	3	60	20	20	—	100	3
EEC 313	Automatic Control	2	1	3	60	20	20	—	100	3
EEC 314	Electronic Computers	2	1	3	60	20	20	—	100	3
EEC 315	Logic Circiuts	2	1	3	60	20	20	—	100	3
EPM 322	Electrical Power and Machines	2	1	3	60	20	20	—	100	3
EEC 316	Measurements For Control	2	1	3	60	20	20	—	100	3
		18	14	32					1000	

Electrical Engineering
(Power and Machines Section)
Fourth year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
EPM 401	Electrical Power System Analysis	2	2	4	60	20	20	—	100	3
EPM 402	Electrical Machines Design	2	2	4	60	20	20	—	100	3
EPM 403	Electrical Testing	—	4	4	40	20	20	20	100	3
EPM 404	Electrical Power Engineering	2	1	3	60	20	20	—	100	3
EPM 405	Generation and Economics of Electrical Energy	2	1	3	60	20	20	—	100	3
EPM 406	Theory of Electrical Machines	2	1	3	60	20	20	—	100	3
EPM 407	Industrial Electronics	2	1	3	60	20	20	—	100	3
EPM 408	Automatic Control	2	1	3	60	20	20	—	100	3
EPM 409	Nunerical Computation in Electrical Engineering	2	1	3	60	20	20	—	100	3
EPM 450	Project	—	2	2	—	—	—	—	200	—
		16	16	32					1100	

Electrical Engineering
(Communications and Electronics Section)
Fourth year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	Final Exam. Hours
EEC 401	Electromagnetic Waves	3	2	5	120	40	40	—	200	4
EEC 402	Electrical Testing	—	4	4	40	40	20	20	100	3
EEC 403	Telephony	2	1	3	60	20	20	—	100	3
EEC 404	Communication Systems	2	1	3	60	20	20	—	100	3
EEC 405	Information Theory	2	1	3	60	20	20	—	100	3
EEC 406	Electronic Engineering	2	1	3	60	20	20	—	100	3
EEC 407	Antennas	2	1	3	60	20	20	—	100	3
EEC 408	Microwave Electronics	2	1	3	60	20	20	—	100	3
EEC 409	Electronic Computers	2	1	3	60	20	20	—	100	3
EEC 450	Project	—	2	2	—	—	—	—	200	—
		17	15	32					1200	

Electrical Engineering
(Computers and Control Section
Fourth year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut. Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
EEC 411	Automatic Control	4	1	5	120	40	40	—	200	4
EEC 412	Electronic Computers	4	1	5	120	40	40	—	200	4
EEC 413	Electrical Testing	—	4	4	40	20	20	20	100	3
EEC 414	Pulse and Digital Circuits	2	1	3	60	20	20	—	100	3
EEC 415	Industrial Measurements	2	—	2	60	20	20	—	100	3
EEC 416	Computer Applications	2	1	3	60	20	20	—	100	3
EEC 417	Computer Systems Programming	2	1	3	60	20	20	—	100	3
EEC 418	Digital Communication Systems	2	1	3	60	20	20	—	100	3
EEC 419	Electronic Instrumentation Systems	2	—	2	60	20	20	—	100	3
EEC 450	project	—	2	2	—	—	—	—	200	—
		20	12	32					1100	

Department of Electrical Power and Machines

Description of Courses

EPM 101 Electric Circuit Theory :

Circuit Parameters, average and effective values, sinusoidal current and voltage, complex impedance and phasor notation, Series and parallel circuits, network reduction, star-delta transforrmation, power and power factor, mesh-current and node voltage analysis, network theorems, non-linear resistive circuits.

EPM 102 Electrical Engineering :

Vector analysis, static electric field, energy and potential, field mapping, dielectrics and capacitances, energy and mechanical forces, steady magnetic fields, Ampere's law, magnetic materials, magnetic circuits, electromagnetic induction and Maxwell's equations.

EPM 121 Electrical Engineering :

Electromagetics, Electric Circuits.

EPM 201 Energy Conversion :

Energy Stored in Electric and Magnetic Fields, Dynamic Equation of Motion, Generalized theory of Electromechanical Energy Converters, General Construction of Electrical Machines and Principles of Transformers, Direct Current and synchronous machines, Induction Motors.

EPM 202 Electrical Testing :

A Series of experiments covering the basic subjects taught in the Second Year.

EPM 203 Electric Circuit Theory :

Resonance, coupled Circuits, Electric Filters, Two-Port Networks, Polyphase Circuits, sinusoidal Excitations and Transients.

EPM 204 Electrical Measuring Instruments :

Classifications, errors in measurements, general equations of motion, moving coil and moving iron, thermal, electro-dynamic, induction and electrostatic instruments, applications and null methods of measurements.

EPM 220 Electrical Engineering :

Electric Circuits, Transformers, Design of Electrical Equipment in Buildings and Industrial Structures.

EPM 222 Electrical Engineering :

Construction and Calculation of D. C. Machines, Transformers, Alternator and Induction Motor.

EPM 301 Electrical Testing :

A Series of Experiments Covering the Subjects of Direct and Alternating machines, Electrical power Transmission, High Voltage Engineering and Electrical Energy Utilization.

EPM 302 Electrical Energy Utilization :

Traction, Illumination, Heating, Welding, Electrolytic Processes, Lifts and Other Electrical Drives.

EPM 303 Power Transmission & Distribution Lines :

Lines Calculations, Network analysis, Transmission, Design of Transmission lines and Electrical Power Distribution Systems.

EPM 304 High Voltage Engineering :

High Voltage Generation, Testing and Measurments, ac-dc, High Frequency and impulse Circuits, Breakdown Theories. Discharges, Corona and Sparkover Characteristics, Insulation, and Earthing.

EPM 305 Direct Current Machines :

Magnetic Circuits, Armature Windings, Armature Reaction and Commutation, Operating Charcteristics, Starting and Speed Control, Testing, Special Machines and Mercury arc rectifiers.

EPM 306 Alternating Current Machines :

Single and 3-phase Tranformers, performance, Equivalent Circuits, Parallel Operation and Autotransformer. Synchronous Machines, Performance, Reactances, Power-Angle Characteristics. Theory of 3-phase Induction Motors.

EPM 307 Electrical Measuring Instruments :

D.C. and A.C. bridges, Measurement of Mutual Inductance and Frequency, Shielding, Electronic Measurements, Electronic Voltmeters, Detectors, Transducers, Recorders and Error Analysis.

EPM 321, 326 Acoustics and Illumination :

Sound, Generation, Reflection, Attenuation, Open air Theaters, Acoustical Design, Selection and Grading of Site Orchestra Shells, Sound Amplification Systems, Room Accoustics, Geometrical Acousics, Statical Acoustics, Sound insulators, Noise Control.

Distribution of Power, Electric Installation in Buildings, Artificial Lighting and Calculations.

EPM 322 Power and Machines :

• General Theory of Electrical Machines, Power Equations, DC Machines. Synchronous Machines, Induction Machines, Special Machines, Representation of Power System, Per unit System, Fault Calculations, Load Flow, System Stability.

EPM 323, 324, 325 Electrical Engineering :

Measuring Apparatus, Electronics.

EPM 401 Electrical Power System Analysis :

Power System Representation, Short — Circuit Analysis, Symmetrical Faults, Load Flow and Power System Stability.

EPM 402 Electrical Machine Design :

Electrical and Magnetic Circuits, Cooling and Ventilation, Design of : Transformers. Induction Motors. Synchronous Machines and Direct Current Machines.

EPM 403 Electrical Testing :

A Series of Experiments Covering the area of Electrical Machines, Industrial Electronics, Power System Analysis, High Voltage Engineering and Automatic Control.

EPM 404 Electrical Power Engineering :

Overvoltages, Generation of Transient Voltages, Travelling Waves, Overvoltage protection Circuit Interruption and Ground Wires and Earthing, Power System Protection.

EPM 405 Generation and Economics of Electrical Energy :

Generating Plants, Station and Substation design, Economics of power generation and Transmission, Economic Operation of Power Systems.

EPM 405 Theory of Electrical Machines :

Theory and Performance of 3 phase Induction Motors, Induction Regulators, Single phase Induction Motors, A.C. Commutator Motors and Frequency Changers, Transients in Synchronous Machines.

EPM 407 Industrial Electronics :

Thyristors and Their Applications, Uncontrolled and phase Controlled Rectifier Circuits, Light Sensitive Devices, High Frequency Heating and Analogue Simulation.

EPM 408 Automatic Control :

Control Techniques, System Simulation Techniques, Control System Stability, Error and Sensitivity Analysis, Industrial Regulators, State — Space Analysis, Introduction to Adaptive and Optimal Control, Applications.

EPM 409 Numerical Computions in Electrical Engineering :

Computer Design, Programming Languages, Numerical Techniques, Case Studies and Analogue, Computers.

EPM 421 Electrical Energy :

Electrical Energy Generators, Transformers, Measurements, Plants, Transmission, Networks.

EPM 450 Project :

Department of Electronics and Computer Engineering

Descripton of Courses

EEC 201 Electronic Engineering :

Motion of Electrons in Electric Field, Thermionic Emission, Vacuum diodes and triodes, Multigrid Tubes, Vacuum Tube Amplifiers, Review of Semiconductor Physics, The pn Junction and Junction diode, The Bipolar Transistor, The SCR.

EEC 202 Electrical Materials :

Motion of Electrons in Crystals, Energy Band Structure, The Effective Mass of an Electron, Properties of Semiconducting Materials under Thermal Equilibruim, Properties of Dielectric Materials, Polarization and Piezoelectricity, Properties of Magnetic Materials, Ferromagnetic Resonance.

EEC 301 Electronic Circuits :

Review of RC-Coupled Vacuum Tube Amplifiers and Frequency Response, Transistor Circuits (DC Analysis and AC-Models), AF RC-Coupled Transistor Amplifiers, AF Power Amplifiers, RF Amplifiers, Feedback Amplifiers, Oscillators, Multivibrators, Sweep Oscillators, Diode Circuits, Regulated Power Supply.

EEC 302 Electrical Testing :

Experiments on Some of The Topics Covered by The Different Courses Studied During The Academic Year.

EEC 303 Electronic Measurements :

Electronic Methods for Measuring DC & AC Currents and Voltages, Power Measurements, Digital Methods for Measuring, Frequency and Phase Measurements, Error Reduction in Electronic Measurements.

EEC 304 Electronic Engineering :

Switching Transients, Field Effect Transistors (Junction and MOS). Solar Cell Characteristics, Metal Semiconductor diodes, Photodevices, Power Semiconductuor Devices.

EEC 305 Communication Systems :

Modulation Techniques (Amplitude, Frequency, Phase and Pulse Modulation)., Detection of Modulated Waves, Frequency Conversion, AM and FM Transmitters and Recivers and Thier Associated Circuits, Class C RF Power Amplifier and its Applications, B/W Television Transmitters and Receivers

EEC 306 Electronic Computers :

Number Systems, Switching Functions (Analysis, Karnaugh Maps, Quin Mc-Cluskey Minimization), Combinational Logic Circuits, Flip Flops (Analysis, Design, Applications). Sequential Circuits, Coding and Code Conversion, Decoding.

EEC 307 Field Theory :

Maxwell's Equations, Electrostatic Fields, Theory of Images and Conformal Mapping, Electromagnetic Fields, Fields in a Conducting Medium, Reflection and Diffraction of Plane Waves, Energy and Power in Electromagnetic Fields, TEM Transmission line Theory, Standing Waves, Smith Chart, Single and Double Stub Matching.

EEC 308 Automatic Control :

Modeling of Dynamic Systems, Transfer Functions, Block Diagram, Manipulations, Time and Frequency Response, Stability of dynamic Systems Design of Simple Compensators.

EEC 309 Electronic Circuits :

Analysis of Bipolar and MOS FETs, Large Signal Analysis, Frequency Response of Transistor Amplifiers, The Difference Amplifier, Power Amplifier, Multivibrators, Regulators.

EEC 310 Electrical Testing :

Experiments on Some of the Topics Covered by The Different Courses Studied During The Academic Year.

EEC 311 Communication Systems :

Modulation Techniques (Amplitude, Frequency, Phase and Pulse Modulation). Detection of Morulated Waves, Frequency Conversion, AM and FM Transmitters and Receivers and Their Associated Circuits, Television Tnansmitters and Receivers.

EEC 312 Process Dynamics :

Principle of Modeling, Standard Forms of Linear Models, Modeling of Lumped Elements and Continuous Systems Such as. Mechanical, Electrical, Hydraulic and Thermal Systems, Case Studies Including Distillation Plants and Others.

EEC 313 Automatic Control :

Introduction to Feedback Control Systems, Transfer Functions of Dynamic Systems with Emphasis on Single-input Single-output, State Space Models. Analytic Solution of State Equations, Frequency Response and Analysis, Stability Analysis, Performance Criteria, Design of Different Types of Series and Parallel Compensators.

EEC 314 Electronic Computers :

Organization and Programming of Small Instruction Computer (SIC), Assembly Language Programming, System Components Which Includes Memorp Types (Core, Semiconductor RAMs and ROMs) Register Transfers and Design Using Hardware Programming Language (AHPL), Machine Organization and Design of SIC Using AHPL, Hardware Implementation of SIC in Two Architecture Forms as Register Transfers Using Logic and Bus Structure, Microprogrammed Based Computer Structure, Input-output, Interrupts and Some Interfacing Problems.

EEC 315 Logic Circuits :

Number Systems, Boolean Algebra, Minimization using Karnaugh maps and Quine Mc-Luskey, Use of MSI in Logic Circuit Design, Synchronous Sequential Circuits, Asynchronous Sequential Circuits, Timing in Logic Circuits.

EEC 316 Measurements for Control :

Analog Versus Digital Instrumentation Techniques, Signal Conditionning for Analog Sinals, Transducers for Measuring Mechanical Variables, Industrial Types of Transducers for Measuring Temperature; Level; Pressure, Flow, .. etc, Electrical and Pneumatic Actuators.

EEC 321 Communications :

Bioplar Transistors, blasing and Hybrid Parameters, The Darlington Transistor, The Junction FET and its Equivalent Circuit, The MOSFET, Feesback Amplifers and Oscillators, Modulation Techniques, Detection of Modulated Waves, AM and FM Transmitters and Receivers, Power line Carrier System.

EEC 401 Electromagnetic waves :

Parallel Plate Waveguide, TE and TM Modes, Dispersion, Attenuation Group and Phase Velocities, Wave Impedance, Rectengular and Circular Waveguides, Dielectric Waveguide : Slab rod and Fiber, Circuit Theory of Waveguiding Systems : Imedance, Transmission and Scattering Matrices, Excitation of Waveguides, Resonators, Passive Microwave Devices, Microwave Power, Wavelength and Impedance Measurements.

EEC 402 Electrical Testing :

Experiments on some of the Topics Coverd by The Different Courses Studied During The Academic Year.

EEC 403 Telephony :

The Telephone Systems, Conventional Telephone Sets, Public Switched Telephone Network, Switching Systems, Traffic and Trunking, Microprocessor Controlled Telephones, Digital Transmission Techniques, Network Transmission, Modems, Digital Data Links.

EEC 404 Communication Systems :

Signal Analysis, Random Variables and Processes. Digital Communications Fundamentals, BER Calculation in Different Systems, Noise in Communication Systems Employing Different Modulation Techniques. Communication System Design.

EEC 405 Information Theory :

Information Measure, Discrete Information Sources, Sources Without Memory, Markov Sources, State Diagram, Stationary Distribution, Entropy of Markov Source, Source Coding, Instantaneous Codes, Compact Codes, Huffman codes, Discrete Information Channel, Mntual Information, Binary Spmmetric Channel, Decision rules, Maximum Likelihood Decision Rule. Channel Capacity, Shannon's Cecond Theorem. Error Correcting Codes, Linear Codes, Convolutional Codes.

EEC 406 Electronic Engineering :

Basic IC Technology, IC Devices, Basic Linear IC Building Bocks, Funramentals of Op-Amps, Op-Amp. Circuits and Applications, Linear Integrated Circuits for Communications, Digital IC Familes and Applications.

EEC 407 Antennas :

Radiation From Current Elements, Radiation Resistance, Radiated Power, and Radiation Pattern, The Half Wave Dipole, The Travelling Wave Antenna, Electromagnetic Fields Close to the Antenna, Mutual Impedance Between Antennas, The Loop Antenna, The Biconical Antenna, Linear Uniform Arrays, Synthesis of Linear Arrays, The Parabolic Reflector Antemma, The Horn Antenna, The Lens Antenna, Slot Antenna, The Ionosphere and Sky Wave Propagation.

EEG 408 Microwave Electronics :

Frequency Limitation of Microwave Triodes, Klystron Amplifiers, Reflex Klystron, The Magnetron, Travelling Wave Tube Amplifiers, The Backward Wave Oscillators, Semiconductor Microwave Devices, Varactor Diodes, The Parametric Amplifiers, Negative Resistance Devices, The Tunnel Diodes, IMPATT, TRAPPAT Diodes, The Gunn Effect Devices, Masers and Lasers.

EEC 409 Electronic Computers :

Microprocessor Architecture and Operation, The Instruction Set, Program Assembly and Simulation Macros, The Stack and Subroutines, Integer and Floating Number Representation and Arithmatic, Program Controlled I/O — Interrupt Structure.

EEC 411 Automatic Control :

Introduction to Digital Control Systems, Sampling Process, Z-Transform, Signal Flow, Discrete State Models, Stability of Digital Control Systems, System Design of Digital Controllers, Analysis of Non-Linear Control Systems : Phase-Plane, Describing Functions, Topics on Modern Control : Optimal Control of Linear Systems, Identification Methods, Analysis and Design of Control Systems Subjected to Stochastic Environment.

EEC 412 Electronic Computers :

Part (A) : Compufer Organization

Basic Computer Structures, Addressing Methods and Machine Sequencing, Instruction Sets and Their Implementation, The Central Processing Unit, Microprogrammed Control Input-output Programming, Arithmatic Unit, The Main Memory, Computer Peripherals and Interfacing Computer Communications.

Part (B) : Operating Systems

Operating Systems and Resource Managers, Process Concepts, Asynchronous Concurrent Processes, Concurment Programming (Monitors and The Ada Rendezvous), Real and Virtual Storage Management, Process Scheduling, Disc Scheduling, File Systems, Case Studies.

EEC 413 Electrical Testing :

Experiments on some of the topics Covered by The Different Courses Studied During The Academic Year.

EEC 414 Pulse & Digital Circuits :

Linear Wave Shaping, Diode Wave Shaping, Transistor Switching Characteristics, Multivibrators, Integrated Digital Logic Circuit Families and Characteristics, Field Effect Transistors.

EEC 415 Industrial Measurements :

Fundamentals of Process Control, On/off Control, Ratio, Feedforward Control Systems, PID Controllers, Different Techniques for Tuning PID Controllers, Identification of Processes From Reaction Cuves, Implementation of PID Controllers Using Microprocessors, Practical Applications.

EEC 416 Computer Applications :

Program Design Tools and Techniques, Elements of Logical Expressions, Relations and Functions, Elements of Program Expressions, Structured Programs, Database Processing and Data Structures, Database Design, Relational Database Model, Numerical Techniques.

EEC 417 Computer Systems Programming :

Introduction to Machine Structure, Machine Language, Assembly Language, Design Procedure of Assemblers, The Different Techniques of Sorting and Searching, The Macro Language and The Design of Macroproessors, Loader Schemes and Their Design, High Level Programming Langueges Features, Compiler Design.

EEC 418 Digital Communication Systems :

Random Processes, Entropy, Channel Capacity, Communication Efficiency, Receiver Noise, Base-Band Transmission, Band-Pass Transmission, Digital Transmission and Modulation Techniques.

EEC 419 Electronic Instrumentation Systems :

Measurement Systems Slassification, Amplifiers, The Operational Amplifiers, Voltage and Current References, Comparators, Sample and Hold Circuits, D/A and A/D Converters, Digital Measuring Equipment, Display of Electronic Signals, Data Acquisition System-Microprocessor Based Systems.

EEC 450 Project for Electronics and Communications Section Students :

Study and Design of a Selected System.

EEC 451 Project for Computers and Control Section Students :

Study and Design of a Selected System.

MECHANICAL ENGINEERING

Mechanical Engineering

First year

Course Code	Course Title	No.Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	Final Exam. Hours
PHM 110	Mathematics	2	2	4	60	20	20	—	100	3
PHM 111	Mechanics	2	2	4	60	20	20	—	100	3
PHM 112	Phyacis	2	2	4	60	15	10	15	100	3
MDP 101	Mechanical & Electrical Drawing	—	3	3	60	20	20	—	100	3
CES 125	Theory of Structures	2	1	3	60	20	20	—	100	3
CES 126	Properties & Testing of Materials	1	1	2	60	20	20	—	100	3
MDP 102	Metallurgy	1	1	2	60	15	10	15	100	3
MDP 103	Production Engineering	2	1	3	60	15	10	15	100	3
MEA 101	Thermodynamics (1)	2	1	3	60	20	20	—	100	3
EPM 121	Eectrical Engineering	2	1	3	60	20	20	—	100	3
		16	15	31					1000	

Mechanical Engineering
Second Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	
MDP 201	Production Engineering	2	2	4	60	15	10	15	100	3
MDP 202	Theory Of Machines (1)	2	2	4	60	20	20	—	100	3
MDP 203	Machine Construction (1)	2	2	4	60	20	20	—	100	3
MEA 201	Heat Transfer	2	2	4	60	15	10	15	100	3
MEA 202	Thermodynamics (2)	2	2	4	60	15	10	15	100	3
MDP 204	Stress Analysis	2	1	3	60	20	20	—	100	3
CEI 221	Fluid Mechanics	1	2	3	60	20	20	—	100	3
PHM 202	Mathematics	2	1	3	60	20	20	—	100	3
EPM 222	Electrical Engineering	2	1	3	60	20	20	—	100	3
		17	15	32					900	

Mechanical Engineering
(Energy Section)
Third Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
MEA 301	Combustion Engines	3	2	5	120	30	20	30	200	4
MDP 321	Theory of Machines(2)	2	2	4	60	20	20	—	100	3
MDP 322	Machine Construction(2)	2	2	4	60	20	20	—	100	3
MDP 323	Production Engineering	2	2	4	60	15	10	15	100	3
MEA 303	Turbo Machinery (1)	2	2	4	60	15	10	15	100	3
MEA 304	Thermal Plants	2	1	3	60	20	20	—	100	3
MEA 305	Combustion	2	1	3	60	15	10	15	100	3
EPM 323	Electrical Engineering	2	1	3	60	20	20	—	100	3
MEA 324	Measuring Instruments & Control	—	2	2	40	20	20	20	100	3
		17	15	32					1000	

Mechanical Engineering
(Automotive Section)
Third year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
MEA 310	Combustion Engines	3	2	5	120	30	20	30	200	4
MDP 326	Theory of Machines (2)	2	2	4	60	20	20	-	100	3
MDP 327	Machine Construction	2	2	4	60	20	20	-	100	3
MDP 328	Production Engineering	2	2	4	60	15	10	15	100	3
MEA 311	Turbo Machinery	2	2	4	60	15	10	15	100	3
MEA 312	Automotive Design	2	2	4	60	20	20	—	100	3
MEA 313	Automotive Engineering	2	2	4	60	20	20	-	100	3
EPM 325	Electrical Engineering	2	1	3	60	20	20	—	100	3
		17	15	32					900	

Mechaniacal Engineering
(Producion Section)
Third Year

Course Code	Course Title	No.Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
					Third	Year				
MDP 301	Theory of Machines (2)	2	2	4	60	20	20	—	100	3
MDP 302	Machine Construction	2	2	4	60	20	20	—	100	3
MDP 303	Production Engineeing	2	1	3	60	15	10	15	100	3
MEA 322	Fluid Machinery (1)	2	2	4	60	15	10	15	100	3
MDP 304	Theory of Metal Forming	2	2	4	60	15	10	15	100	3
MDP 305	Theory of Metal Cutting	2	2	4	60	15	10	15	100	3
EPM 324	Electrical Engineering	2	1	3	60	20	20	—	100	3
MDP 306	Machine Tools and Forming Machines	2	1	3	60	15	10	15	100	3
MDP 307	Measuring Instruments	1	2	3	40	20	20	20	100	2
		17	15	32					900	

Mechanical Engineering
(Energy Section)
Fourth year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	Final Exam. Hours
MEA 401	Turbo Machinery(2)	4	2	6	120	30	20	30	200	3+3
MEA 402	Energy Plants	4	2	6	120	30	20	30	200	4
MEA 403	Refrigeration And Air Conditoining	2	2	4	60	15	10	15	100	3
MDP 421	Industrial Organization	2	2	4	60	20	20	—	100	3
MDP 422	Automatic Control	2	2	4	60	20	20	—	100	3
EPM 421	Electrical Energy	2	1	3	60	20	20	—	100	3
MDP 423	Industrial Legislation	1	—	1	50	—	—	—	50	2
MEA 450	Project	—	4	4	—	—	—	—	200	—
		17	15	32					1050	

Mechanical Engineering
(Automotive Section)
Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	Final Exam. Hours
MEA 410	Automotive Design	4	4	8	120	40	40	—	200	4
MEA 411	Automotive Maintenance & Planning of Service	4	2	6	120	30	20	30	200	4
MEA 412	Automotive Engineeering	4	2	6	120	40	40	—	200	4
MDP 421	Industrial Organization	2	2	4	60	20	20	—	100	3
MEA 413	Vehicle Manufacture Repair	2	1	3	60	20	20	—	100	3
MDP 423	Industrial Legislation	1	—	1	50	—	—	—	50	2
MEA 451	Project	—	4	4	—	—	—	—	200	—
		17	15	32					1050	

Mechanical Engineering

(Production Section)

Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
MDP 401	Factory Planning and Work Study	4	2	6	120	30	20	30	200	4
MDP 402	Industrial Adminstration and Operation Research	3	2	5	120	30	20	30	200	4
MDP 403	Machine Tool Eng	2	2	4	60	15	10	15	100	3
MDP 404	Deaign of Tools And Production Equipment	2	2	4	60	15	10	15	100	3
MDP 405	Quality Control	2	2	4	60	15	10	15	100	3
MDP 406	Metrology	2	2	4	60	15	10	15	100	3
MDP 407	Industrial Legislation	1	—	1	50	—	—	—	50	2
MDP 450	Project	—	4	4	—	—	—	—	200	—
		16	16	32					1050	

Department of Energy and Automotive Engineering

Description of Courses

MEA 101 Thermodynamics (1).

Some important applications of thermodynamics, Mechanical Quantities and their units, work, temperature, heat, First law of thermodynamics kinetic theory of gases, Gaseous Mixtures, Fuels and Combustion.

MEA 201 Heat Transfer :

Methods of Heat Transfer by Conduction, Convection and Radiation — Applications of Heat Transfer in Multi Resistances and Heat Exchangers.

MEA 202 Thermodynamics (2) :

Reversible and Irreversible Processes - The Second law of Thermodymics, thermal cycles, Entropy Kinetic Theory of gsses; Gaseous Mixtures, Fuels and Comustion, Vapour Cycles.

MEA 220 Mechanical Engineering :

Compressors and Internal Combustion Engines.

MEA 221 Heat Engines :

Units and definitions, first law of thermodynamics - Reciprocating Comp. pressors, Reversible and Irreversible Processes, Second law Of thermodynamics, thermal cycles, Entropy, Kinetic Theory of gases; Gaseous Mixtures, Fuels and Combustion, Vapour Cycles.

MEA 301 Combustion Engines :

Combustion Chambers — Friction and Lubrication — Engine cooling — Engineering Capacity — Mixture Formation and Ignition — Performance.

MEA 303 Fluid Machinery (1) :

Mathematical models of fluid motion — Theory and Performance of centrifugal Pumps and blowers — Displacement pumps — Hydraulic Transmission.

MEA 304 Thermal Plants :

Boilers — Evaporators — Condensers — Water treatment plants — Pipe Plant maintenance — Control.

MEA 305 Combustion :

Theory of combustion — Combustion of solid, liquid and gaseous Fuels — Burners — Furnace design — Combustion Chambers —Insulation — Draft Systems.

MEA 310 Combustion Engines :

Combustion chambers — Friction and Lubrication — Engine cooling — Engine Capacity — Mixture Formation and ighition — Performance.

MEA 311 Turbo Machinery :

Mathematical models of fluid motion — Theory and performance of centrifugal pumps and blowers. Displacement pumps and compressors — Hydraulic Transmission.

MEA 312 Automotive Design :

Clutches — Propellar Shaft — Gearboxes — Rear axle.

MEA 313 Automotive Engineering :

Tyre contact with road — Resistances — Choice of Gear Ratios — Brakes — Steering.

MEA 321 Heat Engines :

Heat Transfer by Conduction, Forced Convection and Radiation, Heat exchangers, steam power stations, Gaseous stations.

MEA 322 Turbo Machinery (1) :

Mathematical models of fluid motion — Theory and performance of centrifugal pumps and blowers — Displacement pumps and compressors — Hydraulic transmission.

MEA 324 Measurements and Instrumentation :

General Energy Measurements — Standards — Calibration of Instruments — Measurements of time, Pressure, Temperature, Rate of flow, Concentration, Angular velocity — Transient and repetitive pressure — Indicators — Automatic Control Principles.

MEA 326 Air Conditioning :

Properties of air and water vapour — Psychometric charts — Physical and phitiological principles — Fundamentals of heat transfer — Heat

transmission coefficient of building materials. Heating load : transmission and infiltration — cooling load : transmission, infiltration, solar radiation, lights, motors, machinery and occupants, the strata and rate of conditioned air — principles of air duct design — Building insulation — Heating and cooling cycles.

MEA 401 Turbo Machinery (II) :

Two dimensional Flow — Theory and performance of axial flow pumping machinery — Theory and performance of water, steam and Gas Turbines.

MEA 402 Energy Plant :

Steam, Gas and hydraulic energy generating plants — Variable loads — performance — Maintenance.

MEA 403 Refrigeration and Air Conditioning :

Vapour Compression cycles — Refrigerants — Multistage Cycles — Steam jet refrigeration — Absorption refrigeration — Air conditioning loads — Equipment and sysems — Humidification.

MEA 410 Automotive Design :

Engine Design : Cylinder block and head — Cylinder — Piston connecting rod — Crankshaft — Valve Gear mechanism including valves and camshaft.

MEA 411 Automotive Maintenance and Planning of Service :

Maintenace, tuning, repair and overhauling of auromotive engines, transmission system, chassis, body and electrical accessories — planning of service for different types of fleets.

MEA 412 Automotive Engineering :

Steering — Torque converters — Suspension and comfort Equations of vehicle motion — Soil properties — Contact between roads and both tyre and chains — Earth moving appliances.

MEA 413 Vehicle Manufacture and Repair :

Vehicle manufacturing steps — Production workshop for repairing and rebuilding vehicle parts — Finishing and painting — Technical inspection — Design of production and assembly lines.

MEA 450 Project : For Energy Section Students.

MEA 451 Project : For Automotive Section Students.

Department of Design and Production Engineering

Description of Courses

MDP 021 Production Engineering :

Production Elements : Money — Material — Man — Method — Marketing.

Production of Iron and Steel — Blast Furnaces — Steel Furnaces.

Production of Non Ferrous Metals and Alloys — Non — metallic Materials.

General properties of Engineering Materials — Effect of Mixing the Metals on their properties — Production Planning and Economics.

Introduction of Mechanical Properties of Materials in Engineering

Forming Processes and properties of Materials.

Primary Forming processes — Costing and Fusing Furnaces — Forging — Metal Joining Production by Metal Cutting.

MDP 101 Mechanical & Electrical Drawings :

Methods used in Drawing & Designing Offices — Kinds of Drawings — Position of Dimensions — Views of Sections — Parts of Normal Machines — Drawing Parts of Machines.

MDP 102 Metallurgy :

Substance Structure — Crystallography — Mechanism of Metals Solidiffication — Properties of Metals Alloys — Thermal Equilibrium Binary Alloys Diagrams — Thermal Equilibrium Ferrite & Cementite Diagram — Non Equilibrium Conditions — T.T.T. Steel Diagram — Heat treatments of steel — Carbon Steel and Alloy Steel — Cast Iron — Non — Ferrous Metals and Alloys (Copper — Aluminium — Magnesium — Titanium) — Engineering Alloys — Powder Metallurgy.

MDP 103 Production Engineering :

Principles of Metal Cutting — Cutting Tools Materials — cooling liquids used in Cutting Processes — Shaping & Planning Processes — Milling Processes — Gears Gutting — Indexing and Dividing Heads — Grinding processes — Modern Machining Processes, Allowance in Differemt Machining Processes — Principles of Metal Forming — Rolling — Drawing — Deep Drawing Extrusion — Forging.

MDP 121 Production Engineering :

Introduction to different materials and properties, Manufacturing Processes : Casting (Sand, metal moulds), Welding (Pressure, non pressure), Brazing and Soldering), hot working operation (roling, forging, extrusion, Tube and pipe manufacture), Cold working (extrusion, foil manufacture, wire and tube drawing, Shearing, bending), Machining (processes, cutting tools; basic elements of machine tools), Works visits.

MDP 122 Electrical and Mechanical Drawing :

Methods of projection, Dimensioning, Sectional views and exercises for assembly of different electrical and electromechanical Components, electric wiring diagrams.

MDP 201 Production Engineering :

a) Casting Processes — Material Consisting Mould — Forming of the Mould and Core — Industrialization Patterns — Pouring and Solidification — Different Casting Methods — Design of risers and Sprues-casting Defects — Casting Tests — Mechanical Foundry — Foundries planning — Industrial Security.

b) Joining of Metals by welding : Oxy-Acetylene welding — Fusion Welding — Thermit Welding — Electric Arc Welding — Cold Welding — Hot Welding — Brazing Welding — Soldering Welding — Electric Resistance Welding — Atomic Hydrogen Welding — Plasma Arc Welding — Electronic Beam Welding — Laser Welding — Projection Welding — Ultrasenic Welding — Classification of Welding processes for different Metals.

MDP 202 Theory of Machines (1) :

Mechanisms — Velocitp & Acceleration Diagrams — Static & Dynamic Forces Analysis — Cams — Wheel Gearing — Gear Trains — Governors — Balancing of Reciprocating & Rotating Masses and Applications of In — line and V Twin Engines.

MDP 203 Machine Construction (1) :

Basic Considerations of Machine Design — Safety Factor — Stresses — Calculations in Design — Screwed, Welded and Riveted Joints — Shafts & Axles — Power Screw — Keys — Couplings — Cultches — Springs — Bolts and Chains.

MDP 204 Stress Analysis :

Properties of plane Areas — Combined stresses — Theories of Failure — Slopes and Deflections — Strains and Deformations — Plane Analysis and Calculation of Internal Forces for Statically Indeterminate Beams, Frames and Trusses — Flexural Analysis of Curved Beams — Shell Structure (Preasure Vessel & Liquid Container) — Bukling of Compression Members and Planes — Elastic Stability in Parts — Properties of Plasticity for Solids.

MDP 301 Theory of Machines :

Mechanical vibrations (transverse and torsional) — single and multi — degree systems — Equivalent systems — Introduction to the Theory of Automatic Control.

MDP 302 Machine Construction :

Fluid Lubrication — Sliding and Rolling Bearings — Clutches — Brakes — Gears — Cylinders and Steel Welded joints.

MDP 303 Production Engineering :

Part 1 : Machining processes :

Grinding — Semiautomatic and Automatic machining — Gear Cutting — Honing — Lapping — Superfinishing — Electro — Chemical Machining, Electro — Discharge Machining — Machhining allowance and accuracy — Process sheets.

Part 2 : **Forming Processes :**

Product Design — Process variables — Technological aspects — Defects — Inspection and Testing of finished products : (Hot Forging — Hot Extrusion — Hot Rolling — Roll Forming Cold Forging and Coining — Hydrostatic and Impact Extrusion — Wire and Tube Drawing — Cold Rolling — Bending — Sheet Metal Work).

MDP 304 Theory of Metal Forming :

Introduction to the Theory of Plasticity — Stress — Strain — Stress/Strain relationships — Yield Criteria — Methods of Determining Strain Hardening Characteristics — Mechanics of Forming Processes.

MDP 305 Theory of Metal Cutting :

Chip Formation — Cutting Angles — Cutting Forces — Methods and Equipment for Measuring Cutting Forces — Cutting Temperatures — Cutting Tool Materials — Tool Life and Tool Wear — Cutting Fluids Machinability and Machining Economics — Surface roughness — Chatter.

MDP 306 Machine Tools and Forming Machines :

a) Machine Tools : Accuracy of Machine Tools — Design of Machine Tool Parts according to standard Specifications — (Drives — Beds — spindles) — Maintenance — Acceptance Tests.

b) **Forming Machines :** Basic Types and Capacities — Main Elements — power Transmission and Efficiency — Control and Safety Devices (Presses — Hammers — Draw Benches — Rolling Mills).

MDP 307 Meassuring Instruments :

Kinematic design of equipment — Methods of magnification in linear measuring instruments — Limit gauges and their design — Angular measuring instruments — temperature measurements.

MDP 321 Theory of Machines :

Mechacical vibrations (Transverse and Torsional) — Single/Multi — degree systems — Equivalent systems — Introduction to the theory of automatic control.

MDP 323 Production Engineering :

Part (I) : Finish of Processes — Process sheets.

Part (II) : General Classification of Forming Processes — Process variables — Technological Aspects — Examples and Applications to Line Problems, (Connecting Rod and Crank Shaft Forging — Low and High Pressure Pipe Production — Car Body Manufacture).

MDP 326 Theory of Machines :

Mechanical Vibrations (Transverse and Torsional) — Single and multi — degree systems — Equivalent systems, Introduction to the theory of automatic control.

MDP 327, 322 Machine Comstruction :

Fluid Lubrication — Sliding and Rolling Bearings — Clutches — Brakes — Gears — Cylinders and Seals.

MDP 328 Production Engineering :

Finishing processes, process Variables, Technological aspects, Examples and applications to line problem (connecting rod and crank shaft forging, Low and high pressure pipe production, Car body manufacture).

MDP 401 Factory Planning and work study :

Productivity — Motion study — Time study (Selection of Factory sity — principles of factory planning — Line balance Flexibility — Storage Layout — Selection of machines and equipment.

MDP 402 Industrial Adminstration & Operations Research :

Factory organization — Casting — Storing models — Maintenance — programming — Principles of operation research — Loading — Industrial relations.

MDP 403 Machine Tool Ergineering :

I — Machine Tools : Performance testing of machine tools — Dynamics of machine tools — Automatic Control of machine tools — CAM Automatics — CNC in machine tools — FMC.

II — Continuous Rolling — Mills — Roll pass design — Mill automation — Capacity of continuons strip mill.

MDP 404 Design of Tools and Production Equipment :

Jigs and Fixtures — Design of cutting tools — Design of forming tools.

MDP 405 Quality Control :

I — Industrial Statistics : Representation of data, Statistical measures, probability distributions, Testing hypothesis, Analysis of variance, Analysis of regression and correlation.

II — Quality Control : standard, quality control techniques, Organization for quality, planning, Reliability, Sampling techniques, Case studies.

MDP 406 Metrology :

Linear measurement — Thread measurement — Gear measurement — Thread — surface texture meassurement — Flatness and straightness — Alignment measurement — Force measurement — Vibration measurement.

MDP 407 Industrial Legislations :

Work Legislations — Law.

MDP 421 Industrial Organization :

Plant organization, planning Industrial projects, Work study, Plant layout, Industrial Cost accountings, production plannig and quality control, Industrial relations, Introduction to Operations Research.

MDP 422 Automatic Control :

Linear system analysis, stability, Introduction to non — linear systems.

MDP 423 Industrial Legislation :

Industrial Organization. Industial Property, Indusrial safety, Labour legislation, Law.

MDP 450 Project :

ARCHITECTURAL ENGINEERING

Architectural Engineering

First Year

Course Code	Course Title	No.Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
ARC 101	History of Architecture	2	—	2	60	20	20	—	100	3
ARC 102	Theory of Architecture	2	—	2	60	20	20	—	100	3
ARC 103	Free Hand Drawing and Visual Design	1	2	3	40	30	30	—	100	3+3
ARC 104	Sciagraphy and Perspective	2	2	4	60	20	20	—	100	3+4
ARC 105	Architectural Design	—	8	8	60	60	40	40	200	8
ARC 106	Architectural Building Construction	2	2	4	60	60	40	40	200	5
CES 121	Theory Of Structures	3	2	5	120	40	40	—	200	4
CES 122	Properties and Testing Of Materials	1	1	2	60	20	20	—	100	3
CEP 122	Surveying	1	1	2	60	15	10	15	100	3
		14	18	32					1200	

Architectural Engineering
Second Year

Course Code	Course Title	No. Of Hours Per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
ARC 201	History of Art & Architecture	2	—	2	60	20	20	—	100	3
ARC 202	Theory of Architecture	2	—	2	60	20	20	—	100	3
UPL 221	Town Planning	2	—	2	60	20	20	—	100	3
ARC 204	Architectural Design	—	10	10	100	100	50	50	300	9
ARC 205	Architectural Building Construction	3	2	5	60	60	40	40	200	5
CEP 221	Sanitary Installations	2	—	2	60	20	20	—	100	3
CES 222	Reinforced Concrete Structues and Foundations	4	2	6	100	40	40	20	200	4+3
CES 223	Metallic Structures	2	1	3	60	20	20	—	100	4
		17	15	32					1200	

Architectural Engineering
(Architecture Section)
Third Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
ARC 301	Theory of Architecture	2	—	2	60	20	20	—	100	3
UPL 321	Town Planning and Housing	2	4	6	100	60	20	20	200	3+3
ARC 302	Architecural Design	—	10	10	100	100	50	50	300	9
ARC 303	Working Drawings	—	6	6	60	60	40	40	200	7
ARC 304	Landscaping	2	—	2	60	20	20	—	100	3
ARC 305	Technology and Building Industury	2	—	2	60	20	20	—	100	3
EPM 326 MEA 326	Acoustics, Illumination Air Conditioning	3	—	3	60	20	20	—	100	3+3
ARC 306	Professional Experience and Legislation	1	—	1	30	20	—	—	50	3
		12	20	32					1150	

Architectural Engineeng
(Urban Planning Section)
Third Year

Course Code	Course Title	No.Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
UPL 301	Sociology and Regional Geography	3	—	3	60	20	20	---	100	3
UPL 302	Town Planning and Housing	2	4	6	100	60	20	20	200	3+3
UPL 303	Urban Design	—	6	6	60	60	40	40	200	7
ARC 321	Architectural Design	—	10	10	100	100	50	50	300	9
UPL 304	Landscaping	2	—	2	60	20	20	—	100	3
UPL 305	Technology and Building Industry	2	---	2	60	20	20	—	100	3
EPM 321	Accuetics (Environmental Control)	2	—	2	60	20	20	---	100	3
UPL 306	Professional Experience And Legislation	1	—	1	30	20	---	—	50	2
		12	20	32					1150	

Architectural Engineering
(Architecture Section)
Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work	Mid-Exam.	Oral Exam.	Total	
First Half of the Academic Year										
ARC 401	Theory of Architecture	3	—	3	100	60	—	40	200	2
UPL 421	Town Planning	2	2	4	100	60	—	40	200	4
ARC 402	Architectural Design	—	12	12	120	200	—	80	400	9
ARC 403	Working Drawings Design	—	8	8	100	150	—	50	300	7
ARC 404	Quantities and Specifications	2	1	3	50	30	—	20	100	3
ARC 405	Feasibility Studies and Management of Building Operations	2	—	2	50	30	—	20	100	3
		9	23	32					1300	
Second Half of the Academic Year										
ARC 450	Project in Architectural Design	—	32	32					400	

Architectural Engineering
(Urban Planning Section)
Fourth Year

Course Code	Course Title	No. Of Hours per Week			Maximum Marks					Final Exam. Hours
		Lect.	Tut./ Lab	Total	Final Exam.	Year's Work.	Mid-Exam.	Oral Exam.	Total	
First Half of the Academic Year										
UPL 401	Urban Economics	2	—	2	40	30	—	30	100	2
UPL 402	Town Planning	4	—	4	100	60	—	40	200	5
CEP 427	Traffic Engineering and Transport	2	—	2	60	20	—	20	100	3
UPL 403	Urban Design	—	12	12	120	200	—	80	400	9
ARC 421	Architectural Design	—	8	8	100	150	—	50	300	7
UPL 404	Feasibilty Studies and Cost Estimation	2	—	2	50	30	—	20	100	3
UPL 405	Laws and Planning Acts	2	—	2	50	30	—	20	100	3
		12	20	32					1300	
Second Half Of the Academic Year										
UPL 450	Project in Urban Design	—	32	32					400	

Department of Architecture

Description of Courses

ARC 101 History of Architecture :

Prehistoric, Egyptian, Greek and Roman Architecture.
Early Christian Architecture.
Byzatine Architecture.
Islamic Architecture.

ARC 102 Theory of Architecture (1) :

Prehistoric, Egyptian, Greek and Roman Architecture.
Introduction to Architecture.
Human Scale.
Construction related to Architecture.
Elements of Buildings.
Climate and Architecture.
Data and Dimensions.

ARC 103 Free Hand Drawing and Visual Design.

Free hand drawing in pencil of architectural elements from models and nature.
Study and application of visual arts.
Ways of Architectural Representation.

ARC 104 Sciagraphy & Perspective :

Study of shades and shadows of different architectural elements.
Vanishing and measuring points.
One vanishing point perspective.
Two vanishing points perspective.
Applications on different forms and architectural elements.
Shades and shadows in perspective.

ARC 105 Architecture Building Design :

Analysis study and design of small buildings.
Elements of site planning.
Constructional expression in architecture.

ARC 106 Architectural Building Construction :

Methods of building construction :

Wall bearing, skelton and retaining walls.

Damp - proof materials and applications.

Expansion and settlement joints.

Rainwater drainage.

Floor and roof construction.

Wall and floor finishing.

Means of vertical circulation (stairs).

ARC 201 History of Art and Architecture :

Romanesque architecture.

Gothic architecture.

Rensissance architecture.

Islamic Architecture.

ARC 202 Theory of Architecture :

Basic elements of design : functions, Beauty, Stability and economics.

ARC 204 Architectural Design :

Analysis, study and design of buildings of different architectural elements (housing, Construction & Circulation).

Sketch designs.

ARC 205 Architectural Construction and (Execution) Design :

Timber construction.

Fenestration in wood and metal.

Dimensioning of working drawings & details.

ARC 301 Theory of Architecture :

Analytical study of public buildings :

Housing, Health buildings, Cultural buildings and Commercial buildings.

Industrial & Agricultural buildings....etc.

Composition and Esthetics in architecture.

ARC 302, 321 Architectural Design :

Study and design of Complex public and domestic subjects in relation to group planning and general layouts.

Study and design of public and recreational subjects, sketch designs.

ARC 303 Exection Design :

Full set of working drawings of two projects designed by the student, the second project includes special problems of advanced technology in building industry.

ARC 304 Landscaping :

Fundamentals, Natural, Urban, Different ages : Pharonic, pershian, Indian, European, Modern trends : General, Residential, Urban, Elements of Site Composition, Economics, Acts.

ARC 305 Technology and Building Industry :

Building equipment, specialized tools, Advantages, productivity rates; standard rates for performance and labour productivity, Economics, Use of equipment in different projects.

ARC 306 Professional Experience and Legislations :

Domains of professienal experience, Responsibilities and rights of architect, Management of architural engin offices, Laws and acts. of buildings and urban planning.

ARC 322 Building Construction :

Types of Buildings : Bearing and skelton Types — Erection Methods — Erection programs — Time planning.

Finishing Materials — Sanitary works — Electrical works — Thermal and Moisture Isolation.

Standard dimensions of openings and stairs.

ARC 401 Theory of Architecture :

Theories of Comtemporary architecture during (1900 - 1950).

Space form and order.

ARC 402, 421, Architectural Design :

Design of complex architectural problems.

Sketch design with special characters.

Research in contemporary architectural trends.

Interior Decoration :

Principles of contemporary interior architectural design.

Historical review of interior design in classical styles, materials uses and execution.

Colours, colour analysis, mixing, physical and pspchological effects, colour distribution development of conception, contemporary theories, proportions, areas and volumes, relations and visual effects, visual distortions and effects, application of design and colour theories in practice, applied design.

ARC 403 Execution Design :

Full set of working drawings of a project designed by the student to include extensive detailing.

ARC 404 Quantities and Specifications :

Quantites

Principles of measure.

Counting Survey of constructional works.

Counting accessories and finishing works.

Counting process.

Specifications :

Specifications of building materials of construction.

Supervision of different works and the relation between.

Execution of different works and the relation between.

architectural design and execution.

Technical supervision, Payments, time plan check ups in office and on site.

site management.

Study of offers, general regulations of contracts.

Architect, contractor and owner responsibilities and relations between them.

ARC 405 Feasibilty Studies and Management of Building Operations :

General skelton of feasihlity study, project evaluation, utilization, Engineering, financial, market factors affecting feasihlity studies, Building operations management, Critical path, PERT, linear Tables, use of computers.

ARC 450 Archirectectural Project :

Architectural research.

Determination of the architectural program.

Preparation of the architectural scheme with the aim of achieving creative solutions with, consideration of social, ecnomic and structural factors accompanied by an architectural report.

Department Of Urban Planning

Listing Of Courses

UPL 221 Town Planning :

UPL 301 Sociology and Regional Geography :

UPL 302 Town Planning and Housing :

UPL 303 Urban Desiga :

UPL 304 Landscaping :

UPL 305 Technology and Building Industry :

UPL 306 Professional Experience and Laws :

UPL 321 Town Planning :

UPL 491 Urban Economics :

UPL 402 Town Planning :

UPL 403 Urban Design :

UPL 404 Laws and Planning Acts :

UPL 421 Town Planning :

UPL 450 Project :

The 200'S have started in the academic Year 1986/1987.

The 300'S and 400'S will start in 1987/1988 and 1988/1989.

Curricula will be included in the next edition of this bulletin.

BASIC SCIENCES

Department of Engineering Mathematics and physics

Description of Courses

PHM 011 Mathematics :

Differential and Integral calculas :

Functions and related concepts — Limits and continuity — Differentiation rules — Derivatives of algebraic functions — Applications of derivatives including curve sketching and asymptotes — Derivatives and antiderivatives of elementary functions — Nth derivative and Leibniz formula — Techniques of integration including integration by substitutions, by parts and by reduction — definite integral and its applications — Improper integrals — Numerical Integration — Mean value theorems — Hopital's rule — Functions of several variables — Partial derivatives — Differential Equations of the first order and first degrree.

Algebra and Analytic geometry :

Complex numbers : Polar form — Application to electrical Circuits — De Moivre's theorem and its applications — Elements of set theory — Boolean algebra and its applications — Inequalities and linear programming — Flow chart — Elements of the theory of algebraic equations — Numerical methods for solving algebraic equations and systems of linear equations — Trigonometry — Nomography — Conic sections : parabola — ellipse — hyperbola.

PHM 012 Physics :

Units and Dimensions — Basic concepts of vectors in physics, velocity, momentum, and energy relationship of SHM to uniform circular motion. Gravitation and Planatary metion, stresses in a fluid at rest — Buovancy — Surface Tension — Fluids in Motion, Bernoulli's equation and applications — Viscosity and determination of its coefficient — Deformations of Solids — Relation between Moduli of Elasticity and their determination.

Heat Transfer — Black Body radiation — Kinetic Theory of Pressure in Gases — Interpretation of temperature — Applications of First Law of Thermodynamics — Applications of the Second Law of Thermdynamics — some Remarks on Solar Energy.

Fermat's Principle and reflection and refraction of Light — Reflection and Refraction at spherical surfaces — Dispersion — Aberration during reflection and refraction — Thick lenses and lens conbinations — Bohr's Model of H — atom and Colour.

Coulomb's law and electric field — Gauss's law and electric field — Electric Potential — Capacitors with and without dielectrics — Atomic view of electric current — Resistivity — EMF Kirchhoff's laws.

The Magnetic Induction vector — Biot — Savart law and applications — Ampere's circuital law applications — Transient L-R and C-R currents — Steady State LR and CR circuits — A.C. circuits — Magnetic Properties of Matter.

PHM 013 Mechanics :

1 — Statics

Vector Algebra in three dimensions.
Forces in three dimensions — reduction to wrench applications.
Bodies connected by smooth hinges.

2 — Dynamics :

Kinematics of a particle in three dimensions — Applications.

Newton's laws of motion, work and energy.

Rectilinear motion of a particle, applications.

Simple harmonic motion of a particle, applications.

Projectile motion, applications.

Circular Motion of a particle and general motion of a particle under constraint, applications.

Impulsive motion of a particle, applications.

PHM 014 Descriptive Geometry :

Biorthogonal Projection : Representation of a Point, Straight Line and Plane, Auxiliary Projecton, Position and Metric Problems — Polyhedrons and their representation, Plane sections and Developments — The Circle construction of the Ellipse. The Sphere and its plane section — The Cone, Cylinder and Conic sectors — Surfaces of Revolution and their Intresections — The Helical Surfaces.

Orthogonal Axonometry : The Point, Straight Line and Plane — Position and Metric Problems — Polyhedrons — The Circle, Sphere, Cone, Cylinder and Helix.

PHM 015 Engineering and Architectural Drawing :

The Use and Maintenance of Drawing Instruments — Conventional Lettering and Dimensioning — Engineering Projections — Derivation of

Views from Isometric Drawings and Vice Versa.

Derivation of Views and Sections from given Views — Symbols of Electrical Circuits — Principles of Architectural Drawing.

PHM 016 Chemistry :

1 — **Theoretical Course :**

The gaseous state.

The liquid state.

The Solid state.

Semiconductors.

The phase rule.

Solutions.

Thermochemistry.

Solutions of electrolytes.

Electrochemistry.

Corrosion.

Alloys.

2 — Nuclear chemistry.

Industries based on calcium and silicon compounds (ceramics and cements).

Organic chemistry.

Fuels.

Combustion.

Air polution.

High polymers.

Water treatment.

II) **Practical Excercises :**

Detection of anions and cations in simple Salts.

Titrimetric analysis.

Water analysis.

Petrolium tests (demonestration only).

PHM 101 Mathematics :

Vectors in three-dimensional spase and solid analytic geometry :

Vectors in three-dimensional space - Scalar, Vector and scalar triple products of vectors — Lines and planes in space — Surfaces of the second degree in space — Tangent plane and normal to any surface.

Multiple integrals :

Double integrals — Change of order — Double integrals in polar coordinates — Area and volume by double integrals and other applications — Change of Variables — Triple integrals — Integration in cylindrical and spherical coordinate — Line integrals — Green's theorem — Surface integral.

Infinite series :

Infinite series of constant terms — Convergence and divergence — Comparison test — Integral test — Ratio — Cauchy test — Alternating series and absolute convergence — Power series.

Expansion of functions :

Rolle's and mean value theorems — Taylor's and Maclaurin's formulae — Power series expansions of functions of several variables.

Curvature :

Curvature of a circle — Formulae for curvature — Newton's method — Evolute and envolute — Intrinsic equation — Special curves.

Some applications of partial differentiation :

Maxima and minima of functions of several variables — Lagrange multipliers and constrained maximum — minimum problems — Envelopes — Differentiation under the integral sign.

Differential equations of higher orders :

Definitions — Homogeneous equations and complementary functions — Nonhomogeneous equations — The method of undetermined coefficients — Operator method — Variation of parameters — Reduction of order — Euler's equations — Simultaneous equations — Applications.

Fourier series :

Periodic functions — Fourier series — Euler's formulae — Functions having arbitrary period — Even and odd functions — Even and odd harmo-

nics — Half — range expansions — Numerical computation of Fourier coefficients.

PHM 102, 105 Mechanics :

1 — Statics & Hydrostatics :

Center of Gravity.

Moments & Products of inertia.

Hydrostatics.

Virtual work.

Chains & Flexible strings.

2 — Dynamics of a System of Particles and of Rigid Bodies.

Plane kinematics of a rigid body, applications.

Principle of linear and angular mementa of a system of particles and of rigid bodies — applications to the plane motion of rigid bodies.

Principle of work and energy of a system of particles and of rigid bodies, applications.

Equations of impulsive motion of a system of particles and of rigid bodies — applications.

PHM 103, 107, 112 Physics :

Vibrations and Wave Motion : Types of Vibrations (Free, Damped Forced Vibrations) — Detailed treatment of each type and applications — Resonance phenomena — Analogy between mechanical vibrations and electrical oscillations — Analytical treatment of longitudinal and transverse Wave motions and their propagation in different media : solid, liquid and gaseous — Intensity of sound and pressure Amplitude — Propagation of sound inside buildings and deduction of Sabine's formula for reverberation time — Doppler effect — Interferense of light and applications — Diffraction of light and applications. Polarization of light and applications.

Modern Physics : Experimental proof that matter particles behave as waves and applications — Electron lenses — Radiation — Wave particle properties — Equivalence of matter and energy and its deduction — Variation of mass with velocity — Deduction of wave — packed velocity — Heisenbery uncertainty principle using Compton's effect — Deduction of Schrodinger's equation and examples of its treatment for some simple physical systems like : free body, motion of a body inside a closed space, motion of a particle.

Introduction to solid State Phpsics (Crystal Structure — Amplitude of Scattered Waves and Structure Factor — Atomic Scattering Factor — Band theony of Solids) — Basic Properties of atomic Nuclei and radioactivity (atomic nuclei radii, Charge, Constituents, binding energy, angular Momentum and NMR, radioactivity law, Applications in Engineering using nuclear detecton Systems for logging).

PHM 106, 110 Mathematics :

Vectors in three-dimensional space and solid analytic geometry :

Vectors in three-dimensional space-Scalar, vector and scalar triple pro-
degree in space — Tangent plane normal to any surface.
second degree in spase — Tangent plane and normal to any surface.

Multiple integrals :

Double integrals — Change of order — Double integrals in polar coordinates — Area and volume by double integrals and other applications — Change of variables — Triple integrals — Green's theorem — Surface integral.

Infinite series :

Infinite series of constant terms — Convergence and divergence — comparison test — Integral test — Ratio test — Cauchy test — Alternating series and absolute convergence — Power series.

Expansion of Fucntions :

Rolle's and mean value theorems — Taylor's and Maclaurin's Formulae — Power series expansions of functions of several variables.

Curvature :

Curvature of a circle — Formulae for curvature — Newton's method — Evolute and envolute — Intrinsic equation — Special curves.

Some applications of partial differentiation :

Maxima and minima of functions of several variables — Lagrange multipliers and constrained maximum — minimum problems — Envelopes — Differentiation under the integral sign.

PHM 111 Mechanics :

1 — Statics & Hydrostatics.

Centre of gravity.

Moments & Products of inertia.

Hydrostatics.

— Plane kinematics of a rigid body, Applications.

Plane motion of rigid bodies.

Principle of work and energy for a rigid body. Applications.

Impulsive motion of rigid bodies — Applications.

PHM 203 Mathematics :

Laplace Transform :

Definition — Laplace transform of elementary functions — Properties of Laplace transform — Inverse transform — Laplace transforms of derivatives and integrals — Shifting on both axes — Convolution — Solution of differential and integral equations by Laplace transform — Heaviside unit step and Dirac delta functions — Periodic functions — Applications

Series Solutions of differential Equations — Special Functions :

The power series method and its theoretical basis — Gamma and Beta functions — Bessel's equation — Bessel functions of the first Kind — Bessel functions of the second Kind — Legendre's equation and polynomials — Orthogonal sets of functions.

Application of Matrices in Solving Systems of Differential Equations.

Eigenvalues and eigenvectors - Systems of linear differential equations.

Probability and Statistics :

Basic definitions and theorems - Finite sample spaces - Conditional probability - Discrete random variable - Cumulative, joint and marginal distributions - Mean, variance and standard deviation - Covariance and Correlation - Binomial, multinomial and Poisson distributions - Continuous random variable - Normal distribution - Quality control.

Partial differential Equations :

Basic concepts - Modeling : Vibrating string. one dimensional wave equation - Separation of variables (Fourier's method) - D'Alembert's solution of the wave equation - one - dimensional heat flow - Laplacian in polar cordinates - Rectangular and circular membranes.

Vector Analysis :

Scalar and vector fields - Directional derivative - Gradient of a scalar field - Divergence and curl of a vector field - Gauss, Green's and Stoke's theorems.

Numerical Analysis :

Finite differences - Newton's formulae for forward and backward inter-

polation - Newton's and Lagrange's formulas for divided differences.

PHM 204, 202 Matematics :

Differential equations of higher orders :

Deinitions - Homogeneous equations and complementary functions Nonhomogeneous equations - The method of undetermined Coefficients - Opérator method - Variation of parameters - Reduction of order - Euler's equations - Simultaneous equations - Applications.

Application of matrices in solving systems of differential equations : Eigenvalues and eigenvectors - Systems of linear differential equations.

Peobability and statistics :

Basic definitions and theorems - Finite sample space - Conditional probability - Discrete random variable - Cumulative, joint and marginal distributions - Mean, Variance and standard deviation - Covariance and correltion - Binomial, multinomial and poisson distributions - Continuous random variable - Normal distribution - Quality control.

Fourier series :

Periodic functions - Fourier series - Euler's formulae - Functions having arbitray period - Even and odd functions - Even and odd harmonics - Half - range expansions - Numerical computation of Fourier cofficients.

Partial differential equations :

Basic concepts - Modeling : Vibrating string - one dimensional Wave equation - Separation of variables (Fourier's method) — D'Alambert's method - One - Dimensional heat flow - Laplacian in polar coordinates - rectangular and circular membranes.

Numerical analysis :

Finite differences - Newtom's formula for forward and backward interpolation - Newton's and lagrange's formulae for divided differences.

Spherical trigonometry : (PHM 204 only)

Vector analysis : (PHM 202 only)

Scalar and vector fields - Directional derivative - The gradient Divergence and Curl - Gauss, Green's and Stoke's theorems.

PHM 301, 303 Mathematics :

Functions of a complex variable :

Limits - Continuity - Differentiability and Cauchy - Riemann equations, Analyticity - Integration of complex functions - Infinite complex series - Taylor and Laurent series — Integration by the method of residues.

Linear Programming :

Basic concepts - Linear programming - Simplex method.

Numerical methods for first - order differential equations - Multistep methods - Numerical methods for second - order equations - Introduction to finite element method.

PHM 302 Mathematics

Contents of PHM 301 Plus :

— Fourier Transform : Definitions — Properties — Application to partial differential equations.

— Laplace Transform applied to integral and partial diff.

— The Calculus of Variations : Introduction — Systems of Euler Lagrange equations — The extrema of integral under constraints.

General Courses

General Courses

Description of Courses

These are offered by concerned University departments :

G 021 English Language :

Reading and Composition : Scientific discoveries, Engineering and industry, Industrial development in Egypt.

Comprehension : Questions on chosen technical essays.

Grammer : Revision exercieses on rules of Grammer.

G 221, 222 Law and Eonomics :

Introduction to law, Sources of law, Rights, Industrial law, Commercial property, production and investment laws, Labour laws.

Methods of evaluating projects, Financial evaluation for projects for private enterprises and public enterprises, Economical models for projects.