Ministerial Decision
No. (2210) at 28 / 10 / 2004
Mansoura university
Bachelor Stage

The minister of higher education and state for scientific research and the head of the highest council of universities

- After looking at the rule no. (49) for the year 1972, about coordinating universities and its modification
- And at the president decision no. (809) for the year 1975 about producing the curriculum plan for the coordinating universities rule and its modification decisions
- And at the ministerial decision no. (613) at 10 / 6 / 1997 about producing the Mansoura University- Faculty of Engineering curriculum plan and its modifications decisions
- And at the agreement of Mansoura University Council at 31 / 5 / 2004 , and 28 / 9 / 2004
- And at the agreement of the committee of engineering studies sector at 29 / 7 / 2004
- And at the decision of the highest council of universities at 9, 10 / 9 / 1998 , negotiated by the minister of higher education and state for scientific research and the head of the highest council of universities , to produce the curriculum plans for faculties and institutes and its modifications

Decided

FIRST ARTICLE

- Mansoura university – faculty of engineering works according to its curriculum plan and any other opposite text is canceled

SECOND ARTICLE

- All regions have to execute this decision

The Minister of Higher Education
and The State For Scientific Research
Prof. Dr. Amr Ezzat Salamah

CHAPTER ONE
SCIENTIFIC DEPARTMENTS

Introduction

With high expectations and standards of achievements in teaching, students, and research, the Faculty of Engineering in Mansoura University is considered as one of the pioneers in engineering and technology education in the Delta. Founded in 1957 as an industrial institute and a university since 1974, it has an established reputation for innovative and advanced educational activities. The main goal of the faculty is to prepare well qualified engineers in a wide range of engineering specializations. Meanwhile, close collaboration with partners in industry, planning, and public sector had necessitated the relevance of study programs to the needs of today's workplace. As a result, development and upgrading of the Curriculum Plan for the Undergraduate Program were undertaken to attain sustainability and credibility in all engineering education activities, which extend to cover training courses and postgraduate programs for Diploma, MSc, and PhD in a wide range of specialized engineering professional concentrations.

Article 1

The Faculty of Engineering in Mansoura university consists of the following scientific departments :

1. Department of Mathematical and Physical Sciences.
2. Department of Electrical Power and Machines Engineering.
3. Department of Electronics and Communications Engineering.
4. Department of Computers and Systems Engineering.
5. Department of Mechanical Power Engineering.
6. Department of Production and Mechanical Design Engineering.
7. Department of Textile and Spinning Engineering.
8. Department of Structural Engineering.
9. Department of Irrigation and Hydraulic Engineering.
10. Department of Public Works Engineering.
11. Department of Architectural Engineering.

Article 2

The scientific departments are assigned to supervise the teaching of closely related specialized courses in all departments, including Humanities, Technical language, and Technical Reports, while being assigned to teach all courses stated in their educational program as follows:

2-1- Mathematical and Physical Sciences

Mathematics – Mechanics – Applied Mechanics – Engineering Chemistry – Engineering Physics – Mathematical Statistics – Engineering Projection – Humanities (1) – Technical English Language – Numerical and Statistical Methods.

2-2- Electrical Power and Machines Engineering

Electric Circuits (1) – Computer Programming in Electrical Engineering (1) – Technical Report Writing – Electrical Measurements – Electric Circuit Theory (2) – Humanities in Electrical Engineering – Electromagnetic Fields – Statistical Applications in Electrical Engineering – Electrical testing and Laboratories (1) – Power Systems (1) – Electric Machines (1) – Software in Electrical Engineering (2) – Power Systems (2) – Electric Machines (2) – Electrical Testing and Laboratories (2) – High Voltage Engineering – Power Systems (3) – Electric Machine (3) – Power Electronics (1) – Power System Protection – Power Systems (4) – Electric Machine (4) – Power Electronics (2) – Electrical Testing and Laboratories (3) – Power System Dynamics and Control – Electric Machines Control – Electrical Projects Management – Electrical Testing and Laboratories (4) – Project – Elective courses (Distribution Systems Engineering – Renewable Energy Systems – Special Electric Machines – Internet – Transient Phenomena in Power Systems – Artificial Intelligence Applications – Power System Planning – Electric Traction) – Graduation Project.

2-3- Electronics and Communications Engineering

Solid State Electronics – Circuit Theory – Electronic Measurements (1) – Basic Electronics – Logic Circuits (1) – Electronics Lab (1) – Technical Reports in Communications – Humanities in Communication (2) – Mathematics (5) – Electronics Lab (2) – Electromagnetic Fields – Electronic Measurements (2) –

Logic Circuits (2) – Humanities in Communications (3) – Applied Statistics – Electronic Circuit (1) – Linear Systems and Networks – Computer Application in Communications Engineering – Communication Theory (1) – Electronic Circuits (2) – Signal Analysis – Humanities in Communication (4) – Communication Theory (2) – Electromagnetic Waves – Microprocessors – Electronics Lab (3) – Optical Electronics – Elective (1) (Microwave Electronics – Industrial Electronics – Biomedical Electronics – Acoustic Engineering – Computer Control Systems) – Elective (2) (Information Systems – Programming and Algorithms Design – Operation Research – Power Electronics – Artificial Intelligence) – Communication Networks – Electronic Circuits (3) – Antennas and Wave Propagations – Electronics Lab (4) – Elective (3) (Neural Networks – Computer-Aided Circuit Design – Communication Circuits – Microwave Circuits – Computer Interface Circuits Design – Switching and Telephone Systems – Optical Communication Systems – Radar Systems) – Integrated Circuits – Digital Signal Processing – Communication Systems – Graduation Project – Elective (4) (Satellite Communication Systems – Recording and Broadcasting Systems – Mobile Communication Systems – Computer Networks) – Graduation Project.

2-4- Computers & Systems Engineering

Human Relations in Systems Engineering (2) – Logic Design (1) – Programming Language (1) – Introduction in Control Engineering – Technical Reports in System Engineering – Operating System Eng. (1) – Introduction To Computer Networks – Elements of Control Systems – Human Relations in Systems Engineering (3) – Digital Logic Design (2) – Programming Language (2) – Measurement Devices and Sensors – Modeling and Simulation – Statistical Applications – Operating System (2) – Programming Language (3) – Electric Power and Machines – Systems Identification – Digital Control Systems – Computer Architecture Engineering (1) – Data Structure and Algorithms – Database (1) – Modern Control Theory – Artificial Intelligent – Programmable Logic Control – Database (2) – Computer System Design and Analysis – Computer Graphics – Computer Based Control (1) – Elective Course (1) in Computer Engineering (Programming of Computer Peripheral – Data Processing – Object Oriented Programming – Slandered Package – Computer Peripherals – Computer Applications) – Elective Course (2) in Control Engineering (Dynamic Systems – Industrial Measurements – Robotics

– Control Measurements – Industrial Electronics – Machine Intelligence) – Computer Architecture Engineering (2) – Network Design and Programming – Machine Learning – Elective Course (3) in Computer Engineering (Information Technology and Decision Support System – Natural Language Processing – Image Processing – Computer Security – Compiler Design – Information Theory and Encryption) – Elective Course (4) in Control Engineering (Dynamic Analysis – Identification – Real Time Systems – Computer and Control Systems – Control Systems Applications – Knowledge Engineering) – Computer Maintenance – Distributed Systems – Computer Based Control (2) – Elective Course (5) in Computer Engineering (Programming of Parallel Architecture – Multimedia – Wireless and Optical Network – Advanced Software Engineering – Internet and Advanced Applications – Advanced Computer Applications – System Performance and Evaluation Standard Specifications – Microprocessors) – Elective Course (6) in Control Engineering (Computer Vision – Expert Systems – Trajectory Planning and Control – Adaptive Control – Fuzzy Control – Optimal Control – Neural Networks – Advanced Control Applications) – Graduation Project .

2-5- Mechanical Power Engineering

Machine Drawing – Humanities (2) – Thermodynamics (1) – Fluid Mechanics (1) – Computer Applications (1) – Thermodynamics (2) – Fluid Mechanics (2) – Computer Applications (2) – Humanities (3) – Measurements and Measuring Devices – Theory of Combustion – Heat Transfer (1) – Heat Transfer (2) – Projects Management – Computer Applications (3) – Energy Conversion – Gas Dynamics – Combustion Engines – Mechanical Laboratories – Humanities (4) – Hydraulic Machines – Turbo-machines – Refrigeration and Air Conditioning – Design of Mechanical Power Engines – Automatic Control of Energy Systems – Power Plants – Contracts and specifications – Elective Courses (Steam Technology – Water Desalination – Petroleum Engineering – Pipe Lines – Water Treatment – Pollution and Environment Engineering – Renewable Energy – Heat Exchangers – Engine Performance – Fluid Machines – Solar Energy – Wind Energy – Nuclear Energy – Mass Transfer – Solar Cooling and Heating – Control of Refrigeration and Air Conditioning Systems – Fuel and Oils – Engines Modeling – Combustion – Hydraulic Control – Hydraulic Machines Design – Selected subjects in Fluid mechanics, Power and Hydraulic Machines) – Graduation Project .

2-6- Production and Mechanical Design Engineering

Engineering Drawing – Production Engineering – Engineering Materials (1) – Mechanical Drawing – Computer Application in Production Engineering (1) – Programming – Engineering Economy – Strength of Materials – Machining Techniques and equipments (1) – Shaping Techniques and equipments (1) – Technical Reports in Production Engineering – Machine Design (1) – Theory of Machine (1) – Stress Analysis Systems – Computer Applications in Production Engineering (2) – Engineering Management (1) – Machining Techniques and Equipments (2) – Shaping Techniques and Equipments (2) – Machine Design (2) – Measurements – Engineering Materials (2) – Theory of Machines (2) – Machine Tool Design (1) – Metrology – Theory of Metal Cutting – Theory of Metal Forming – Elective Course (1) (Robot Arm Engineering – Production Technology – Nontraditional Measurements – Packing and Packaging Engineering – Product Design – Environmental Engineering – Industrial and Professional Safety – Biomedical Engineering) – Numerical Control of Machine Tool – Factory Planning and Production Processes – Statistical application in production – Machining Techniques and Equipments (3) – Engineering Management (2) – Elective Course (2) (Heat treatment – Industrial oil Engineering – Advanced Production technology – Work Study – Industrial Relations and Regulation Laws – Design of Mechanical Equipments – Engineering Materials Selection) – Production System Analysis – Production Tools and Equipment – Design – Elective Course (3) (Methods and Techniques of Design – Scientific Management Systems – Design and Production of Dies – Tribology – Non-Traditional Shaping Processes – Reversing Engineering in Mechanical Design – Mechatronic – Design and Production of Cutting Tools) – Design and Production Engineering Laboratory – Machine Tool Design (2) –Quality Control – Mechanical Maintenance and Faults Monitoring – Elective Course (4) (Computer Aided Manufacturing – Optimum Design – Operation Research – Non-Traditional Machining Processes – Feasibility Studies – Composite Materials – Hydraulic Control Systems) – Fine Measurements – Graduation Project .

2-7- Textile and Spinning Engineering

Cotton yarn manufacturing – Textile raw materials – Computer applications in spinning – Humanities in Textiles (2) – Weaving preparation – Textile physics (1) – Technical reports in textile – Textile chemistry – Wool fibre manufacturing – Weaving technology (1) – Computer applications in spinning engineering – Humanities in textile (3) – Textile physics (2) – Manufacturing of man-made fibres – Applied Statistics – Textile Machine Design – Textile Design – Spinning theory (1) – Special courses (Industrial fabrics technology – Mechanics of knit and garment machines – Dying and finishing – Weaving structures – Spinning Theory (2) – Mechanics of spinning machines – Analysis of weaving yarn stresses – Mechanics of weaving machines (2) – Spinning Theory (3) – Machine noise – Planning of knitting and Garment Factories – Operational research – Weaving Automatic control – Specifications and standards in textiles) – Knitting and Apparel Technology – Measuring Engineering – Weaving Technology (2) – Computer applications in spinning engineering (3) – Textile mills organizing (1) – Quality Control (Spinning mills, Weaving mills) – Spinning methods – Knitting and sewing machines (Knitting machines, Sewing machines) – Weaving technology (3) – Graduation Project – Textile Finishing – Non-woven fabrics – Textile mills organizing (2) – Economics and Costing – Graduation Project .

2-8- Structural Engineering

Theory of Structures (1) - Strength of Materials (1) - Strength of Materials (2) - Engineer Behaviors - Theory of Structures (2) - Reinforced Concrete (1) – Quantities Estimation - Theory of Structures (3) - Reinforced Concrete (2) – Steel Constructions (1) – Soil Mechanics and Foundations (1) - Technical Reports in Civil Engineering (2) – Soil Mechanics and Foundations (2) – Construction Project Management – Reinforced Concrete (3) - Steel Constructions (2) – New Construction Materials – Earthquake Construction Design – Brick Construction Design – Repair and Strengthening of Constructions – Structural Analysis Using Computer - Graduation Project.

2-9- Irrigation and Hydraulic Engineering

Law of Financing Sources - Civil Engineering Drawing - Technical Reports in Civil Engineering (1) - Hydraulics (1) - Irrigation and Drainage Engineering – Hydrology (9) - Design of Irrigation Works (1) - Hydraulics (2) - Hydraulics

(2) – Design of Irrigation Works (2) – Harbor Engineering – Water Resources Engineering – Internal Navigation Engineering – Design of Advanced Irrigation Systems – Design of Large Irrigation Structures – Design of Coastal Protection Works - Graduation Project.

2-10- Department of Public Works Engineering

Statistical Applications in Civil Engineering - Plane Surveying - Environmental Science - Topographic Surveying and Geodesy - Geology and Soil Mechanics - Construction Equipment and Technology - Railroad Engineering – Transportation and Traffic Engineering – Highway and Airport Engineering – Sanitary Engineering – Modern Economical Techniques in Waste Water Collection and Treatment – Modern Trends in Asphalt Paving Design Mixes – Remote Sensing – Non-classical Methods in Potable Water Purification – Air Transportation Systems - Graduation Project.

2-11- Architectural Engineering

Architectural Design (1) – Building Construction (1) – History &Theories of Architecture (1) – Architectural Design (2) – Building Construction (2) – Visual Training – Technical Reports in Architecture – Computer Applications in Architecture (1) – Architectural Design (3) – Building Construction (3) – History &Theories of Architecture (2) – History of City Planning – Architectural Design (4) – Building Construction (4) – Urban Design – Building Physics and Environmental Control – Steel Structures – Computer Applications in Architecture – Architectural Design (5) – Executive Designs (1) – Theories and Philosophy of Architecture (1) – Urban Planning and Design – Architectural Design (5) – Executive Designs (1) – Housing and Urban Design (1) – Architectural Design (6) – Executive Designs (2) – Theories and Philosophy of Architecture (2) – Interior Design – Urban Planning (2) – Housing and Urban Design (2) – Specifications, Quantities, and Quality Control – Optional Courses (Environmental design – Computer Aided Design – Landscape Design – Urban Conservation and Maintenance – Advanced Building Technologies – Architectural Projects' Management – Architectural Criticism and Competitions – Advanced Architectural design – Detailed Planning – Urban Renovation and Upgrading) – Graduation Project.

CHAPTER TWO
STUDY FOR THE BACHELOR OF SCIENCE DEGREE

Article 3

Upon request from the Faculty of Engineering Council, Mansoura University grants the Bachelor of Science (B.Sc.) degree to students who successfully pass the examinations of the applied courses in one of the following areas of specialty:

1. Electrical Power and Machines Engineering
2. Electronics and Communications Engineering
3. Computers and Systems Engineering
4. Mechanical Power Engineering
5. Production and Mechanical Design Engineering
6. Textile and Spinning Engineering
7. Civil Engineering
8. Architectural Engineering

Article 4

The student is fettered to the Bachelor degree and any of its scientific departments after making sure that he/she obtained his/her secondary degree or its, according to article (75) of The Universities Coordinating Rules.

Article 5

The duration of study for obtaining the Bachelor of Science (B.Sc.) degree is five years, each divided into two terms. Next to a preparatory year that is obligatory for all students, specialization to all scientific departments takes place in respect of the announced tables for each curricula.

Article 6

The given courses are distributed on both terms for each academic year. These courses are detailed in the tables of curricula in the 4th Chapter of the Curriculum Plan. These tables also outline the allocated hours for lectures, laboratory and theoretical exercises, courses codes, maximum of marks, oral and practical examinations, number of hours of final examinations, and the

scientific content of each given course, developed by the council of each scientific department, according to the decisions of the faculty council, article (41) of the Universities Coordinating Rules.

Article 7

The student may be exempted from attendance of some courses, except in the 3rd and 4th years, if he/she gives evidence of attending equivalent courses in another recognized faculty, college, or scientific institute. Referring to article (170) of the Universities Coordinating Rules, this exemption is to be affected by a decision from the University President after an approval of the Council of Education and Students' affairs, according to the advice of the Faculty Council, based on the decision of the concerned departments.

Article 8

Examinations are to be held in the end of each term in the courses taught during this term, according to the Tables of Curricula outlined at the 4th Chapter of this plan.

Article 9

Upon request from relevant department councils, the Faculty Council issues a resolution, prohibiting students who are not satisfying at least 75% attendance of the designated hours in each course from attending the term examination in this course. The student is considered failed in the course he/she has been prohibited from attending its examination unless he/she provides an excuse, which should be accepted by the Faculty Council. In this case, the student is considered absent with an acceptable excuse.

Article 10

The final grade of the student in courses that include written and/or oral and/or practical test is to be the summation of the scores obtained in these tests, in addition to the marks of the term work as stated in the courses' tables for each department. The student who is absent without excuse from the written paper exam is to be considered failed in this course. If the student provides an excuse, which should be accepted by the Faculty Council, he/she is to be considered absent with an acceptable excuse.

Article 11

The grades of the courses' exams and the general grade of students are evaluated as follows:

- **Excellent**: From 85% of the total mark and above.
- **Very Good**: From 75% to less than 85% of the total mark.
- **Good**: From 65% to less than 75% of the total mark.
- **Pass**: From 50% to less than 65% of the total mark.

The student is considered failed if he/she obtains less than 50% of the total mark, and evaluated according to the following grades:

- **Weak**: From 30% of the total mark.
- **Very Weak**: Less than 30% of the total mark.

The course's grade of the student who fails in its exam or makes unacceptable absence from this exam are not to exceed "pass". The graduation general grade is to be determined after the student passes the 4^{th} year exams by adding up the aggregate scores obtained throughout the five-year study, according to the grades mentioned above.

Article 12

(a) The student is to be promoted from an academic year to the next one if he/she passes the examination in all courses of the original year, or if he/she fails in no more than two courses of his/her class or from lower classes. The divided course is considered one course if the student fails in one part or in both parts.

(b) In addition to the two subjects mentioned in the previous item, the student who fails in Humanities' exams are to be promoted to the next year. The student is to attend the exams of these courses according to the conditions set by the Faculty Council.

(c) The student who fails in a divided course is to repeat the examination in the whole course.

Article 13

Fourth year students are to implement a B.Sc. project on a subject to be determined by the relevant Department Councils, during a 4-week period after the end of the written exam of the fourth year's second term. These projects are to be set, supervised, and evaluated by staff members in each department, according to the executive internal regulations prepared by the Faculty Council.

Article 14

Supplementary examinations are to be held yearly in October for the Fourth-year students who fail or make absence in at most two courses from their class or from any lower level, in addition to one of Humanities' courses. This does not apply to the graduation project in which failing students should stay to repeat this project in the next year.

Article 15

Under supervision of scientific departments, the faculty is to arrange scientific visits to relevant industrial and construction projects for the Third and Fourth-year students, with respect to regulations set by the Faculty Council.

Article 16

A 4-week training in the summer vacation is regarded for students promoted to the 2^{nd}, 3^{rd}, and 4^{th} academic years, under supervision of staff members of each scientific department as follows:

- **Professional Training**: Students promoted to the 2^{nd} year are to carry out professional training inside the faculty, or in specialized training centers.
- **Field Training**: Students promoted to the 2^{nd} and 4^{th} year are to carry out field training in specialized training sectors.

Students trained outside the country should be approved by relevant Department Councils. The student will not be able to obtain his/her B.Sc. Graduation Certificate until Professional and Field Training are both accomplished successfully. The executive regulation of students' training is issued by the University Council based on advices from Scientific Departments, and the Council of Education and Students' Affairs.

CHAPTER THREE
TRANSFERENCE JUDGMENTS

Article 17

The curriculum plan is applying in sequence, starting from the next academic year on all students who are fettered to the preparatory year, both new or stayed to repeat and keeping work with the previous plan, produced with the Ministerial Decision No. (613) for the year 1997 and its modifications for the rest of students till finishing their study.

CHAPTER FOUR
STUDY PROGRAM

The following tables outline the studying courses divided on the two terms for each academic year. It also shows the courses' codes, number of hours allocated for lectures and exercises, maximum ends of marks for each course in term work, oral, and practical examinations, and allocated hours for the courses' final year exams.

Course code

The Course Code consists of two separate parts as follows:

- First part: A four-digits code found in the first column of the tables:

  - **The first digit starting from the far left**, is the code of each branch to which the course is given, ranging from 1–9, as shown in the following table :

No.	The Branch	Code
1	General (Preparatory)	1
2	Electrical Power and Machines Engineering	2
3	Computers and Systems Engineering	3
4	Mechanical Power Engineering	4
5	Production and Mechanical Design Engineering	5
6	Textile and Spinning Engineering	6
7	Architectural Engineering	7
8	Civil Engineering	8
9	Electronics and Communications Engineering	9

  - **The second digit from the far left**, indicates the stage, as (0) stands for the Preparatory year, (1) for the first year, (2) for the second year, (3) for the third year, and (4) for the fourth year.
  - **The third digit from the far left**, indicates the term, as (1) stands for the first term and (2) for the second term.

- **The fourth digit from the far left**, shows the arrangement of the subject in each term, ranging from 1–7.

- Second part: The second column in the courses' tables, an alphabetic code referring to the main scientific department to which the course is basically related, as shown in the following table :

No.	Scientific Department	Code
1	Mathematical and Physical Sciences	BAS
2	Electrical Power and Machines Engineering	EE
3	Computers and Systems Engineering	CSE
4	Mechanical Power Engineering	MPE
5	Production and Mechanical Design Engineering	PRE
6	Textile and Spinning Engineering	TXE
7	Architectural Engineering	ARE
8	Structural Engineering	STE
9	Irrigation and Hydraulics Engineering	IRH
10	Public Works Engineering	PWE
11	Electronics and Communications Engineering	COM

Example: As for the course:

7111 – BAS – Mathematics, Statistics, and Computers, the digits refer to the following:

(7): **Architectural Engineering** (the branch to which the course is given)
(1): **1st Year**
(1): **1st Term**
(1): **Subject No. 1**
(BAS): **Mathematical and Physical Sciences** (the main Scientific Department to which the course is basically related).

Table (1 – 0)
Preparatory Year
First Term

Course coding			No. of Hrs/w			Maximum Marks				Final Exam Hours
Dept.	Code No.	Course Title	Lect.	Tut. Lab.	Total	Term Work	Oral Exam	Fin. Exam	Total	
BAS	1011	Mathematics (1)	4	3	7	45	-	130	175	3
BAS	1012	Physics*	4	2	6	40	10	100	150	3
BAS	1013	Mechanics *	3	2	5	35	-	90	125	2
BAS +PRE	1014	Engineering Drawing and Projection *	2	3	5	40	-	60	100	2
BAS	1015	Chemistry	3	2	5	35	10	80	125	3
BAS	1016	Technical Language (English)	-	2	2	10	-	40	50	2
Total			16	14	30	-	-	725	-	-
Second Term										
BAS	1021	Mathematics (2)	4	3	7	45	-	130	175	3
BAS	1022	Physics*	4	2	6	40	10	100	150	3
BAS	1023	Mechanics *	2	2	4	30	-	70	100	2
BAS +PRE	1024	Engineering Drawing and Projection *	1	3	4	35	-	90	125	4
PRE	1025	Production Engineering	2	2	4	20	10	70	100	2
CSE	1026	Introduction to Computer	2	1	3	25	-	50	75	2
BAS	1027	Humanities (1)	2	-	2	-	-	50	50	2
Total			17	13	30	-	-	-	775	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (2 – 1)

Electrical Power& Machines Engineering

First Year

Course Code		Course Name	Hours/wk			Maximum Marks				Final Exam. Hours
Dept.	Code		Lect.	Tutorial & Lab.	Total	Mid Term	Oral	Final	Total	
First Term										
BAS	2111	Engineering Math. (3)	4	2	6	40	-	110	150	3
COM	2112	Solid –State Electronics	4	2	6	40	10	100	150	3
EE	2113	Electric Circuits (1)	4	4	8	40	40	120	200	3
STE	2114	Civil Engineering	2	2	4	30	-	70	100	3
EE	2115	Programming (1)	2	2	4	30	20	50	100	3
EE	2116	Technical Reports	-	2	2	10	-	40	50	2
Total			16	14	30	-	-	-	750	-
Second Term										
BAS	2121	Engineering Math. (4)	4	2	6	40	-	110	150	3
COM	2122	Electronics Fundamentals	4	2	6	40	-	110	150	3
EE	2123	Electrical Measurements	2	2	4	20	20	60	100	3
EE	2124	Electric Circuits (2)	4	2	6	40	20	90	150	3
MPE	2125	Fluid Mechanic & Thermal Engineering	4	2	6	40	-	110	150	3
EE	2126	Humanities (2)	2	-	2	10	-	40	50	2
Total			20	10	30	-	-	-	750	-

Table (2 – 2)

Electrical Power& Machines Engineering

Second Year

Course Code		Course Name	Hours/wk			Maximum Marks				Final Exam. Hours
Dept.	Code		Lect.	Tutorial & Lab.	Total	Mid Term	Oral	Final	Total	
First Term										
BAS	2211	Engineering Math. (5)	4	2	6	40	-	110	150	3
COM	2212	Digital signals Processing	4	2	6	40	20	90	150	3
EE	2213	Electromagnetics	4	2	6	40	20	90	150	3
MPE	2214	Thermal & Hydraulic Machines	4	2	6	40	-	110	150	3
COM	2215	Logic & Digital Circuits	2	2	4	30	-	70	100	3
EE	2216	Humanities (3)	2	-	2	10	-	40	50	2
Total			20	10	30	-	-	-	750	-
Second Term										
EE	2221	Statistics	2	2	4	30	-	70	100	3
COM	2222	Electronic Circuits & Microprocessor	4	2	6	40	-	110	150	3
EE	2223	Laboratory (1)	-	4	4	50	50	-	100	-
EE	2224	Electrical Power (1)	4	2	6	40	-	110	150	3
EE	2225	Electrical Machines (1)	4	2	6	40	-	110	150	3
EE	2226	Programming (2)	2	-	4	30	20	50	100	2
Total			16	14	30	-	-	-	750	-

Table (2 – 3)

Electrical Power& Machines Engineering

Third Year

Course Code		Course Name	Hours/wk			Maximum Marks				Final Exam. Hours
Dept.	Code		Lect.	Tutorial & Lab.	Total	Mid Term	Oral	Final	Total	
First Term										
EE	2311	Electrical Power (2)	2	2	4	30	-	70	100	3
EE	2312	Electrical Machines (2)	4	2	6	40	-	110	150	3
CSE	2313	Automatic Control (1)	2	2	4	30	-	70	100	3
COM	2314	Theory of Communication Sys.	4	2	6	40	-	110	150	3
EE	2315	Laboratory (2)	-	4	4	50	50	-	100	-
EE	2316	High Voltage	4	2	6	50	-	100	150	3
Total			16	14	30	-	-	-	750	-
Second Term										
EE	2321	Electrical Power (3)	4	2	6	40	20	90	150	3
EE	2322	Electrical Machines (3)	2	2	4	20	20	60	100	3
EE	2323	Power Electronics (1)	4	2	6	40	20	90	150	3
EE	2324	Protection Systems	4	2	6	40	20	90	150	3
CSE	2325	Automatic Control (2)	2	2	4	30	-	70	100	3
EE	2326	Elective Course (1)	2	2	4	30	-	70	100	3
Total			18	12	30	-	-	-	750	-

Elective Course (1)

1. **EE** Distribution Systems
2. **EE** Renewable Energy Resources
3. **EE** Special Electrical Machines
4. **EE** Internet Network

Table (2 – 4)

Electrical Power& Machines Engineering

Fourth Year

Course Code		Course Name	Hours/wk			Maximum Marks				Final Exam. Hours
Dept.	Code		Lect.	Tutorial & Lab.	Total	Mid Term	Oral	Final	Total	
First Term										
EE	2411	Electrical Power (4)	4	2	6	50	-	100	150	3
EE	2412	Electrical Machines (4)	4	2	6	50	-	100	150	3
EE	2413	Power Electronics (2)	4	2	6	40	20	90	150	3
EE	2414	Elective Course (2)	2	2	4	30	-	70	100	3
EE	2415	Laboratory (3)	2	4	4	75	50	-	125	-
EE	2416	Project *	2	2	4	40	10	-	50	-
Total			16	14	30	-	-	-	725	-
Second Term										
EE	2421	Power System Control	4	2	6	40	20	90	150	3
EE	2422	Electrical Machines Control	4	2	6	40	20	90	150	3
EE	2423	Project Management	2	1	3	30	-	70	100	3
EE	2424	Elective Course(3)	2	2	4	30	-	70	100	3
EE	2425	Laboratory (4)		4	4	75	50	-	125	-
EE	2426	Project *	2	4	6	40	10	100	150	Discussion
Total			14	15	29	-	-	-	775	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Course (2)

1. **EE** Transient Phenomena in Power Systems
2. **EE** Artificial Intelligence Applications

Elective Course (3)

1. **EE** Electric Traction
2. **EE** Power Networks Planning

Table (3 – 1)

Computers & Systems Engineering

First Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept	Code		Lect.	Tuto.	Total	Class	Exp./Oral	Written	Total	
First Term										
BAS	3111	Mathematics (3)	4	4	8	40	-	110	150	3
CSE	3112	Human Relations In Systems Engineering (2)	2	-	2	-	-	75	75	2
CSE	3113	Electronics Concepts	3	2	5	20	15	90	125	3
CSE	3114	Logic & Digital Design (1)	3	2	5	30	20	100	150	3
CSE	3115	Programming Languages(1)	3	2	5	20	15	90	125	3
CSE	3116	Control Engineering (1)	3	2	5	20	15	90	125	3
Total			18	12	30	-	-	-	750	-
Second Term										
BAS	3121	Mathematics (4)	4	4	8	40	-	110	150	3
CSE	3122	Technical Reports In System Engineering	-	2	2	-	-	50	50	2
EE+ COM	3123	Electrical & Electronic Engineering	3	2	5	20	15	90	125	3
CSE	3124	Computers Operating System Eng.(1)	3	2	5	30	20	100	150	3
CSE	3125	Introduction To Computer Networks	3	2	5	30	20	100	150	3
CSE	3126	Control Engineering (2)	3	2	5	20	15	90	125	3
Total			16	14	30	-	-	-	750	-

Table (3 – 2)

Computers & Systems Engineering

Second Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept	Code		Lect.	Tuto.	Total	Class	Exp./Oral	Written	Total	
First Term										
BAS	3211	Mathematics (5)	4	4	8	40	-	110	150	3
CSE	3212	Human Relations In Systems Engineering (3)	2	-	2	-	-	75	75	3
CSE	3213	Logic & Digital Design (2)	3	2	5	20	15	90	125	3
CSE	3214	Programming Language(2)	3	2	5	30	20	100	150	3
CSE	3215	Measurement Devices and Sensors	3	2	5	20	15	90	125	3
CSE	3216	Systems Modeling and Simulation	3	2	5	20	15	90	125	3
Total			18	12	30	-	-	-	750	-
Second Term										
CSE	3221	Statistical Applications	2	2	4	30	-	70	100	3
CSE	3222	Computers Operating System (2)	3	3	6	30	20	100	150	3
CSE	3223	Programming Language(3)	3	2	5	20	15	90	125	3
EE	3224	Electric Power And Machines	3	2	5	20	15	90	125	3
CSE	3225	Systems Components Identification	3	2	5	20	15	90	125	3
CSE	3226	Digital Control Systems	3	2	5	20	15	90	125	3
Total			17	13	30	-	-	-	750	-

Table (3 – 3)

Computers & Systems Engineering

Third Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam
Dept	Code		Lect.	Tuto.	Total	Class	Exp./Oral	Written	Total	Time
First Term										
CSE	3311	Computer Architecture Engineering (1)	3	2	5	20	15	90	125	3
CSE	3312	Data Structure And Algorithms	3	2	5	20	15	90	125	3
CSE	3313	Database (1)	3	2	5	20	15	90	125	3
CSE	3314	Modern Control Theory	3	2	5	20	15	90	125	3
CSE	3315	Artificial Intelligent	3	2	5	20	15	90	125	3
CSE	3316	Programmable Logic Control	3	2	5	20	15	90	125	3
Total			18	12	30	-	-	-	750	-
Second Term										
CSE	3321	Database (2)	3	2	5	20	15	90	125	3
CSE	3322	Computer Systems Design and Analysis	3	2	5	20	15	90	125	3
CSE	3323	Computer Graphics	3	2	5	20	15	90	125	3
CSE	3324	Computer Based Control (1)	3	2	5	20	15	90	125	3
CSE	3325	Elective Course (1): in Computer Eng.	3	2	5	20	15	90	125	3
CSE	3326	Elective Course (2): in Control Eng.	3	2	5	20	15	90	125	3
Total			18	12	30	-	-	-	750	-

ELECTIVE COURSE (1) : IN COMPUTER ENGINEERING

CSE 1 Programming Of Computer Peripheral
CSE 2 Data Processing
CSE 3 Object Oriented Programming
CSE 4 Standard Programs Package
CSE 5 Computer Peripherals
CSE 6 Computer Applications

ELECTIVE COURSE (2) : IN CONTROL SYSTEMS

CSE 1 Dynamic Systems
CSE 2 Industrial Measurements
CSE 3 Robotics
CSE 4 Control Measurements
CSE 5 Industrial Electronics
CSE 6 Machine Intelligence

Table (3 – 4)

Computers & Systems Engineering

Fourth Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept	Code		Lect.	Tuto.	Total	Class	Exp./Oral	Written	Total	
First Term										
CSE	3411	Computer Architecture Engineering (2)	3	2	5	30	20	100	150	3
CSE	3412	Network Design and Programming	3	3	6	30	20	100	150	3
CSE	3413	Machine Learning	3	2	5	30	20	100	150	3
CSE	3414	Elective Course (3) : in Computer Eng.	3	2	5	20	15	90	125	3
CSE	3415	Elective Course (4) : in Control Eng.	3	2	5	20	15	90	125	3
CSE	3416	Project*	2	2	4	40	10	-	50	-
Total			17	13	30	-	-	-	750	-
Second Term										
CSE	3421	Computer Maintenance	3	3	6	30	30	90	150	3
CSE	3422	Distributed Computers Systems	2	3	5	20	15	90	125	3
CSE	3423	Computer Based Control (2)	2	3	5	20	15	90	125	3
CSE	3424	Elective Course (5) : in Computer Eng.	2	2	4	15	15	70	100	3
CSE	3425	Elective Course (6) : in Control Eng.	2	2	4	15	15	70	100	3
CSE	3426	Project*	2	4	6	40	10	100	150	Discussion
Total			13	17	30	-	-	-	750	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (3 – 4) Continued

Computers & Systems Engineering

Fourth Year

ELECTIVE COURSE (3) : IN COMPUTER ENGINEERING

CSE 1 Decision Support Systems and Information Technology
CSE 2 Natural Languages Processing
CSE 3 Image Processing
CSE 4 Computer Security and Protection
CSE 5 Compiler Systems Design
COM 6 Information Theory And Encryption

ELECTIVE COURSE (4) : IN CONTROL SYSTEMS

CSE 1 Dynamic Systems Analysis
CSE 2 Identification
CSE 3 Real Time Systems
CSE 4 Computer And Control Systems
CSE 5 Control Systems Applications
CSE 6 Knowledge Engineering

ELECTIVE COURSE (5) : IN COMPUTER ENGINEERING

CSE 1 Programming Of Parallel Architecture
CSE 2 Multimedia
COM 3 Wireless And Optical Communications
CSE 4 Advanced Software Engineering
CSE 5 Internet And Advanced Applications
CSE 6 Advanced Computer Applications
CSE 7 System Performance And Evaluation
CSE 8 Standard Specifications
CSE 9 Microprocessors

ELECTIVE COURSE (6) IN CONTROL SYSTEMS

CSE 1 Computer Vision
CSE 2 Expert Systems
CSE 3 Trajectory Planning And Control
CSE 4 Adaptive Control
CSE 5 Fuzzy Control
CSE 6 Optimal Control
CSE 7 Neural Networks
CSE 8 Advanced Control Applications

Table (4 – 1)

Mechanical Power Engineering

First year

Course Code		Course Name	Weekly Hours			Maximum Marks				Final Exam (hrs)
Dept.	Code		Lect.	Exc.	Total	Term Work	Oral/ Lab	Final Exam	Total	
First Term										
BAS	4111	Mathematics (3)	4	2	6	40	-	110	150	3
BAS	4112	Applied Mechanics	4	2	6	40	-	110	150	3
STE	4113	Civil Engineering Production and Material Engineering	3	2	5	35	-	90	125	3
MPE	4114	Thermodynamics (1)	4	2	6	40	10	100	150	3
MPE	4115	Mechanical Power Engine Drawing *	1	3	4	50	-	-	50	-
MPE	4116	Humanities in MPE (2)	3		3	15	-	60	75	2
Total			19	11	30	-	-	-	700	-
Second Term										
PRE	4121	Material Strength & Stress Analysis	4	2	6	40	10	100	150	3
PRE	4122	Production and Material Engineering	4	2	6	40	10	100	150	3
MPE	4123	Fluid Mechanics (1)	4	2	6	40	10	100	150	3
PRE	4124	Mechanical Power Engine Drawing *	4	2	6	40	10	100	150	3
MPE	4125	Computer Application in MPE (1)	2	3	5	25	10	90	125	3
MPE	4126	Technical Reports in MPE	1	2	3	15		60	75	2
Total			16	14	30	-	-	-	800	-

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Table (4 – 2)

Mechanical Power Engineering

Second Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Final Exam (hrs)
Dept.	Code		Lect.	Exc.	Total	Term work	Oral. / Lab.	Final Exam	Total	
First Term										
BAS	4211	Mathematics (4)	4	2	6	40	-	110	150	3
MPE	4212	Thermodynamics (2)	4	2	6	40	10	100	150	3
MPE	4213	Measurements & Measuring Devices	4	2	6	40	10	100	150	3
EE	4214	Electrical Engineering	3	2	5	35	-	90	125	3
MPE	4215	Theory of Machines (1)	2	2	4	30	-	70	100	3
MPE	4216	Humanities in MPE (3)	3	-	3	15	-	60	75	3
Total			20	10	30	-	-	-	750	-
Second Term										
BAS	4221	Numerical Methods & Statistics	4	2	6	40	-	110	150	3
MPE	4222	Fluid Mechanics (2)	4	2	6	40	10	100	150	3
MPE	4223	Heat Transfer	4	2	6	40	-	110	150	3
COM	4224	Electronic Engineering	2	2	4	30	-	70	100	3
PRE	4225	Theory of Machines (2)	2	2	4	30	-	70	100	3
MPE	4226	Computer Application in MPE (2)	2	2	4	30	10	60	100	2
Total			18	12	30	-	-	-	750	-

Table (4 – 3)

Mechanical Power Engineering

Third Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Final Exam (hrs)
Dept.	Code		Lect.	Exc.	Total	Term work	Oral/ Lab.	Final Exam	Total	
First Term										
MPE	4311	Energy Conversion	4	2	6	40	-	110	150	3
MPE	4312	Heat & Mass Transfer (2)	4	2	6	40	-	110	150	3
MPE	4313	Theory of Combustion	4	1	5	35	-	90	125	3
MPE	4314	Steam Technology	3	2	5	25	10	90	125	3
MPE	4315	Elective Course (1)	2	2	4	30	10	60	100	3
MPE	4316	Computer Application in MPE (3)	2	2	4	30	10	60	100	3
Total			19	11	30	-	-	-	750	-
Second Term										
MPE	4321	Gas Dynamics	4	2	6	40	-	110	150	3
MPE	4322	Combustion Engines	4	2	6	40	10	100	150	3
EE	4323	Electrical Power and Machines	4	2	6	4	-	110	150	3
PRE	4324	Design of Machines	3	2	5	35	-	90	125	3
MPE	4325	Elective Course (2)	2	2	4	30	10	60	100	3
MPE	4326	Humanities in MPE (4)	3	-	3	15		60	75	2
Total			20	10	30	-	-	-	750	-

List of Elective Courses

Course 1

1- [MPE] Water Treatment Steam Technology
2- [MPE] Petroleum Engineering
3- [MPE] Two Phase Flow

Course 2

1- [MPE] Water Desalination
2- [MPE] Fuel & Oils
3- [MPE] Pipe Lines

Table (4 – 4)

Mechanical Power Engineering

Fourth Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Final Exam (hrs)
Dept.	Code		Lect.	Exc.	Total	Term work	Oral. / Lab.	Final Exam	Total	
First Term										
MPE	4411	Hydraulic Machines	4	2	6	40	10	100	150	3
PRE	4412	Operation Research	3	2	5	35	-	90	125	3
MPE	4413	Refrigeration & Air Conditioning	4	2	6	40	10	100	150	3
MPE	4414	Design of Mechanical Power Engines	4	2	6	50	10	90	150	3
MPE	4415	Elective Course (3)	3	2	5	25	10	90	125	3
MPE	4416	Project *	2		2	40	10	-	50	-
Total			20	10	30	-	-	-	750	-
Second Term										
MPE	4421	Turbo Machines	4	2	6	40	10	100	150	3
MPE	4422	Power Plants	4	2	6	40	10	100	150	3
PRE	4423	Automatic Control of Energy Systems	3	2	5	35	-	90	125	3
MPE	4424	Elective Course (4)	2	2	4	30	10	60	100	3
MPE	4425	Humanities in MPE (5)	3		3	15	-	60	75	2
MPE	4426	Project *	2	6	8	40	10	100	150	Discussion
Total			18	12	30	-	-	-	750	-

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Table (4 – 4) Continued

Mechanical Power Engineering

Fourth Year

The student chooses two elective courses from the following Four Groups:

Elective Courses 3	Elective Courses 4
First Group	
[MPE] New & Renewable Energy	[MPE] Solar Energy [MPE] Nuclear Energy
Second Group	
[MPE] Heat Exchangers	[MPE] Solar Heating and Cooling [MPE] Refrigeration and Air Conditioning Control System
Third Group	
[MPE] Engine Performance	[MPE] Fuel and Combustion Systems [MPE] Natural Gas Technology
Fourth Group	
[MPE] Fluid Machines	[MPE] Hydraulic Control [MPE] Hydraulic Machine Design

Table (5 – 1)

Production and Mechanical Design Engineering

First year

Course code		Course Name	Weak hours			Maximum marks				Exam hours
Dept.	Code		Lecture	Ex	Total	Term work	Oral exam	Final exam	Total	
First Term										
BAS	5111	Mathematics 3	4	2	6	40	-	110	150	3
BAS	5112	Mechanics	4	2	6	40	-	110	150	3
PRE	5113	Eng. Material 1	2		2	10	-	40	50	2
PRE	5114	Mechanical Drawing*	1	3	4	25	-	-	25	-
PRE	5115	Computer Application in Production Engineering 1	2	2	4	30	10	60	100	3
MPE	5116	Heat Engineering	2	2	4	30	-	70	100	3
PRE	5117	Engineering Economy	3	1	4	30	-	70	100	3
Total			18	12	30	-	-	-	675	-
Second Term										
BAS	5121	Mathematics 4	4	2	6	40	-	110	150	3
PRE	5122	Strength of Material	4	1	5	25	10	90	125	3
PRE	5123	Machining Techniques & Equipments 1	3	2	5	35	-	90	125	3
PRE	5124	Mechanical drawing *	1	2	3	30	10	110	150	4
PRE	5125	Shaping Techniques & Equipments 1	4	2	6	40	-	110	150	3
MPE	5126	Fluid Mechanics	2	1	3	15	-	60	75	2
PRE	5127	Technical Report in Production Engineering	-	2	2	-	-	50	50	2
Total			18	12	30	-	-	-	825	-

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Table (5 – 2)

Production and Mechanical Design Engineering

Second year

Course code		Course Name	Weak hours			Maximum marks				Exam hours
Dept.	Code		Lecture	Ex	Total	Term work	Oral exam	Final exam	Total	
First Term										
PRE	5211	Machine design (1)	4	2	6	40	10	100	150	3
PRE	5212	Theory of machine (1)	4	2	6	40	-	110	150	3
PRE	5213	Stress analysis systems	2	2	4	30	-	70	100	3
EE	5214	Electric& Electronic Engineering	4	2	6	40	-	110	150	3
PRE	5215	Computer application in production Engineering (2)	4	2	6	40	10	100	150	3
PRE	5216	Engineering Management (1)	2	0	2	-	-	50	50	2
Total			20	10	30	-	-	-	750	-
Second Term										
BAS	5221	Mathematics (5)	3	1	4	30	-	70	100	3
PRE	5222	Machining Processes and Equipments (2)	4	2	6	40	10	100	150	3
PRE	5223	Shaping processes and Equipments (2)	4	2	6	40	10	100	150	3
PRE	5224	Machine design (2)	3	2	5	40	5	80	125	3
PRE	5225	Measurements	2	2	4	30	-	70	100	3
PRE	5226	Engineering Materials (2)	4	1	5	25	10	90	125	3
Total			20	10	30	-	-	-	750	-

Table (5 – 3)

Production and Mechanical Design Engineering

Third year

Course code			Weak hours			Maximum marks				
Dept.	Code	Course title	Lecture	Ex	Total	Term work	Oral exam	Final exam	Total	Exam hours
First Term										
PRE	5311	Theory of Machine (2)	4	2	6	40	-	110	150	3
PRE	5312	Machine Tool Design (1) *	2	2	4	40	10	-	50	-
PRE	5313	Meteorology	4	2	6	40	10	100	150	3
PRE	5314	Theory of Metal Cutting	4	2	6	40	-	110	150	3
PRE	5315	Theory of Metal Forming	4	1	5	35	-	90	125	3
PRE	5316	Elective course (1)	2	1	3	15	-	60	75	3
Total			20	10	30	-	-	-	700	-
Second Term										
PRE	5321	Numerical Control of Machine Tool	2	2	4	30	-	70	100	3
PRE	5322	Machine Tool Design (1)*	3	2	5	40	5	130	175	4
PRE	5323	Factory Planning and Production Processes	4	2	6	40	-	110	150	3
PRE	5324	Applied Statistics in Production Engineering	3	1	4	30	-	70	100	3
PRE	5325	Machining Techniques & Equipment (3)	2	2	4	30	-	70	100	3
PRE	5326	Engineering Management (2)	3	1	4	30	-	70	100	3
PRE	5327	Elective course (2)	2	1	3	15	-	60	75	3
Total			19	11	30	-	-	-	800	-

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Course (1)

1 PRE Rebort Arm Engineering
2 PRE Production Technology
3 PRE Nontraditional Measurements
4 PRE Packing and packaging Engineering
5 PRE Product Design
6 PRE Environmental Engineering
7 PRE Industrial and Professional safety
8 PRE Biomedical Engineering

Elective Course (2)

1 PRE Heat Treatment
2 PRE Industrial Oil Engineering
3 PRE Advanced Production Technology
4 PRE Work Study
5 PRE Industrial Relation and Regulation laws
6 PRE Design of Mechanical Equipments
7 PRE Engineering Materials Selection

Table (5 – 4)

Production and Mechanical Design Engineering

Fourth year

Course code		Course Name	Weak hours			Maximum marks				
Dept.	Code		Lecture	Ex	Total	Term work	Oral exam	Final exam	Total	Exam hours
First Term										
PRE	5411	Production System Analysis	3	1	4	30	-	70	100	3
PRE	5412	Production Tools and Equipment Design	4	2	6	40	-	110	150	4
CSE	5413	Automatic Control	4	1	5	35	-	90	125	3
PRE	5414	Elective Course (3)	4	2	6	50	-	100	150	3
PRE	5415	Design and Production Engineering laboratory	-	3	3	75	-	-	75	-
PRE	5416	Project *	4	2	6	40	10	-	50	-
Total			19	11	30	-	-	-	650	-
Second Term										
PRE	5421	Machine Tool Design (2)	4	3	7	45	10	120	175	4
PRE	5422	Quality Control	3	2	5	30	-	95	125	3
PRE	5423	Mechanical maintenance and Faults Monitoring	3	2	5	30	-	95	125	3
PRE	5424	Elective Course (4)	3	2	5	35		90	125	3
PRE	5425	Fine Measurements	2	2	4	20	10	70	100	3
PRE	5426	Project *	2	2	4	40	10	150	200	Discussion
Total			17	13	30	-	-	-	850	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Course (3)

1 PRE Methods and Techniques of Design
2 PRE Scientific Management Systems
3 PRE Design and production of Dies
4 PRE Tribology
5 PRE Non-Traditional Shaping Processes
6 PRE Reversing Engineering in Mechanical Design
7 PRE Mecatronics
8 PRE Design and Production of Cutting Tools

Elective Course (4)

1 PRE Computer Aided Manufacturing
2 PRE Optimum Design
3 PRE Operation Research
4 PRE Non-Traditional Machining Processes
5 PRE Feasibility Study
6 PRE Composite Material
7 PRE Hydraulic Control System

Table (6 – 1)

Textile and Spinning Engineering

First Year

First Term

Course coding			No. of Hrs/w			Maximum Marks				Final Exam Hours
Dept.	Code	Course Title	Lect.	Tut. Lab.	Total	Term Work	Oral Exam	Fin. Exam	Total	
BAS	6111	Mathematics (3)	4	2	6	40	-	110	150	3
PRE	6112	Strength of Materials	3	2	5	30	20	75	125	3
TXE	6113	Cotton Yarn Production	4	2	6	30	20	100	150	3
TXE	6114	Textile Materials	4	2	6	30	20	100	150	3
TXE	6115	Computer Applications in spinning	2	2	4	20	20	60	100	3
TXE	6116	Humanities (2)	3	-	3	-	-	75	75	2
Total			20	10	30	-	-	-	750	-
Second Term										
BAS	6121	Applied Mechanics	4	2	6	40	-	110	150	3
PRE	6122	Machine Drawing	2	4	6	40	20	90	150	3
TXE	6123	Weaving Preparation	4	2	6	30	20	100	150	3
MPE	6124	Heat Transfer and Air Conditioning	2	2	4	30	-	70	100	3
TXE	6125	Textile Physics(1)	4	2	6	30	20	100	150	3
TXE	6126	Technical Reports in Textile	-	2	2	-	-	50	50	2
Total			16	14	16	-	-	-	750	-

Table (6 – 2)

Textile and Spinning Engineering

Second Year

First Term

Course coding			No. of Hrs/w			Maximum Marks				Final Exam Hours
Dept.	Code	Course Title	Lect.	Tut. Lab.	Total	Term Work	Oral Exam	Fin. Exam	Total	
TXE	6211	Textile Chemistry	4	2	6	20	20	110	150	3
PRE	6222	Theory of Machines	4	2	6	20	20	110	150	3
TXE	6223	Wool Yarn Production	4	2	6	30	10	110	150	3
TXE	6224	Weaving Technology (1)	4	2	6	20	20	110	150	3
TXE	6225	Computer Application in Textiles (3)	2	2	4	20	20	60	100	3
TXE	6226	Humanities in Textiles(3)	2	-	2	-	-	50	50	2
Total			20	10	30	-	-	-	750	-
Second Term										
BAS	6221	Mathematics(4)	4	2	6	40	-	110	150	3
MPE	6222	Fluid Mechanics	2	2	4	20	10	70	100	3
PRE	6223	Machine Design	3	2	5	25	10	90	125	4
TXE	6224	Textile Physics(2)	3	2	5	25	20	80	125	3
TXE	6225	Synthetic Fiber Production	4	2	6	30	10	110	150	3
EE+COM	6226	Electrical and Electronic Eng.	2	2	4	10	20	70	100	3
Total			18	12	30	-	-	-	750	-

Table (6 – 3)

Textile and Spinning Engineering

Third Year

First Term

Course coding			No. of Hrs/w			Maximum Marks				Final Exam Hours
Dept.	Code	Course Title	Lect.	Tut. Lab.	Total	Term Work	Oral Exam	Fin. Exam	Total	
TXE	6311	Applied Statistics	2	2	4	20	10	70	100	3
TXE	6312	Textile Machine Design	4	3	7	40	15	120	175	4
TXE	6313	Design & Textile Production	2	3	5	20	15	90	125	3
TXE	6314	Theory of Spinning (1)	4	-	4	20	10	70	100	3
TXE	6315	Elective Course(1)	3	2	5	25	10	90	125	3
TXE	6316	Elective Course(2)	3	2	5	25	10	90	125	3
Total			18	12	30	-	-	-	750	-
Second Term										
TXE	6321	Garment Manufacturing and knitting	4	2	6	30	20	100	150	3
TXE	6322	Engineering Measurments	4	2	6	30	10	110	150	3
TXE	6323	Weaving Technology (2)	2	2	4	20	20	60	100	3
TXE	6324	Computer Application in Textiles (4)	2	2	4	20	20	60	100	3
TXE	6325	Elective Course(3)	3	2	5	25	10	90	125	3
TXE	6326	Elective Course(4)	3	2	5	25	10	90	125	3
Total			18	12	30	-	-	-	750	-

Elective Course 1, 2, 3, 4 (Group 1)

1- TXE Technical Textiles
2- TXE Printing and Finishing
3- TXE Theory of Spinning (2)
4- TXE Yarn Stressing and Analysis

Elective Course 1, 2, 3, 4 (Group 2)

1- TXE Mechanics of Knitting and Appalrel
2- TXE Fabric Structure
3- TXE Mechanics of Spinning Machines
4- TXE Mechanics of Weaving Machines

Table (6 – 4)

Textile and Spinning Engineering

Fourth Year

First Term

Course coding			No. of Hrs/w			Maximum Marks				Final Exam Hours
Dept.	Code	Course Title	Lect.	Tut. Lab.	Total	Term Work	Oral Exam	Fin. Exam	Total	
TXE	6411	Planning and Production Control of Textiles (1)	2	4	6	30	10	110	150	3
TXE	6412	Quality Control	4	2	6	30	10	110	150	3
CSE	6413	Automatic Control	3	2	5	25	10	90	125	3
TXE	6414	Spinning Systems	2	1	3	10	5	60	75	3
TXE	6415	Knetted and Apparel Machines	2	2	4	30	10	60	100	3
TXE	6416	Weavin Technology (2)	2	2	4	30	10	60	100	3
TXE	6417	Project*	2	-	2	40	10	-	50	-
Total			17	13	30	-	-	-	750	-
Second Term										
TXE	6421	Textile Finishing	2	2	4	30	20	60	100	3
TXE	6422	Nonwovens	2	2	4	30	10	60	100	3
TXE	6423	Planning and Production Control of Textiles (2)	2	3	5	25	10	90	125	3
TXE	6424	Textile Eng. Economics and accounts	2	2	4	20	10	70	100	3
TXE	6425	Elective Course(5)	2	2	4	20	10	70	100	3
TXE	6426	Elective Course(6)	2	2	4	20	10	70	100	3
TXE	6427	Project*	2	3	5	25	10	90	125	Discussion
Total			14	16	30	-	-	-	750	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Course (5)

1- TEX Theory of Spinning (3)

2- TEX Noise

3- TEX Planning and Production Control of Knitting and Apparel

Elective Course (6)

1- TEX Processing Research

2- TEX Quality Control in Weaving

3- TEX Specifications and Standards in Textiles

Table (7 – 1)

Architectural Engineering

First Year

Course Code		Course Name	Hrs./week			Maximum Marks				Exam time
Dept.	Code		Lect.	Tut. Lab.	Total	Term Work	Oral/ Prac.	Final Exam	Total	
First Term										
BAS	7111	Mathematics, Statistics, and Programming	4	2	6	40	-	110	150	3
ARE	7112	Architectural Design* (1)	1	5	6	75	15	60	150	6
ARE	7113	Building Construction* (1)	2	4	6	60	-	90	100	4
ARE	7114	History &Theories of Architecture (1)	4	-	4	40	-	60	100	3
STE	7115	Theories of Structures	2	2	4	30		70	100	3
PWE	7116	Surveying	2	2	4	20	10	70	100	3
Total			15	15	30	-	-	-	750	-
Second Term										
ARE	7121	Architectural Design* (2)	1	5	6	75	15	60	150	6
ARE	7122	Building Construction* (2)	2	4	6	60	-	90	150	6
ARE	7123	Shade and Perspective	2	4	6	60	-	90	150	6
STE	7124	Properties and Test of Materials	3	2	5	35	10	80	125	3
ARE	7125	Visual Training	2	3	5	45	-	80	125	4
ARE	7126	Technical Reports in Architecture	-	2	2	-	-	50	50	2
Total			10	20	30	-	-	-	750	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (7 – 2)

Architectural Engineering

Second Year

Course Code		Course Name	Hrs./week			Maximum Marks				Exam time (Hrs.)
Dept.	Code		Lect.	Tut.	Total	Term work	Oral/ lab	Final Exam	Total	
First Term										
ARE	7211	Computer Applications in Architecture* (1)	2	2	4	40	-	60	100	3
ARE	7212	Architectural Design* (3)	2	5	7	70	15	90	175	6
ARE	7213	Building Construction* (3)	2	4	6	60	-	90	150	4
ARE	7214	History &Theories of Architecture (2)	4	-	4	40	-	60	100	3
STE	7215	Concrete Structures	3	2	5	45	-	80	125	4
ARE	7216	History of City Planning	4	-	4	30	-	70	100	3
Total			17	13	30	-	-	-	750	-
Second Term										
ARE	7221	Architectural Design* (4)	2	5	7	70	15	90	175	6
ARE	7222	Building Construction* (4)	2	6	5	60	-	90	150	4
ARE	7223	Urban Design	2	3	5	45	-	80	125	4
ARE	7224	Building Physics and Environmental Control	2	2	4	40	-	60	100	3
STE	7225	Steel Structures	2	2	4	30	-	70	100	4
ARE	7226	Computer Applications in Architecture* (2)	2	2	4	30	10	60	100	3
Total			12	18	30	-	-	-	750	-

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Table (7 – 3)

Architectural Engineering

Third Year

Course Code		Course Title	Hrs./week			Maximum Marks				Exam time (Hrs.)
Dept.	Code		Lect.	Tut.	Total	Term work	Oral / lab	Final Exam	Final Exam	
First Term										
ARE	7311	Architectural Design* (5)	2	5	7	-	-	-	175	6
ARE	7312	Executive Designs* (1)	1	5	6	150	-	-	150	-
ARE	7313	Theories and Philosophy of Architecture (1)	3	-	3	15	-	60	75	3
ARE	7314	Urban Planning and Design	2	4	6	-	-	-	150	6
STE	7315	Foundations	2	2	4	30		70	100	3
ARE	7316	Elective Courses (1)	3	2	4	-	-	-	100	3
Total			12	18	30	-	-	-	750	-
Second Term										
ARE	7321	Architectural Design* (5)	2	6	8	70	10	120	200	7
ARE	7322	Executive Designs* (1)	1	5	6	40	10	100	150	7
ARE	7323	Housing and Urban Design (1)	2	2	4	30	-	70	100	3
PWE	7324	Sanitary Engineering	2	2	4	30	-	70	100	3
ARE	7325	Elective Courses (2)	2	2	4	-	-	100	100	3
ARE	7326	Elective Courses (3)	2	2	4	-	-	100	100	3
Total			11	19	30	-	-	-	750	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Courses (1)

1. ARE Environmental Design
2. ARE Computer Aided Design

Elective Courses (2)

1. ARE Lanscape Design
2. ARE Urban Conservation and Maintenance

Elective Courses (3)

1. ARE Advanced Building Technologies
2. ARE Architectural Projects' Management

Table (7 – 4)

Architectural Engineering

Fourth Year

Course Code		Course Title	Hrs./week			Maximum Marks				Exam time (Hrs.)
Dept.	Code		Lect.	Tut.	Total	Term work	Oral / lab	Final Exam	Total	
First Term										
ARE	7411	Architectural Design (6)	1	6	7	70	15	90	175	7
ARE	7412	Executive Designs (2)	1	5	6	50	20	80	150	7
ARE	7413	Theories and Philosophy of Architecture (2)	3	-	3	15	-	60	75	3
ARE	7414	Interior Design	2	2	4	30	10	60	100	3
ARE	7415	Urban Planning (2)	2	4	6	40	10	100	150	6
ARE	7416	Elective Courses (4)	4		4	30	-	70	100	3
Total			13	17	30	-	-	-	750	-
Second Term										
ARE	7421	Housing and Urban Design (2)	2	4	6	80	-	90	150	4
ARE	7422	Specifications, Quantities, and Quality Control	2	2	4	30	-	70	100	3
ARE	7423	Elective Courses (5)	2	2	4	30		70	100	3
ARE	7424	Project	4	10	14	150	50	200	400	Discussion
Total			10	18	28	-	-	-	750	-

Elective Courses (4)

1. ARE Architectural Criticism and Competitions
2. ARE Advanced Architectural design

Elective Courses (5)

1. ARE Detailed Planning
2. ARE Urban Renovation and Upgrading

Table (8 – 1)

Civil Engineering Department

First Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept.	Code		Lect.	Tut.	Total	Term Work	Exp./ Oral	Final Exam	Total	
First Term										
BAS	8111	Mathematics (3)	4	2	6	50	-	100	150	3
IRH	8112	Law and Financing Sources	3	1	4	30	-	70	100	3
PWE	8113	Statistical Applications in Civil Engineering	4	2	6	50	-	100	150	3
IRH	8114	Civil Engineering Drawing	2	4	6	50	-	100	150	3
PWE	8115	Surveying *	2	2	4	30	-	-	30	-
STE	8116	Theory of Structures 1*	2	2	4	40	-	-	40	-
Total			17	13	30	-	-	-	620	-
Second Term										
BAS	8121	Mathematics (4)	4	2	6	50	-	100	150	3
STE	8122	Strength of Materials(1)	4	4	8	60	10	130	200	3
EE+ MPE	8123	Electrical and Mechanical Installation	4	2	6	50	-	100	150	3
IRH	8124	Technical Reports in Civil Engineering	2	-	2	-	-	50	50	2
PWE	8125	Surveying *	2	2	4	30	30	110	170	4
STE	8126	Theory of structures(1)*	2	2	4	40	-	120	160	4
Total			18	12	30	-	-	-	880	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (8 – 2)

Civil Engineering Department

Second Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept.	Course		Lect.	Tut.	Total	Term Work	Exp./ Oral	Final Exam	Total	
First Term										
IRH	8211	Hydraulics (1)	4	2	6	50	10	90	150	3
IRH	8212	Irrigation and Drainage Engineering	2	2	4	30	-	70	100	3
STE	8213	Strength of Materials(2)	4	4	8	60	10	130	200	3
PWE	8214	Environmental Sciences	2	-	2	10	-	40	50	2
STE	8215	Engineering Behaviors	2	-	2	-	-	50	50	2
STE	8216	Theory of Structures (2)*	2	2	4	-	40	-	40	-
PWE	8217	Topographic and Geodesic*	2	2	4	-	30	-	30	-
Total			18	12	30	-	-	-	620	-
Second Term										
ARE	8221	Building Systems	2	2	4	30	-	70	100	3
PWE	8222	geology and Soil Mechanics	4	2	6	40	10	100	150	3
STE	8223	Concrete (1)	4	2	6	50	-	100	150	3
IRH	8224	Hydrology	2	1	3	15	10	50	75	2
PWE	8225	Methods and Equipment of Construction	2	1	3	15	-	60	75	2
STE	8226	Theory of Structures (2)*	2	2	4	40	-	120	160	4
PWE	8227	Topographic and Geodesic*	2	2	4	30	30	110	170	4
Total			18	12	30	-	-	-	820	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (8 – 3)

Civil Engineering Department

Third Year

Course Code		Course Name	Weekly Hours			Maximum Marks				Exam Time
Dept.	Course		Lect.	Tut.	Total	Term Work	Exp./ Oral	Final Exam	Total	
First Term										
IRH	8311	Design of irrigation works (1)	4	2	6	50	-	100	150	4
STE	8312	Quantities and descriptions	2	2	4	30	-	70	100	3
STE	8313	Theory of structures (3)	2	2	4	30	-	70	100	3
PWE	8314	Railway	2	2	4	30	-	70	100	3
IRH	8315	Hydraulics (2)*	3	2	5	35	15	-	50	-
STE	8316	Concrete (2)*	2	2	4	40	-	-	40	-
STE	8317	Steal constructions (1)*	2	2	4	40	-	-	40	-
Total			17	14	31	-	-	-	580	-
Second Term										
STE	8321	Soil mechanics and foundations (1)	4	4	8	70	-	130	200	4
PWE	8322	Transport and Traffic	4	2	6	40	10	100	150	3
STE	8323	Artistic reports in civil engineering	2	-	2	-	-	50	50	2
IRH	8324	Hydraulics (2)*	3	2	5	35	15	100	150	3
STE	8325	Concrete (2)*	2	2	4	40	-	120	160	4
STE	8326	Steal constructions (1)*	2	2	4	40	-	120	160	4
Total			17	12	29	-	-	-	920	-

** Continued course. Results of both Terms are summed at the end of the academic year.*

Table (8 – 4)

Civil Engineering Department

Fourth Year

Course Code		Course Name	Weekly Hours			Maximum Degrees				Exam Time
Dept.	Course		Lect.	Tut.	Total	Term Work	Exp./ Oral	Final Exam	Total	
First Term										
STE	8411	Soil Mechanics and Foundations (2)	4	4	8	60	20	120	200	4
IRH	8412	Design of Irrigation Works (2)	4	2	6	50	-	100	150	4
PWE	8413	Roads and Airports	4	2	6	50	-	100	150	3
STE	8414	Management of Construction Projects	2	2	4	30	-	70	100	3
STE	8415	Elective Courses (1)	2	1	3	25	-	50	75	2
PWE	8416	Elective Courses (2)	2	1	3	25	-	50	75	2
Total			18	12	30	-	-	-	750	-
Second Term										
STE	8421	Concrete (3)	4	2	6	50	-	100	150	4
STE	8422	Steel constructions (2)	4	2	6	50	-	100	150	4
IRH	8423	Harbors	2	2	4	30	-	70	100	3
PWE	8424	Sanitary engineering	4	2	6	35	-	90	125	3
IRH	8425	Elective course (3)	2	1	3	25	-	50	75	2
STE+ PWE +IRH	8426	Project	-	5	5	50	100	-	150	Discussion
Total			16	14	30	-	-	-	750	-

Table (8 – 4) Continued

Civil Engineering Department

Fourth Year

Elective Courses

Elective Courses (1)

STE 1	New Construction Materials
STE 2	Design of Earthquake Resistance Structures
STE 3	Design of Brick Buildings
PWE 4	New Economical Systems in Collecting and Curing of Sanitary Water
IRH 5	Water Resources Engineering

Elective Courses (2)

PWE 1	New Trends in Design of Asphalt Mixtures
PWE 2	Remote Sensing
PWE 3	Untraditional Systems in Purification of Drinking Water
STE 4	Restoration, Consolidation and Strengthening of Structures
IRH 5	Internal Navigation Engineering

Elective Courses (3)

IRH 1	Design of Advanced Irrigation Systems
IRH 2	Design of Large Irrigation Structures
IRH 3	Design of Coastal Protection Works
PWE 4	systems of Air Transport Operations
STE 5	Analysis of Structures Using Computer

Table (9 – 1)

Electronics and Communications Engineering

First Year

First Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
BAS	9111	Mathematics (3)	4	2	6	40	---	110	150	3
COM	9112	Solid State Electronics	4	2	6	40	10	100	150	3
COM	9113	Circuit Theory	4	2	6	40	10	100	150	3
MPE	9114	Engineering Thermodynamics	4	2	6	40	---	110	150	3
CSE	9115	Computer Programming	2	1	3	10	5	60	75	2
COM	9116	Technical Reports in Communications	---	3	3	---	---	75	75	2
Total			18	12	30	---			750	---

Second Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lec.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
BAS	9121	Mathematics (4)	4	4	8	60	---	140	200	3
COM	9122	Basic Electronics	4	2	6	40	10	100	150	3
COM	9123	Electronic Measurements (1)	4	2	6	40	10	100	150	3
COM	9124	Logic Circuits (1)	2	2	4	25	5	70	100	3
COM	9125	Electronic Lab (1)	---	4	4	40	10	50	100	2
COM	9126	Humanities in Communications(2)	2	---	2	---	---	50	50	2
Total			16	14	30	---			750	---

Table (9 – 2)

Electronics and Communications Engineering

Second Year

First Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
BAS	9211	Mathematics (5)	4	4	8	60	---	140	200	3
COM	9212	Electronic Lab (2)	1	3	4	40	10	50	100	2
COM	9213	Electromagnetics	4	2	6	40	10	100	150	3
COM	9214	Electronic Measurements (2)	2	2	4	25	5	70	100	3
COM	9215	Logic Circuits (2)	3	2	5	35	10	80	125	3
COM	9216	Humanities in Communications(3)	3	---	3	---	---	75	75	3
Total			17	13	30	---			750	---

Second Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
COM	9221	Applied Statistics	2	2	4	30	---	70	100	3
COM	9222	Electronic Circuits (1)	4	2	6	40	10	100	150	3
CSE	9223	Automatic Control	3	2	5	35	---	90	125	3
EE	9224	Electrical Machines	4	2	6	40	---	110	150	3
COM	9225	Linear Systems and Networks	4	2	6	40	10	100	150	2
COM	9226	Computer applications in Communications(3)	2	1	3	15	---	60	75	2
Total			19	11	30	---			750	--

Table (9 – 3)

Electronics and Communications Engineering

Third Year

First Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
COM	9311	Communications Theory (1)	4	2	6	40	10	100	150	3
COM	9312	Electronic Circuits (2)	4	2	6	40	10	100	150	3
COM	9313	Signal Analysis	4	2	6	40	10	100	150	3
EE	9314	Electrical Power	2	2	4	30	---	70	100	3
COM	9315	Elective Courses(1)	3	1	4	25	5	70	100	3
COM	9316	Humanities in Communications(4)	4	---	4	30	---	70	100	2
Total			21	9	30	---			750	--

Second Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
COM	9321	Communications Theory (2)	4	2	6	40	10	100	150	3
COM	9322	Electromagnetic Waves	4	2	6	40	10	100	150	3
COM	9323	Micro-Processors	4	2	6	40	10	100	150	3
COM	9324	Electronics Lab (3)	1	3	4	40	10	50	100	2
COM	9325	Optical Electronics	2	2	4	20	10	70	100	3
COM	9326	Elective Courses (2)	2	2	4	25	5	70	100	3
Total			17	13	30	---			750	--

Elective Courses (1)

1. COM Microwave Electronics
2. COM Industrial Electronics
3. COM Biomedical Electronics
4. COM Acoustic Engineering
5. CSE Computer Controlled Systems

Elective Courses (2)

1. COM Information Systems
2. COM Programming and Algorithm Design
3. COM Operation Research
4. COM Power Electronics
5. CSE Artificial Intelligence

Table (9 – 4)
Electronics and Communications Engineering
Fourth Year
First Term

Course Code		Course Name	Weekly Hours			Maximum Marks				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
COM	9411	Communications Networks	4	2	6	40	---	110	150	3
COM	9412	Electronic Circuits(3)	4	2	6	40	10	100	150	3
COM	9413	Antennas and Wave Propagation	4	2	6	40	10	100	150	3
COM	9414	Electronics lab (4)	---	3	3	30	5	40	75	2
COM	9415	Elective course (3)	4	1	5	35	---	90	125	3
COM	9416	Project *	2	2	4	80	20	---	100	---
Total			18	12	30	---			750	--

Second Term

Course Code		Course Name	Weekly Hours			Grading System				Final exam hours
Dept.	Code		Lect.	Tut.	Total	Term work	Lab/ oral	Final exam	Total	
COM	9421	Integrated Circuits	4	2	6	40	10	100	150	3
COM	9422	Digital Signal Processing	4	2	6	40	10	100	150	3
COM	9423	Communication Systems	4	2	6	40	10	100	150	3
COM	9424	Elective course (4)	4	2	6	40	10	10	150	3
COM	9425	Project *	2	4	6	40	10	100	150	Discussion
Total			18	12	30	---			750	--

* *Continued course. Results of both Terms are summed at the end of the academic year.*

Elective Course (3)

1. COM Neural Networks
2. COM Computer Circuit Design
3. COM Communication Circuits
4. COM Microwave Circuits
5. COM Computer Interface Design
6. COM Telephone Systems
7. COM Optical Communication Systems
8. COM Radar Systems

Elective Course (4)

1. COM Satellite Communication Systems
2. COM Broadcasting and Recording Systems
3. CSE Computer Engineering
4. COM Mobile Communication Systems
5. CSE Computer Networks
6. COM Image Processing
7. COM Optimization Theory

Preparatory Year

BAS 01011 Math 1

Differential Calculus: Concept of Functions - functions classification- inverse functions- basic elementary functions: trigonometric, logarithmic, exponential ,hyperbolic and inverse hyperbolic functions - limits- limit theorems-continuity of functions and mean value theorems - derivatives- differentiation rules - derivatives of elementary functions chain rule - implicit differentiation and parametric differentiation derivatives of higher ordres - partial differentiation- applications of derivatives- l' hospital's rule - taylor and maclaurin expansions - curve sketching curve sketching- extreme of functions - approximations - indefinite integrals- properties of indefinite integrals.

Algebra:- Binomial theorem and its applications -partial fractions - theory of equations - system of linear algebraic equations - matrices and determinants and their properties and applications - gauss methods- vector spaces

BAS01021 Math 2

Integral Calculus:- : Methods of Integrations: Integration by substitution and trigonometric substitutions: successive reduction method- definite integrals - properties of definite integrals -fundamental theorems of definite integrals (Remann's definition of integrals) fundamental theorems integral calculus - improper integrals - applications of definite integral- areas, volumes and volumes of revolution- computing are length and surface area - numerical integration: trapezoidal rule - Simpson's rule of integration - polar coordinates and applications.

Analytical Geometry :

Equations of second degree- pairs of straight lines- circles- system of circles - conic sections - solid geometry- coordinates systems - equations of straight line and plane - sphere, cylinder and cone.

BAS 3111- Math3_elect

Application of partial derivatives-Extreme values of functions of several variables-Multiple integrals and its applications-Infinite series and functions expansion-Convergence and divergence concepts-First order ordinary differential equations-

Second order ordinary differential equations: with constant coefficients, with variable coefficients, Laplace transform and its application in solving differential equations.

BAS 3121- Math4_elect

Fourier series- Periodic function and Euler's laws- Fourier integral-Vector analysis-Gauss's and stoke's theorem – Orthogonal coordinates-Functions of complex variables- Analytical functions-Derivatives-Line integrals-Green's and Cauchy theorem and its applications-Principles of numerical analysis-Least squares method and curve fitting-Numerical solution of algebraic equation.

BAS 3211 – Math 5_elect

Series solution of differential equations-Special functions-Gamma, Beta and error functions-Bessel and Legendre functions- Solution of partial differential equations using separation of variables-Principles of probability theorem for conditional and unconditional probabilities-Random variables-Probability distribution functions-Polynomial approximation of functions-Introduction to numerical methods to solve linear and differential equations-Eigen problem.

BAS01014 Statics I

Introduction to mechanics, Newton's laws of motion, vector representation of forces in 2D and 3D, equilibrium of a particle, moment of a force, couple, equivalent systems of forces, equilibrium of rigid bodies in 2D and 3D, centroids, analysis of simple structures, trusses, beams and frames, shear and bending-moment diagrams, friction.

BAS01023 Mechanics II

Engineering dynamics: Kinetics of a particle, Newton's laws of motion, Equations of motion in different coordinates, Work and Energy, Conservative systems, friction and its application, relative rectilinear motion, Motion of rigid body, Planar motion: translation, rotation, general motion; Kinetics of rigid bodies.

Chemistry, BAS 1015

Equations of state-chemical thermodynamics - kinetics of chemical reactions - Material and energy balance in fuel combustion and chemical processes - properties of solutions - Dynamic equilibrium in physical and chemical processes - Basic principles in electrochemistry - Introduction to corrosion engineering - Industry and chemistry of cement - Chemical fertilizers - Dyes and dyeing industry.

Humanities (1), BAS 1027

An introduction to environmental science:-

The struggle between man and environment and the effects of this struggle on human-Environmental quality and development - the technological basis of solid waste handling and disposal - Economical aspects of environmental abatement - Responsibilities of pollution abatement on local, regional and universal levels-legislatives concerning environmental protection - Environmental protection - Environmental impact assessment (ELA) for development projects.

An introduction to engineering:-

Engineering profession - International specifications of engineering profession - Engineering specializations - Importance of information technology (IT) - Ethics of engineering profession - Basic concepts of private business culture.

PHYSICS BAS1012

1. **Mechanical Properties of matter:**

   Physical quantities- Units and dimensional analysis - Oscillations- Mechanical Properties of metals- Fluid Properties -Viscosity- Surface tension-The Sound Waves- The Waves in elastic medium.

2. **Heat and thermodynamics:-**

   Heat Transfer- The kinetic theory of gases- The first law of thermodynamics-the entropy and the second law of thermodynamics - Temperature and thermometers- Thermal expansion.

PHYSICS BAS1022

1. **Electricity and Magnetism:-**

   The Charge and matter - The electric field - Coulomb's law- The electric flux - Gauss's law - The electric Potential - the capacitors and dielectrics- the electric current, resistors and the electro- motive force- Ohm's Law and circuits - the magnetic field -Boit- Savart's law- The magnetic flux Gauss's Law - Faraday's Law- Magnetic induction.

2. **Optics and Atomic Physics:**

Geometric Optics- Huygen's Wave Theory and quantum theory -Interference and Diffraction - Polarization - Optical fibres- Atomic construction - Bohr's theory - The principle of Quantum theory - laser- photoelectric effect- Relativity.

BAS 1016 The English language (Technical)

students in the first term of the preparatory year are supplied with a course book which includes selected tests in subjects related to engineering. the aim of these selected texts is to train students in skimming and scanning, in writing reports , in information transfer , and in communication skills through topics for discussion and summary writings.

By the end of the course, students are able to use the English language communicatively through developing the language four skills: listening, speaking, reading and writing.

These objectives are achieved through students regularly attending lectures and sections where they work individually, in pairs and in groups under the guidance and supervision and fair assessment of their tutors. those tutors assess students' performance both orally and in writing, and also through written tests from time to time all through the term, and prepare them to sit for their term exam .

A list of books and references is included in the students course book

Electrical Power and Machines Engineering

First Year

Mathematics 3 BAS2111
Applications of partial differentiation-multi-variable problem maximization-vector analysis-Vectorial differential operators-multiple integrals and its applications-infinite series and function expansion-main concepts of convergence and divergence-first order ordinary differential equations-second order ordinary differential equations-Laplace transform and its applications in solution of differential equations.

Solid State Electronics COM2112
Atomic structure-Principles of quantum mechanics-crystal structure of solids- Energy band and charge carrier in semiconductors- carrier concentration- motion of carriers in electromagnetic fields- concentration of excessive carriers in semiconductors-photonic absorption- Carriers interference-application on bi-junction and transistor-insulators-Static insulation constant-Polarization-Bizo-electricity-insulators losses-properties of magnetic materials-ferrite materials- Electromagnetic effects of Superconductivity.

Electric Circuits 1 EE2113
Basic circuit laws: Ohm's law, Kirchoff's laws, Circuit analysis techniques: Thevinen's, Norton's, Superposition, Source transformation, Maximum power transfer-Energy storage elements- Basic concepts of ac circuits- First order transients- Three phase circuits.

Civil Engineering STE2114
General principles of structure theory-Structural analysis of reactions-Loads-Momentums- shear stress-axial forces-statically determined structures-Types of buildings and applications: concrete and steel-Types of walls and ceilings- Machine base design principles.

Computer Programming in Electrical Engineering 1 EE2115
Introduces C/C++ programming for engineers. Covers fundamentals of structural and object oriented programming with applications to engineering. Topics include variables, expressions and statements, I/O instructions, modularization and functions, arrays, pointers and strings, algorithms, structures, classes and file I/O. Introduces working with C/C++ at the bit manipulation level. Laboratories include designing and programming engineering applications.

Technical Report Writing EE2116
Definition of Technical Writing -Defining Audiences -The Technical Writing Process - Technical Writing Style - Researching - Summarizing - Designing Pages -Using Visual Aids - Defining - Describing -Sets of Instructions -Memorandums and Informal Reports - Developing Web Sites -Formal Reports - Recommendation and Feasibility Reports - Proposals -User Manuals - Oral Reports - Letters -Job Application Materials.

Mathematics 4 BAS2121
Special functions-Fourierr series-Periodic functions and Euler's laws-Fourier integration-Differential equation solving using series-Solution of partial differential equations by variables separation-Functions of complex variables-Analytical functions-Derivation-Linear integrals-Green theorem and Coushi theorem and its applications- Theorem of remainders and its applications.

Electronic Fundamentals COM2122
Current flow in semiconductors-Positive-negative junction-General characteristics and current components in different bias cases- Characteristics of junctions-Bipolar junction transistors-Dynamic and static characteristics-Unipolar transistors: types and properties-Field effect transistors and its characteristics-Photonic transistors.

Electrical Measurements EE2123
Basic measurement concepts- DC and AC indicating meters – single and three phase power and power factor measurement- Measurement of frequency- Rise time and phase difference measurement- Function generators- A/D and D/A converters- digital instruments- counters.

Electric Circuit Theory 2 EE2124
Solutions of second order circuits- Analysis of three phase networks- State equations-Linear circuits- Computer aided circuit analysis-Frequency domain analysis and Bode plots- Network analysis using Laplace and Fourier transforms- Mutual inductance and transformers-Two port networks-Circuit analysis using topology.

Fluid Mechanics and Thermal Engineering MPE2125
Properties of fluids-Fluid statics-Fluid kinematics-Fluid flow-Principles of motion quantity and thrust - Fluid dynamics and its applications-Fluid measurements- Principles of hydrodynamics-First law of thermodynamics and its application to different systems-Second law of thermodynamics and its applications- Thermal power stations-Methods of heat transfer- Thermal insulators- Critical diameter of thermal insulation-Cooling surfaces.

Humanities in Electrical Engineering EE2126
Introduction to economics-Supply and demand-Costs-Pay back period- Comparing alternatives-Economic feasibility- Economic analysis of projects in public sector-Break even and sensitivity analysis-Introduction to law- Work legalisations and bylaws of engineering professions- Legalisations of industrial safety and environment.

Second Year

Mathematics 5 BAS2211
Numerical analysis-Least square method and curve fitting-Numerical solution of algebraic equations-Numerical solution of set of algebraic and differential equations-Equations with boundary and initial values- Some numerical methods for solving partial differential equations.

Digital Signal Processing COM2212
Analog to digital conversion-Discrete Fourier transform-Fast transform and spectrum of discrete signals-time invariant linear digital filters- Filters response analysis and stability-Basics of filter design-Design of finite and infinite impulse response filters- Solid state implementation of filters- Discrete time random processes and optimal filters- Error analysis and effect of limited word length on digital filters-Finer's filters- Adaptive filters- Data coding and compression-Restoration techniques- Applications in biomedical engineering and image processing.

Electromagnetic Fields EE2213
Coulomb's law , Gauss's law , Electric potential , Electric boundary conditions , Electric dipole- capacitance- laplace's equation - Biot savart's law - Amprer's law. Magnetic boundary conditions - inductance- Time varying fields- Maxwell's equations , plane wave propagation - Relaxation and refraction.- Introduction to transmission line theory.

Thermal and Hydraulic Machines MPE2214
Types of thermal power stations-Steam power stations-Steam generators-Steam turbines-Condensers and cooling towers-Gas turbines-Compressors and its types-Hydraulic power stations-Hydraulic turbines- Bolton wheels- Francais turbine-Caplan turbine-types of pumps- Performance of pumps.

Statistical Applications in Electrical Engineering EE2221
Data sorting-Measures of eccentricity, variance, torsion and curvature-Basics of probability theory-Main probabilistic distributions and its applications in engineering-Experiment design- Assumptions testing, curves of operation characteristics, confidence intervals and quality control with its applications in electrical engineering-Correlation and regression.

Electrical testing and Laboratories 1 EE2223
Experiments in: DC circuits measurements- Superposition, Thevenin, Norton theorems and maximum power transfer- AC circuits measurements-Resonance circuits-Dependant sources and operational amplifiers-Magnetic coupling-Two port networks- Three phase circuits- Transients and power factor correction- Hybrid parameters of transistors-Transient behaviour of electronic components- Identification of coil resistance-Frequency response of voltmeter- Whitestone bridge and alike bridges- Optical measurement devices- Optical transistor- Frequency, time and phase measurement with oscilloscope.

Power Systems 1 EE2224
Introduction and basic concepts in power systems engineering-Definitions of real and reactive power- DC and AC power distribution systems: modeling, voltage regulation, voltage levels, and power factor correction- Over head transmission lines: bundled conductors, calculations of inductance, capacitance and resistance, line modeling, circle diagram, parallel conductors, long lines and transfer capability definitions- Under ground cables: types, modeling- per unit system.

Electric Machines 1 EE2225
Introduction to machinery principles- Power Transformers- DC. Machinery Fundamentals: Construction, power flow and losses in DC. machine – DC Generators: Types of excitation, magnetization curve, characteristics of DC generators, parallel operation, armature reaction- DC motors: Performance characteristics- equivalent circuit- DC motor starting- Speed control- Braking.

Software in Electrical Engineering 2 EE2226
Introduction to MATLAB and its application for engineering analysis and problem Solving. This includes:- Introduction to MATLAB: Basic MATLAB syntax, MATLAB and matrices and vectors, mathematical operations, Data manipulation. MATLAB Programming: Script m-files, Function m-files, input and output, flow control. Some legendary MATLAB functions: numerical integration, local minimum of a function, fitting data, interpolation of data- Graphic Visualization: Controlling the display, Handling graphics- Modeling in SIMULINK- Selected applications like: equation solving, optimization, statistical analysis.

Third Year

Power Systems 2 EE2311

Electrical load characteristics and its factors- Basic cost concepts associated with the operation and expansion of power systems- Cost functions, average cost, marginal cost, customer billing and tariff systems- System modeling- The Impedance model and Network calculations- Symmetrical short circuit calculation, z-matrix and use of matrix methods- three phase unbalanced systems- Symmetrical components and Unsymmetrical fault analysis.

Electric Machines 2 EE2312

Basic Concepts of Rotating Electric Machine: Physical concepts of torque production, electromagnetic interaction torque, reluctance torque, constructional features of rotating electrical machine.- Polyphase Synchronous Generators: Construction, the speed of rotation, the internal generated voltage, the equivalent circuit, the parameters, operating alone, parallel operation, transient state. Synchronous Motors: Steady state motor operation, starting, synchronous generator and synchronous motor. Induction Motors Construction, equivalent circuits, power and torque, torque-speed characteristic, starting, speed control- Single-phase Induction Motor: Introduction, starting, speed control, the circuit model.

Electrical Testing and Laboratories 2 EE2315

Characteristics of DC machines with and without loads-Hopkinsen Test- Open and short circuit tests of transformer- two to three phase transformation and vice versa using transformers-Parallel operation of transformers.

High Voltage Engineering EE2316

High voltage generation(DC, AC and impulse)-High voltage measurement and testing-Insulators(solid, liquid and gaseous)- Insulation classes and machine insulation-Corona discharge, grounding and travelling waves- Insulation co-ordination.

Power Systems 3 EE2321

Power flow analysis: power flow equations and numerical solutions by Gauss and Newton methods, Fast decoupled load flow and linear (DC) approximations- Economic operation of power systems- Z_bus methods in contingency analysis- Angular stability analysis of power systems: Static and Transient stability analysis, Long term stability.

Electric Machine 3 EE2322

The Universal Machine, Application of U. M , Speed control of U.M.- Reluctance motors, Hyestersis motors, Stepper motors, Brushless DC motors, Amplydyne and Metadyne -Linear electric motors- Construction, difference between linear and rotary motors, problems of these type of motors, applications.

Power Electronics 1 EE2323

Principles: Background – organizing and analyzing switches – Converter concepts. Converters and applications: DC –DC converter – Diode – Capacitor circuits and rectifiers – Inverters – AC to AC conversion – Introduction to resonance in converters – Discontinuous modes.

Power System Protection EE2324

Relay Operating principles- Introduction to protective Relaying- Current & potential transformers - Over Current, differential , distance and pilot Protection of generators , motors , transformers - and transmission line- bus bar protection. Protection aspects of power system transients phenomena.

Fourth year

Power Systems 4 EE2411

State estimation of power systems-Optimization in electrical power systems under regulation: -Economic Dispatch, Unit Commitment- Voltage stability: concepts and analysis- Power system harmonics: definitions, sources, modeling and solutions- Power stations and substations- Power electronics in power utility: HVDC, FACTS-Overview of deregulation and energy markets.

Electric Machine 4 EE2412

The concept "primitive machine" will be analyzed and this generalized approach will permit steady state and transient state condition analysis for all machines - Voltage equation and connection matrices– transformer and rotational emf's equations – Fundamental torque equation- Matrix expression of DC and AC machines.

Power Electronics 2 EE2413

Real components and their effects: Real sources and loads – Capacitors and Resistors – concepts of magnetism for power electronics – power semiconductors in converters. - Interfacing with power semiconductors- Control for converters: Overview of feedback theory – Approximate methods for control design – Geometric control for power converters- Introduction to resonant converters.

Electrical Testing and Laboratories 3 EE32415

Insulators breakdown-Air bubbles and liquids- Corona discharge- Characteristics of transmission lines and underground cables- Protection systems- Load flow- Load curves-Grounding.

Power System Dynamics and Control EE2421

Dynamic properties of electrical machines, networks, loads and interconnected systems.- Models of power stations and turbines- control of turbines- load and frequency control-power exchange between networks- model of the synchronous machine connected with the network, transient model, behavior of the machine in case of disturbances- transient stability- model for small disturbances- voltage control- Fact Devices. SCADA/State Estimation- Asset Management- Future Trends in IT for Power Systems.

Electric Machines Control EE2422

Rectifier control of DC motors, chopper control of DC drives, closed loop control of DC drives- Induction motor control: variable terminals voltage control- variable frequency control- rotor resistance control-operation with a current source inverters- control of I.M by voltage source inverters - Synchronous motors control.

Electrical Projects Management EE2423

Engineering economics- Risk analysis- Project structure- Planning- Control and scheduling- Project life cycle- Law and ethics- Contracts.

Electrical Testing and Laboratories 4 EE24525

Open circuit test of rotating machines- Loading and locked rotor test of three phase and single phase induction motors- Measurement of magnetization curve and synchronization- Loading of synchronous machines.

Project EE2426

The student prepares a theoretical and/or experimental project under the supervision of a faculty member. The aim is to permit the student to gather, connect and apply the knowledge acquired through his study period in a real-world problem.

Elective courses

Distribution Systems Engineering EE2326

Distribution schemes and planning- Load characteristics- Distribution transformers- Substation design- Primary system design- Secondary system design- Voltage drop and power loss calculation- Capacitor application and power factor improvement.

Renewable Energy Systems EE2326

Energy conversion systems- resources of renewable energy- Photovoltaic systems- Wind energy- Biomass energy- Geothermal energy- Fuel cells.

Special Electric Machines EE2326

Linear motors- Reluctance motors- Servo motors- Disc motors.

Internet EE2326

Internet organizing techniques- Network management- Servers- Dynamic formation of network- Next internet generation.

Transient Phenomena in Power Systems EE2414

Switching transient analysis- Transient modeling of transmission lines- Traveling waves: computer-based computation and damping methods- Insulator co-ordination.

Artificial Intelligence Applications EE2414

Expert systems- Fuzzy logic- Neural networks- Genetic algorithms.

Power System Planning EE2424

Short term and long term forecasting- System planning approaches- Fault analysis.

Electric Traction EE2424

Industrial applications of traction- Torque and speed characteristics of ac and dc motors- Speed control of motors- Transients and dynamic behavior of motors- Motion starters- Electric braking methods.

Computers & Systems Engineering
First Year
First Semester

BAS 3111 MATHEMATICS (3)
Application of partial derivatives-Extreme values of functions of several variables-Multiple integrals and its applications-Infinite series and functions expansion-Convergence and divergence concepts-First order ordinary differential equations- Second order ordinary differential equations: with constant coefficients, with variable coefficients, Laplace transform and its application in solving differential equations

CSE 3112 HUMAN RELATIONS IN SYSTEMS ENGINEERING (2)
Project economy analysis – management principles – modern management – levels and types of management – planning and decision making – quantities and specifications - purchase methods - contracts

COM 3113 ELECTRONICS CONCEPTS
Atomic structure, principal of Quantum mechanics , crystal structure of solid material , Energy Bands and charge carriers in semiconductors, Light absorption , carrier combination , PN junction diode and BJT transistors, isolation materials and isolation constant, polarization , piezo electricity dissipation in isolation materials, properties of magnetic materials, ferromagnetic materials, magnetic effects in superconductors.

CSE 3114 LOGIC & DIGITAL DESIGN (1)
Numeric Systems- Boolean Algebra - Logic Gates- Boolean Function simplification - Sequential Logic Circuit – Large and Small Digital Integrated Circuit – Synchronized Sequential components

CSE 3115 PROGRAMMING LANGUAGES (1)
Introduction to structure Programming – Data Types – File handling – Functions – Pointers – Data structure - - Procedure -- Memory handling – Implemtion via recent programming language.

CSE 3116 CONTROL ENGINEERING (1)
Introduction to control systems – study of some natural systems – open and closed loop control systems – transfer function – block diagram – signal flow – frequency response – routh stability analysis.

First Year
Second Semester

CSE 3121 MATHEMATICS (4)
Fourier series- Periodic function and Euler's laws- Fourier integral-Vector analysis-Gauss's and stroke's theorem – Orthogonal coordinates-Functions of complex variables- Analytical functions-Derivatives-Line integrals-Green's and Cauchy theorem and its applications-Principles of numerical analysis-Least squares method and curve fitting-Numerical solution of algebraic equation.

CSE 3122 TECHNICAL REPORTS IN SYSTEM ENGINEERING
Scripts in computer and systems – scientific and practical reports – summery preparation for specialized manuscripts – discussions and training for students – summery preparation from read manuscripts.

EE + COM 3123 ELECTRICAL & ELECTRONIC ENGINEERINGCIRCUITS
Electric Circuits : elements – analysis – theory phases.
Electronic Circuit : PN diode circuits and its applications , BJT configurations and applications , feedback circuits , transistor small signal amplifiers and gain – frequency response , oscillators and signal generators , wave shaping , photo – voltaic cells , laser types, optical switches and optical fiber and their applications .

CSE 3124 COMPUTERS OPERATING SYSTEM ENG. (1)
Introduction to Operating system – File system – access methods and data location – Resources management system – tasks- managing , processing and scheduling (task -process – memory – secondary storage – cache memory) – sequential execution – system selection consideration – studying of recent operation system.

CSE 3125 INTRODUCTION TO COMPUTER NETWORKS
Introduction to data communication – network architecture – communication protocol – layered model – local area network LAN – Wide area network WAN – Centralized and distributed network – Network design algorithms – routing algorithm – digital integrated network system- Practical studying and exercises

CSE 3126 CONTROL ENGINEERING (2)
Input elements – differentiators – integrators – proportional control – differential control – integral control-proportional integral differential (PID) control – output elements – hydraulic engine – electric elements – dc motor – ac motor.

Second Year
First Semester

BAS 3211 MATHEMATICS (5)
Series solution of differential equations-Special functions-Gamma, Beta and error functions-Bessel and Legendre functions- Solution of partial differential equations using seperation of variables-Principles of probability theorem for conditional and unconditional propbabilities-Random variables-Probability distribution functions-Polynomial approximation of functions-Introduction to numerical methods to solve linear and differential equations-Eigen problem.

CSE 3212 HUMAN RELATIONS IN SYSTEMS ENGINEERING (3)
Rights and privileges – owner rights – crime in computer systems – computer viruses – security in computer systems.

CSE 3213 LOGIC & DIGITAL DESIGN (2)
Registers – Counters – Memory unit – processor logic design – Controller logic design – Asynchronous Sequential components.

CSE 3214 PROGRAMMING LANGUAGES (2)
Advanced programming via object oriented language - object oriented language properties – inheritance - Polytheism – object construction – using and reusability – application on using previous concepts via recent object oriented language.

CSE 3215 MEASUREMENT DEVICES AND SENSORS
Digital measuring devices – oscilloscopes – automatic measuring devices – noise in measuring systems – different types of sensors.

CSE 3216 SYSTEMS MODELING AND SIMULATION
Modeling based on state variables – feedback elements – Stability based on reasoning – Root analysis – advanced angle

Second Year
Second Semester

CSE 3221 STATISTICAL APPLICATIONS
Basic concepts – correlation analysis – distribution analysis – confidence intervals and hypothesis tests – nonparametric analysis – time series – applications in electric signals.

CSE 3222 COMPUTERS OPERATING SYSTEM (2)
Synchronized process management – Computer security - Distributed Operating –System - Processors management and control – secondary storage management – Lab exercises

CSE 3223 PROGRAMMING LANGUAGE (3)
Advanced properties of the structure language and object oriented programming language application based on the previous concepts.

EE 3224 ELECTRICAL POWER AND MACHINES
Generation , distribution and Transmission Electric Power – protection systems – Transformers – DC machines – AC machines – speed control – linear motors – small and special motors – Applications .

CSE 3225 SYSTEMS COMPONENTS IDENTIFICATION
Compensators and their designs – state and time analysis – linear control systems and sensitivity – non-linear control systems – phase plane analysis.

CSE 3226 DIGITAL CONTROL SYSTEMS
Introduction for digital control systems – transfer function for digital systems – digital systems representations – frequency response – stability analysis for digital systems.

Third Year
First Semester

CSE 3311 COMPUTER ARCHITECTURE ENGINEERING (1)
Integrated and digital Circuit components - data representation - — Register and processing - Computer organization and design – microprocessors programming - microprocessors programming control .

CSE 3312 DATA STRUCTURE AND ALGORITHMS
Introduction to Data Structure – Data representation - Data Structure (Array – Stack – Queue – hierarchy tree – table) - Data Structure storing – Search , ordering and sorting algorithm - evaluation and analysis of the studied algorithm using prestudied language.

CSE 3313 DATABASE (1)
Database Concepts - Data Structure handling – File system – Database management System DBMS – Data modeling – Relationship types – Structure Query Language SQL – Schema and process of (Creation – Deletion – modification – retrieving) - Relationship types design – E/R model – Database programming – practical implementation using advanced DBMS

CSE 3314 MODERN CONTROL THEORY
Introduction for modern control theory – Lyaponove stability concept – first method – second method – krasoveski method – optimal control systems – controllability and observability - applications.

CSE 3315 ARTIFICIAL INTELLIGENT
Introduction to Artificial Intelligent and its importance – fact and knowledge representation – Natural Language processing – Computer vision – Robotic usage in practical area – Introduction to expert system – using computer in fact representation.

CSE 3316 PROGRAMMABLE LOGIC CONTROL
Principles of logic control – sequential control – switching signals – hydraulic systems – electric systems – industrial systems.

Third Year
Second Semester

CSE 3321 DATABASE (2)
Advanced concepts in database – data integrity and security – Data recover within system failure – Transaction – Query optimization algorithm – Query processing problem – Concurrency execution - Distributed Database system – OO Database system – Forth generation database system – Practical implementation using powerful DBMS.

CSE 3322 COMPUTER SYSTEMS DESIGN AND ANALYSIS
Computer system definition- Problem definition and analysis- System analysis methods – System Design method - Analysis of the system performance - Practical implementation for a given specific problem.

CSE 3323 COMPUTER GRAPHICS
Computer Graphics advantages and usage in practical area – Hardware and Software in Computer Graphics – Basic of Computer Graphics (Monitor – Pixel – resolution – brightness – intensity) - Computer Graphics language – permitive components drawing - Interactive methods – Animation creation – Image format - Practical implementation using high level language.

CSE 3324 COMPUTER BASED CONTROL (1)
Principles of signal digitization – compensators using computers – real time systems improvement – languages in real time systems – factors used in computer based control components selection.

CSE 3325 ELECTIVE COURSE (1) : [IN COMPUTER ENGINEERING]
Details are given after 4 th year courses

CSE 3326 ELECTIVE COURSE (2) : [IN CONTROL ENGINEERING]
Details are given after 4 th year courses

Fourth Year
First Semester

CSE 3411 COMPUTER ARCHITECTURE ENGINEERING (2)
Central Processing Unit CPU – Vector processing - Pipeline processors - Input / output organization and management – Multiprocessors system – Performance evaluation of the computer architecture – Simulation and practical studying .

CSE 3412 NETWORKS DESIGN AND PROGRAMMING
Network Design and programming basic and concepts – (client/server) system – Remote procedure call – Socket programming – Load balancing algorithm – File transferee algorithm – browser architecture – Web programming – Practical implementation using web programming language

CSE 3413 MACHINE LEARNING
Introduction – history of machine learning – inductive learning – deductive learning
abductive learning – modeling and simulation.

CSE 3414 ELECTIVE COURSE (3) : [IN COMPUTER ENGINEERING]
Details are given after 4 th year courses

CSE 3415 ELECTIVE COURSE (4) : [IN CONTROL ENGINEERING]
Details are given after 4 th year courses

CSE 3416 PROJECT
The student chooses a project approved by the department committee in computer engineering and control systems then plans the project and its literature review under the supervision of a stuff member in the department.

Fourth Year
Second Semester

CSE 3421 COMPUTER MAINTENANCE
Computer Failure types and reasons – Computer peripherals and SW – Problem recovery and different solutions - Practical Studies

CSE 3422 DISTRIBUTED COMPUTERS SYSTEMS
Distributed systems Basic and concepts – Basic of distributed hardware (Bus based – switched based) – Distributed database system – Distribution problems and solving and design issues - Computer network operating system – Processors scheduling and communication in distributed system environment – Memory management in distributed system – Communication and synchronization – Parallel processing - Distributed systems language - Design issue – Different example of Distributed systems. Practical study

CSE 3423 COMPUTER BASED CONTROL (2)
Principles of signal digitization – compensators using computers – real time systems improvement – languages in real time systems – factors used in computer based control components selection

CSE 3424 ELECTIVE COURSE (5 :)[IN COMPUTER ENGINEERING]
Details are given after 4 th year courses

CSE 3425 ELECTIVE COURSE (6) : [IN CONTROL ENGINEERING]
Details are given after 4 th year courses

CSE 3426 PROJECT
The student completes the theoretical and practical analysis for the project started in the first term then realized before being completed after the exams of the second term.

Elective Courses

Third Year Second Semester

ELECTIVE COURSE (1) : IN COMPUTER ENGINEERING

CSE 1 PROGRAMMING OF COMPUTER PERIPHERAL
Computer Peripheral (Input / Output and other) Programming – Design of operating system of the real time system application – Practical experimental

CSE 2 DATA PROCESSING
Data interchange in the computer system – data storage and retrieving methods - advanced topics in data processing – handling of the distributed database- Expert system in the data processing – practical implementation

CSE 3 OBJECT ORIENTED PROGRAMMING
Object Oriented Programming methods and technique – algorithms – object models – Design model - practical implementation

CSE 4 STANDARD PROGRAMS PACKAGE
Studying of the different package – studying and analysis and evaluation of an example of such package

CSE 5 COMPUTER PERIPHERALS
Introduction to Computer Peripheral – (Input / output devices such as Keyboard printers scanner , storage device driver Camera CD ROM drive) installation - practical implementation

CSE 6 COMPUTER APPLICATIONS
Implementation of engineering application by using advanced computer programming language – using of the slandered SW package .

Elective Courses

Third Year Second Semester

ELECTIVE COURSE (2) IN CONTROL SYSTEMS

CSE 1 DYNAMIC SYSTEMS
Nonlinear dynamic systems - discrete dynamic systems - nonlinear systems stability analysis - dynamic characteristics for discrete systems – dynamic improvement using compensators.

CSE 2 INDUSTRIAL MEASUREMENTS
Intelligent measurement devices - temperature measurements - weight and force measurements strain measurements - flow measurements - speed measurements.

CSE 3 ROBOTICS
Mathematical modeling of robotic arms - robotic arms movement analysis in space applications.

CSE 4 CONTROL MEASUREMENTS
Analogue to digital converters and digital to analogue converters - measurement design and applications .

CSE 5 INDUSTRIAL ELECTRONICS
The thyristor an its application in current rectifying circuits - the transistor and its application as a fast response switch - dc regulators - uninterruptible power supply electronic controllers - computers peripherals - electronic devices and multimedia systems.

CSE 6 MACHINE INTELLIGENCE
Expert systems and their relation with knowledge base - expert systems examples - knowledge presentation - production system as all example for knowledge presentation - problem solving - different types of knowledge and its presentation production methods - languages - levels of programming - a small know ledge base system design - theory - design - improvement - knowledge engineering -evaluation.

Elective Courses

Fourth Year First Semester

ELECTIVE COURSE (3) : IN COMPUTER ENGINEERING

CSE 1 INFORMATION TECHNOLOGY AND DECISION SUPPORT SYSTEMS
Information Systems types - Information Technology - Decision Support System- Decision strategy level – system components – System design – Systems design and evaluation - practical implementation.

CSE 2 NATURAL LANGUAGES PROCESSING
Introduction to Natural Language Processing – Syntax constrain – Various types of Natural Language Processing – Modeling and simulation – programming Language Processing – Studying an to understand of Natural Language Processing – translation machine .

CSE 3 IMAGE PROCESSING
Image Representation – Image conversion to digital data – primary processing methods – Image segmentation – linear and non-linear conversion – line and object description – Filtering – encoding – Image compression – Image retrieval - Image shadow and rendering and animation – An application in signal processing.

CSE 4 COMPUTER SYSTEMS SECURITY AND PROTECTION
Computer Security system – Copyright – Access methods control – trusting and authorization control – privacy - random generation - Computer virus – firewall – security evaluation and analysis – Security protocol - Application (E-Commerce – intelligent card – ATM - electronic signature) – Computer security application and implantation in the real system.

CSF 5 COMPUTER COMPILERS
Interpreter – Compilers – Compiler types – Basic of Compiler Design – Steps of Compiler design – Compilations Steps – Token segmentation methods – Syntax and semantic methods- Binary Code Generation – Source – Code Conversion – Building small compiler .

COM 6 INFORMATION THEORY AND ENCRYPTION
Information theory – channel capacity and Entropy – probability of Error in digital communication channels – coding for Error Detection and Error correction– Matched filters Digital signal processing and Digital filters – Digital signal compression and expansion (speech compression – Image compression).

Elective Courses

Fourth Year First Semester

ELECTIVE COURSE (4) IN CONTROL SYSTEMS

CSE 1 DYNAMIC SYSTEMS ANALYSIS
Multi input multi output dynamic systems – basic concepts for effective controller design – methods of design for multivariable systems – applications.

CSE 2 IDENTIFICATION
Pays theory for decision making – natural – pays theory for discrete functions – fefer linear equation – error minimization – linear programming – applications.

CSE 3 REAL TIME SYSTEMS
Concepts of real time design – examples – languages – real time software – programming cycle – design of real time system – communication and synchronization between tasks – tabular algorithms – analysis and evaluation – multiprocessing systems – applications.

CSE 4 COMPUTER AND CONTROL SYSTEMS
Discretization and z- transform , reconstruction of discretized signals , open loop systems, closed loop system , control and monitoring , digital controllers , digital filters , applications .

CSE 5 CONTROL APPLICATIONS
Microcontrollers programming using different languages (Assembly , prolog , etc) , date processing , control and measurements applications .

CSE 6 KNOWLEDGE ENGINEERING
Knowledge system design – theories – small expert systems – large – knowledge system design and improvement – knowledge engineering – a complete expert system improvement – evaluation .

Elective Courses
Fourth Year Second Semester

ELECTIVE COURSE (5) : IN COMPUTER ENGINEERING

CSE 1 PROGRAMMING OF PARALLEL ARCHITECTURE
Basic concepts of concurrent and Parallel Architecture - Parallel computations models-Operating system support such environment - Processors communication protocols - Parallel Architecture algorithms - Parallel Architecture scheduling algorithms - concurrent load balance - Case study.

CSE 2 MULTIMEDIA
Multimedia usage and programming (video - Audio - Image - Secondary storage computer interface - graphical layer interface - 3 d image - Image compressions encoding - data transferee protocol.

COM 3 WIRELESS AND OPTICAL COMMUNICATIONS
Introduction to communication system – Analog and digital modulator and detection – pulse coded modulation (pcm, dpcm , dm) – channel coding noise in modulation system – fiber optic communication systems – mobile communication systems – satellite communication system – wireless computer networks – and protocols .

CSE 4 ADVANCED SOFTWARE ENGINEERING
Advanced Software Development and design – Assist Software - Performance and quality of Software - Case Study

CSE 5 INTERNET AND ADVANCED APPLICATIONS
Internet applications development, design and programming - Internet Advanced Functions (Search - Chatting - e-mail- FTP) - Data security and protections.

CSE 6 ADVANCED COMPUTER APPLICATIONS
Application on using standard Software package in different area such numeric analysis - linear programming system design

CSE 7 SYSTEM PERFORMANCE AND EVALUATION
Hardware components and human resources - evaluation and planning of computer system - evaluation of the performance of the computer system methods optimization - Case Study

CSE 8 STANDARD SPECIFICATIONS
Study and analysis the standard specifications for computer systems and its components ; Hardware , Software , and Humanware .

CSE 9 MICROPROCESSORS
Architecture of the Microprocessor - Microprocessors Programming Programmable Integrated Circuit - Data acquisition system- Input/ Output Hardware alternative - Industrial Applications.

Elective Courses

Fourth Year Second Semester

ELECTIVE COURSE (6) IN CONTROL SYSTEMS

CSE 1 COMPUTER VISION
Digital images and their types - unage processing - image preparation - transformations - image reconstruction - pattern recognition - pattern matching three dimensional vision - mathematical linear and nonlinear transformations - image compression - applications.

CSE 2 EXPERT SYSTEMS
Concepts of know ledge engineering - architecture of expert systems - survey of expert systems - languages and tools for expert systems - characterization of expert system.

CSE 3 TRAJECTORY PLANNING AND CONTROL
Different types of trajectory planning and control- trajectory planning usulg robotic languages - trajectory phnming languages - applications.

CSE 4 ADAPTIVE CONTROL
Dynamic system modeling – Random methods for ID systems Design and implementation.

CSE 5 FUZZY CONTROL
Fuzzy logic concepts - theories - applications.

CSE 6 OPTIMAL CONTROL
Hamilton theory-Pelgan theory - optimal control realization methods - applications.

CSE 7 NEURAL NETWORKS
Included are trainable nrulti-layer feed forward structures for achieving data clustering -classification and generalization - selected recurrent networks for unsupervised learning.

CSE 8 ADVANCED CONTROL APPLICATIONS
Speed control - automatic methods - using artificial vision in testing and Identification - data transfer.

Mechanical Power Engineering

First Year

4111 BAS Mathematics 3

Partial deferential applications – The maximum values of functions in more than variable – Vector analysis – Directional deferential operators – Multi integrations and its applications (Perpendicular and curved coordinates – Gauss and Stock theory) – Infinite series and expansion of functions – The essential concepts of convergence and divergence – First order ordinary deferential equations – Separable, homogenous, and perfect equations - Second order ordinary deferential equations – Equations with constant coefficients – complementary function and the special solution and its indication – Laplace's transformation and its applications in deferential equation solution.

4112 BAS Applied mechanics

Dynamics of curvilinear motion of particle - Dynamics of particle motion in space – Moment inertia– Dynamics of rigid bodies rotating around fixed axis in space – Dynamics of the general plane motion of rigid bodies – Bodies motion in the space – The relative motion – The theory of the virtual work.

4113 STE Civil engineering

The general principles of structural theory – Structural analysis of reactions – Loads – Moments – Shear forces – Axial forces – The statically defined structures – Types and usage of buildings (concrete & steel) – Types of roofs and walls – Design principles of machine bases.

4114 MPE Thermodynamics 1

Basic concepts of thermodynamics - Ideal and actual gases – Mixtures of gases – The first law of thermodynamics – The basic processes of ideal gases – The second law of thermodynamics – Entropy – Availability – The thermodynamic probability – Deferential thermodynamic relationships – Thermodynamic property relations – Properties of pure substance - Thermodynamic properties of materials – Vapor processes – Heat flow processes.

4115 MPE , 4124 MPE Mechanical power engine drawing

Variance and accuracy – Surface roughness – Fits and tolerances – Screw teeth – Springs – Bolts and nuts – Keys and rivet – Welding representation – Power transmission belts – Couplings – Types of bearings - Clamps – Cross head – Connecting rod – Crank shaft – Pistons – Spark plugs – Fuel injectors – Stuffing box – Machine vise – English spanner - Steam safety valves – Evaporator pressure regulator – Solenoid valve – Pressure and flow rate control valves – Three-way valve – Non-return valve – Control valves of cooling systems – Auto control valve of temperature – Pumps types – Symbols of hydraulic and cooling systems – Manual valves.

4116 MPE Humanities in mechanical power engineering 2

Introduction in economy – Proposal and demand – costs – carnal value of money deliberation – Comparing between alternatives – Economic feasibility – Economic analysis for projects in public works section – Breaking and sensitivity points analysis –

Introduction in work law – Enactment of work and engineering jobs organizing laws – Enactment of industrial safety and environment.

4121 PRE Material strength & stresses analysis

Types and properties of engineering materials – Tension, compression, shear, and bending tests – Tension and compression stresses and strains – Thermal stresses – Stress concentration and safety factor – Shear stresses and strains – The direct shear and Torsion for rotating shafts – Bending stresses for members under moments and transeverse forces – Mathematical and graphical stresses and strains analysis – Power transmission shafts – Eccentric loading – Shafts buckling – Stresses in pressure vessels.

4122 PRE Production and material engineering

Cast iron production in blast furnaces – Steel production – Production of non ferrous metals– Properties of metals and alloys– Crystal structure of materials – Phase theory and Phase diagram of binary systems – Iron-carbon diagram – Heat treatment – Techniques and equipments of shaping and machining of metals (casting - welding – blanking and piercing– rolling – bending - drawing - forging – turning - extrusion).

4123 MPE Fluid mechanics 1

Introduction in fluid mechanics – Definitions and units – Fluid properties – Fluid static – Fluid dynamics – Flow of ideal incompressible fluids – Impact and momentum principles – Similarity and dimensional analysis – Fluid flow in pipes – Fluid measurements – Computer applications in fluid mechanics.

4124 MPE Computer applications in mechanical power engineering 1

Applications with Fortran language – Applications in thermodynamics and fluid mechanics– The basic concepts of files and data bases.

4126 MPE Technical reports in mechanical power engineering

Basics of mechanical power engineering – Preparing of scientific and technical reports – Preparing abstracts of professorial papers – Discussions and training - Preparing abstracts of available papers.

Second Year

4211 BAS Mathematics 4

Special functions – Fourier series – periodical functions and Euler laws – Fourier integration – Solving of deferential equations using series – Solving of partial differential equations by separation of variables – Complex functions – Analytical functions – Derivation – Linear integration – Caushi and Green theories and its applications – Series – Residual theory and its applications.

4212 MPE Thermodynamics 2

The thermodynamic analysis of engineering systems – Gas power cycles – Steam and power cycles – Combined power cycles - Refrigeration cycles – Moist air – Combustion reaction – Chemical and phase equilibrium – Thermodynamics of fluid flow – Air compressors.

4213 MPE Measurements and measuring devices

Fundamentals of measurements – Characteristics of measurement system – Classifications measuring devices– Statistical analysis of experimental data – Multi purpose measuring transducers – Electrical indicators – Pressure measurements – Flow measurements – Temperature measurements – Transport properties measurements – Time, velocity, and acceleration measurements – Force, torque, and power measurements – The linear measurements – Analogue devices (mechanical, electrical, udio, and fluid pressure) – Angle measurements – Fits and Tolerances - Design of instruments and measuring systems.

4214 EE Electrical engineering

The direct current – Electrical circuits theories – Delta and star junction and the conversion between them – Continuous sinusoidal AC circuits – Solving using Time vectors – Electrical power and power coefficient in AC circuits – Three phase current – Electrical machines – DC machines – Electrical transformers – synchronize machines – Induction machines – Small power motors.

4215 PRE Theory of machine 1

Positions and displacements – Velocity and acceleration –Design of Cams – Gears – Analysis of dynamic forces – The balance – Reciprocating engine dynamics – Torsional moment – Flywheels – Gear train – gyroscopic forces – Applications.

4216 MPE Humanities in mechanical power engineering 3

Environmental pollution: (source – effects – methods of control) – Environment pollution and the natural balance – Air pollution – Disasters and environmental phenomena's – air pollutants (source – effects – methods of control) – Important considerations about dealing with air pollutants – Water pollution and methods of control – Water pollution by oil and petroleum materials – Solid wastes pollution – Noise and morale pollution.

4221 BAS Numerical methods and statistics

Special functions – Numerical solution of sets of linear and differential equations – Some of numerical methods for partial differential equations solving – Probability theory –

Mathematical prediction – non continuous distributions – continuous distributions – Study of normal distributions samples – deducing and valuating – Assumption tests – Least square method – Correlation – Disparity and analysis of the carnal series.

4222 MPE Fluid mechanics 2

Introduction in fluid dynamics – physical laws in fluid mechanics field – Reynolds transport theorem – Analysis of some engineering applications by control volume method – Deducing the Navier-Stock's equations - The use of Navier-Stock's equations in solving some engineering applications – Boundary layer theory – Boundary layer solution using Von-Karmen equations - Potential flow theory and its applications, using conformal mapping - Computer applications in the field of fluid mechanics.

4223 MPE Heat transfer

Introduction on modes of heat transfer (Conduction, convection, and radiation) – The conduction heat transfer general equation – Steady-state conduction heat transfer with varying conductivity – One-dimensional conduction heat transfer in Cartesian and cylindrical coordinates – One-dimensional unsteady conduction heat transfer – Extended surfaces (fins) – Principles of convective heat transfer – Dimensionless analysis of forced convection heat transfer – Natural convection systems.

4224 COE Electronic engineering

Conductors and semiconductors – Diodes and its applications – Bipolar transistor – Field effect transistor – Basic amplifier transistor circuits – Feed and biasing transistors – Small signals transistors models – One stage amplifier analysis – RC amplifiers – Time and frequency range – Impulse response – Feedback – Oscillators – Operational amplifiers applications – Switches – Logic gates – Logic circuits principles – Thirestors.

4225 PRE Theory of machine 2

Simple harmonic motion – Free vibration – Forced harmonic vibration – Shafts vibration – Two-degree freedom vibration of bodies – Multi-degree freedom vibration of bodies – Linear vibrations.

4226 MPE Computer applications in mechanical power engineering

Application of C-Language in the fields of computational fluid mechanics and thermal engineering - Application of C-Language in heat transfer problems, refrigeration cycles and air conditioning processes – The use of programs packages in the statistic analysis of experimental data and numerical analysis.

Third Year

4311 MPE Energy conversion

Energy types and classifications – Energy sources – Energy forms – Energy growth rates - Principles of energy conversion (first and second law) – Principal fuels for energy conversion (Biomass fuels, Fossil fuels, Nuclear fuels, and Solar energy) – Production of thermal energy from (chemical energy, nuclear energy, and solar energy) – Production of mechanical energy from (thermal energy, chemical energy, electrical energy, and wind energy) – Production of electrical energy from (mechanical energy, chemical energy, solar energy, and nuclear energy) - Energy storage – Environmental impact of energy production.

4312 MPE Heat and Mass transfer

Radiation heat transfer – Heat transfer radiation laws (Planck – Wien – Stephan Boltezmann – Kirochhoff) – Black and gray bodies – The view factors – Radiation exchange between surfaces – Boiling heat transfer – Nucleate boiling – Film boiling – Condensation heat transfer – Nucleate condensation – Turbulent and laminar film condensation on surfaces – Heat exchanger and its types – Logarithmic mean temperature difference calculation – Heat exchanger surface calculation – Thermal insulation – Types, properties, and selection methods of insulating materials – Introduction in mass transfer – The partial diffusion and diffusivity – Diffusivity in mixtures – Mass transfer coefficients – Mass transfer in laminar and turbulent flow.

4313 MPE Theory of combustion

Atom and molecule construction principles – Binding energy and heat of formation – Adiabatic flame temperature – The chemical equilibrium – Flame propagation theory – Chemical balance – Detonation and true flam progress – Applications – Combustion in furnaces – Burners – Suction – devices – Internal combustion engine – Flame stability – Flame quenching – combustion methods – High temperature measurement.

4314 MPE Steam Technology

Introduction – Steam Properties – Simple Rankin cycle – Rankin cycle improvements – Modern steam plant cycles – Steam nozzles – Steam condensers – Steam generators – High pressure boilers – Steam boiler accessories – Steam generators performance – air and exhaust suction systems in boilers.

4315 MPE Computer applications in mechanical power engineering 3

Introduction to computational fluid dynamics – Methods of engineering calculating and evaluating – Numerical representation for fluid and heat flow equations using finite difference and finite volume methods – Principals of accuracy, converging and stability of numerical solutions – Application in fluid flow problems and thermal processes using numerical analysis computer program packages and computational fluid dynamics.

4321 MPE Gas dynamics

Principals – Continuity and Bernoulli equations for compressible flow – Sonic velocity and mach number – Waves spreading – Empirical relations between pressure, temperature, density, and mach number – Flow density – Difference between subsonic and supersonic flow – Effect of entropy increase – Damping energy – Accelerating and decelerating

velocity in flow in pipes – Shock wave – Vertical shock wave equations derivation – Curve of multi weak shock waves – Shock wave spreading velocity – Two dimensional gas dynamic problems – Frictional equations derivation – Subsonic flow – Expansion relations for supersonic flow.

4322 MPE Combustion engines

Types of internal combustion engines – Parts of internal combustion engines – Four stroke cycle engines - Two stroke cycle engines – Combustion in spark ignition engines - Combustion in compression ignition engines – Fuel systems in spark ignition engines - Fuel systems in diesel engines – Engine characteristics and valve timing – Air and fuel cycle analysis – Cooling and lubrication systems – Engine performance tests.

4323 EE Power & Electrical machines

Principles of electrical machines – AC and DC machines – induction motors – synchronize motors – Special motors – Transformers – AC and DC distribution systems – Transmission lines - Secondary stations – Stations devices.

4324 PRE Design of machines

Loads – Power transmission by power screws – Axial shafts – Keys – Axial couplings - Power transmission gears – Belts and pulleys – Pressure vessels – Liquid and gas pipe lines – separation and transmission of motion (brake – clutches) – Bolts, rivet, and wilding – Springs – Bearing – Machine elements – Load distribution – Tests and operations.

4236 MPE Humanities in mechanical power engineering 4

Principles of management – Society of organizations - Organizational behaviors – Management functions (planning – organizing – leadership – staffing - guiding – controlling) – management processes (communications – decision making) – Management of engineering projects: (Environmental effects of projects – projects feasibility study – Risks and projects management – Quality and projects management – Projects planning).

Fourth Year

4411 MPE Hydraulic machines

Introduction – Velocity triangles – Principles of momentum and energy equation – Turbo machine theory - Euler theory – Dimensional analysis efficiency characteristics – Specific speed – Specific diameter – Pressure and volume coefficients – Cascade mechanics – Analysis of force and coefficient of lift and resistance– Cascade performance – Pressure and flow rate diagram for straight cascade – Pressure distributor – Centrifugal pumps (performance – maintenance – troubles) – Cavitation theorem – Axial pumps – Pump selection – Hydraulic turbines – Pelton wheel – Francis Turbine – Kaplan turbine – Axial compressors – Volumetric machines – Performance of reciprocating and rotary pumps.

4412 PRE Operation research

Introduction – Operation research applications and stages – Modeling of production systems – Linear programming – Graphical and simplex methods – Transportation problem – Assignment problem –Bridge transportation problem – Maximum flow problem – Short route problem – True programming – Dynamic programming – Waiting line models – Simulation and model design.

4413 MPE Refrigeration and air conditioning

Introduction – Gas Refrigeration cycles – Vapor compression cycles – Working fluids - Multi pressure cycles – Compressors – Condensers – Expansion devices – Evaporators – Complete vapor compression refrigeration system – Moist air properties – Psychometric chart and air conditioning processes – Vapor absorption cycle – Vapor suction cycles – Applications in air conditioning– Designing considerations – Load estimation – Air transport and distribution – Control devices – Non-conventional cooling systems.

4414 MPE Design of mechanical power engines

Design of internal combustion engines (piston – cylinder head – connecting rod – crank shaft – cylinder – cooling jackets – valves – cams shaft) – Design of external combustion engines – Design of gas turbine – Dynamics of gas turbine – Design of axial turbine – Blades – Centrifugal compressor – Axial compressor.

4415 MPE Turbo machines

Introduction in Turbo machines - Turbo machines types – Thermodynamic cycles of turbo machines – Steam flow through steam turbine nozzles – Steam flow through impulse and reaction turbine blades – Bleeding and reheat systems in steam turbines – Performance parameters at variable loads - Methods of steam turbine control – Velocity regulation in steam turbines – Thermodynamic cycles of steam turbines - Gas turbines types – Elements of gas turbines used in power stations and jet engines – Gas turbine performance – Air compressors – Design and methods of cooling of gas turbine blades – Inlet and outlet ports of gas turbines used in airplanes - Diffusers design – Combustion chambers in gas turbines.

4416 MPE Power plants

Energy sources and utilization – Thermodynamic analysis of Rankin cycle – Steam generators – The condensate feed water systems – The circulating water systems - Cooling

systems – Gas turbines and combined cycles – The nuclear power stations – Power plant economics.

4417 MPE Automatic control of energy systems

Modeling of natural systems– Open and closed systems – block diagram and transfer function – Signal flow diagram – Characteristics modeling – Frequency response analysis – Feedback – Stability study – Root locus – Nequest analysis – Design of feedback control systems (lag phase – lead phase – temperature control – pressure, velocity, and flow rate control).

4425 MPE Humanities in mechanical power engineering 5

Contracts and specifications: Kinds of contracts – Contracts of contractors – The stipulations and specifications book – The technical specifications of engineering projects – The administrative contracts – The general technical stipulations and specifications of mechanical works, electrical works, and air conditioning works – Applications and cases study.

Elective Courses

MPE Water Treatment

Water analysis – Water treatment for different purposes – Calculations of used devices– Design, maintenance, economics, and energy requirements of the main methods of water treatment and desalination.

MPE Petroleum engineering

Introduction – Theory of row oil formation – Digging processes – Oil types – Raw oil and its manufacturing methods - Refinement methods – Distillation units and processes – Cracking processes and benzene improvement – Petroleum products purification – Additives and its effects.

MPE Two-phase flow

Introduction and variables definitions in two phase flow – Governing equations derivation – Presentation of pressure losses in pipes – Review of simulation in the field – Application of two phase flow in mechanical devices field – numerical methods used in two phase flow.

MPE Water desalination

Water desalination principles – Desalination methods (Thermal – Membrane – Electrical – Chemical) – Desalination using cogeneration – Desalination using new and renewable energies – Water desalination economics.

MPE Fuel and oils

Oils types – Solid fuel – Liquid fuel – Gas fuel – Fuel technology – Lubrication oils types - Lubrication technology.

MPE Pipe lines

Laminar flow in pipes – Momentum and dynamic forces in flowing fluids – Energy transmission by pipes – Unsteady flow in pipes – Pressure Transport theory – Control in tanks.

MPE New and renewable energy

Introduction – Different sources of energy – Solar energy and its Applications – Wind energy and its conversion systems – Biomass energy and its utilization systems – Hydraulic energy – Utilized turbines and systems – Energy storage – Energy economics.

MPE Heat exchangers

Review of principles of heat transfer and thermodynamics – Boiling and condensation – Types of heat exchangers – Pressurized heat exchangers – Static porous heat exchanger – Heat exchangers with nearly boiling media – Design of heat exchanger – Improvements of heat exchanger systems effectiveness.

MPE Engine performance

Characteristics of internal combustion engine performance – Constant velocity engine performance for variable loads – Engines and performance tests – Governers (types, and applications).

MPE Fluid machines
Construction and classification of centrifugal fans and its performance analysis – Construction and classification of blowers - Construction and classification of centrifugal pumps and its performance – Centrifugal compressors – Lift and drag theory – Aerofoil theory - Construction and classification of axial pumps and its performance – Hydraulic transmission methods – Application of fluid machine in renewable energy field.

MPE Solar energy
Solar energy collection – Reflectors and lenses – Photovolaic systems – Solar energy systems – Solar energy economics.

MPE Nuclear energy
Principals of nuclear physics – Reactor theory principals – Heat generation and transfer in reactors – Reactors types – Reactor safety and location selection – Nuclear energy economics.

MPE Solar cooling and heating
Solar energy collection – Solar thermal systems – Design of water heating devices by solar energy – Conversion of solar energy to electrical energy – Design of solar cooling equipments.

MPE Refrigeration and air conditioning Control systems
Principles of hydraulic control – Control valves – Transporting parts of control forces – Sensors and its types – Electrical and electronic control elements – Applications (Methods of control of cooling room temperature) – Ventilation and air conditioning systems - Using of hot and cold water and air in controlling of temperature and humidity of conditioned spaces – Protection circuits of compressor.

MPE Fuel and combustion systems
Systems of gas fuel combustion - Systems of liquid fuel combustion - Systems of solid fuel combustion – Fuel systems in petrol engines – Fuel systems in diesel engines – Fuel systems in gas turbines – Other applications in fuel systems.

MPE Natural gas technology
Natural gas extraction – Technology of natural gas manufacturing – liquefaction of natural gas – Supplying and Transportation of Natural gas.

MPE Hydraulic control
Hydraulic control principles - Hydraulic control systems – Pumps and hydraulic machines – Control valves - Transporting parts of control forces – Constructions of control systems– Flow and pressure valves – Introduction to fluid systems – Application in fields of mechanical energy systems.

MPE Hydraulic machines design
Theory and design of pumps and lifters – Performance curves of hydraulic machines – Design of radial flow devices – Pipe lines – Pelton wheel design.

Production and Mechanical Design Engineering

First Year

BAS5111: Mathematics 3

BAS5112: Mechanics

PRE5113: Engineering Materials 1
Engineering materials – Extraction of metals – Mechanical properties of materials – Crystallographic structure – Elastic and plastic deformation in crystals – Crystallographic control in materials properties – Theory of alloying – Thermal equilibrium diagrams – Equilibrium diagram for iron and carbon – Ferrous and nonferrous alloys.

PRE5114: Mechanical Drawing (continues course)
Joints description and representation - Bolted joints - Key and pin joints - Riveted joints - Welded joints - Drawing and representation of springs - Gears representation - Pipes and valves representation - Fits and tolerances - Machining remarks and surface accuracy - Electrical circuits representation – Layout - Construction and working drawing - Drawing a complete assembly drawing for different mechanical examples and show how to assembled it – Pullers - Screw jack - Tool rest - Sliding bearing - Vices – Valves - Reduction gear box – Pump - Tail stock. etc,...

PRE5115: Computer Application in Production Engineering 1
Programming: Basics of programming with C – Writing C Programs – Mathematical operators – Variables and Functions – Arrays – Making Decisions – Loops.
CAD: Basics of CAD – Drawing and Editing objects – Specifying points, distances and angles – Object properties – Plotting drawings – Applications.

MPE5116: Heat Engineering
Introduction – Ideal gases – First law of thermodynamics – Processes of ideal gases – Air standard cycle- Pure substances and formation of stream – Steam power cycles – Steam and gas turbines – Internal combustion engines – Heat transfer – Heat exchangers – refrigeration cycles.

PRE5117: Engineering Economy
Introduction to engineering economy – Benefit evaluation for engineering investments – Economic equivalence – Interest relations – Cash flow – Interest rate calculation – Benefit and cost relations – Selecting interest rates and minimum attractive rate of return – Depreciation cost and engineering economy – Inflation and sensitivity analysis – Replacement of contract analysis.

BAS5121: Mathematics 4

PRE5122: Strength of Materials
Types of loads acting on mechanical components – Force analysis of simple mechanical elements – Axial forces – Shear forces – Bending and twisting moments – Stress, strain and Hooke's law – Design stresses and factor of safety – Stress concentration – Thermal stresses – Bearing stresses – Direct and Torsional shear stresses – Bending stresses shear stresses in beams – Deflection in beams – Stress and strain analysis – Stresses in two dimensions – Principal stresses and maximum shear stresses Mohor stress circle – Power transmission shafts – Eccentric loading – Buckling of columns – Euler equation and empirical equations – Thin walled pressure vessels.

PRE5123: Machining Techniques and equipments 1
Sawing operations – Reciprocating saw – Band saw – Circular saw – Turning – Elements of turning machines - Methods of workpiece fixation– Cutting tools – Ordinary and taper turning – Thread turning – Drilling – Elements of drilling machines – Drilling tools - Methods of workpiece fixation – Cutting conditions – Threads – Planning and shaping – Elements of planning and shaping machines – Setting of planning and shaping machines – Cutting tools - Planning and shaping operations – Milling – Types and elements of milling machines – Milling cutters – Fixation methods of workpiece and cutters – Milling operations – Indexing.

PRE5124: Mechanical Drawing (continues course)

PRE5125: Shaping Techniques and equipments 1
Introduction to manufacturing technology – Furnace for steel and cast iron production – Metal casting (principles of sand casting – casting procedure – patterns and their allowances – sand specification and testing – casting machines) – Special casting processes (permanent moulds – die casting – investment casting – centrifugal casting – shell mould casting) – Casting solidification theory – Gating system – Casting defects – Cleaning and casting inspection – Welding fabrication – Different welding processes – Special welding processes – Methods of welding – Testing and inspection – Welding joints.

MPE5126 Fluid Mechanics
Fundamental concepts – Fluid properties - Fluids statics - Fluids kinematics – Flow of ideal incomparable fluids - The impulse principle - Pipe flow - Dimensional analysis – Fluids measurements

PRE5127: Technical Reports in Production Engineering
Design and production engineering texts – Writing of scientific and technical reports – Summarizing of specialized articles – Discussions and exercises.

Second Year

PRE5211: Machine Design 1
Introduction to machine element design (design steps and consideration) - Variable loads – Failure theory – Selection of materials for design – Factors of safety - Design of joints (Rivets – Welds – Interference - Bolts) - Design of power screws – Shafts – Key – Pin – Couplings - Clutches – Brakes - Pressure vessels - Sealing and – Gaskets – Standards – Project for mechanical element structures using computers - Design of springs.

PRE5212: Theory of Machine I
Geometry of motion – Plane mechanisms – Degrees of freedom – Robots and its applications – Velocities – Instantaneous center – Force analysis for static and dynamic mechanisms – Static and dynamic balancing of rotating shafts – Fluctuating energy and flywheels – Planetary gears – Cam kinematics.

PRE5213: Stress Analysis Systems
Elasticity – Stresses – Stress and strain relations – Basic equations of theory of elasticity – Brittle coating materials – Introduction to strain measurements by electrical resistance strain gages – Semiconductor strain gages – Recording instruments – Optical methods of stress analysis – Plane polariscope and circular polariscope arrangements – Moiré methods – Theory of photoelasticity – Two dimensional photoelasticity – Three dimensional photoelasticity - Applications.

EE 5214: Electric and Electronics Engineering
Electrostatic-electromagnetic – Circuits theories – kirchoff laws - Single phase AC - Series and parallel circuits - Resonance circuits - three-phase A.C. – Balanced star and delta connection - Semiconductor theory – PN junction diode - BJT and its application – Small signal transistor – Analysis – Operational amplifiers

PRE5215: Computer Applications in Production Engineering 2
Benefits of Computer Aided Engineering - Computer Aided Drafting and Design - Computer Aided Manufacturing - Computer Aided Prototyping – PLC Programming and Control for Industrial Processes – Robot Programming and Material Handling using AGV.

PRE5216 Engineering Management 1
Introduction to law – Labor regulation laws and engineering proficiency work organizing laws – Contracts - Industrial safety regulations - Industrial relations - Selected topics in psychology and social science - Commercial and Industrial cost cycles - Cost analysis – Static theory.

BAS5221: Mathematics 5

PRE5222: Machining Techniques and Equipments 2
Cutting tool materials – Drilling tools and drilling process – Turret lathes – Automatic lathes – Application on automatic lathes – Copy milling – Gear milling.

PRE 5223: Shaping Techniques and Equipments 2
Introduction on metal shaping-blanking process - Bending process – Drawing – Extraction - Rolling – Forging – Spinning - Ironing – Stamping – Stretching - Force and work done required for each process - Presses and hammer types - Dimensions of punch and die for each processes – Powder metallurgy processes - Powder pressing technology - Tools and machine required - Different examples of powder metallurgy products - Advanced shipping process – Shaping process economics.

PRE5224: Machine Design 2
Design of power transmition drives: Friction drivers (belt drives, rope drives, chain drives, contact stresses) - Design of gear drives (spur, helical, bevel, worm, tooth design) - Friction and wear - Sliding and rolling friction - Lubrication theories (boundary, hydrodynamic, hydrostatic, elsto-hydrodynamic) - Design of bearings (sliding bearing, rolling bearings, bearing selection) – Applications.

PRE5225: Measurements
Introduction – Basics of measurements – Errors of measurements – Linear measurements – Angles and cones measurements – Comparators (Mechanical, Electrical, Pneumatic and Optical) – Pressure measurements – Time, speed and acceleration measurements – Force, moment and power measurements.

PRE5226: Engineering Materials 2
Introduction – Crystal structure of metals – Crystal imperfections – Phase diagrams – Effect of crystal structure on materials properties – Effect of inhomogeneity on metal resistance mechanism – Alloys – Heat treatment – Crystal structure and mechanical properties of ceramics – Industrial applications of ceramics – Composite materials and their properties – Case study.

Third Year

PRE5311: Theory of Machines 2
Simple harmonic motion – Single degree undamped free vibration - Single degree forced vibration - Single degree damped free and forced vibration – Two degree free damped and undamped vibration - Two degree forced damped and undamped vibration – Solving using Lagrange's equation – Multi degree of freedom – Torsional vibration – Application.

PRE5312: Machine Tool Design 1 (continuous course)
Classification of machine tools - Cutting and feed motions - Machine tool elements - Drive and analysis of the cutting forces for machine tools – Design of speed and feed gear boxes - Functional design of gears - Main spindles design - Functional design of bearings - Design of machine tool frames - Type and design of slide ways.

PRE5313: Metrology
ISO engineering tolerances – Dimensions, form and surface roughness tolerances – Types of fits and design of limit gauges – Measurement of form errors – Metrology of thread – Limit gauges of threads – Metrology of bearings – Machine tool tests.

PRE5314: Theory of Metal Cutting
Mechanics of metal cutting – Tool geometry – Cutting forces and power calculation – Tool wear and tool life – Heat generation in metal cutting – Cutting fluids – Methods of measuring cutting forces – Metal cutting economics.

PRE5315: Theory of Metal Forming
Relations of stresses and strains for elastic and plastic materials behaviour – Yield criteria – Principles of plastic flow – Effective stresses, strains and volumetric strains – Experimental methods to determination of major and minor strains (forming limit diagrams) – Theories of stress-strain analysis for blanking and piercing – Deep drawing - Stretching – Bending – Wire drawing – Extrusion - Rolling – Introduction of forming tools.

PRE5316: Elective Course 1

PRE5321: Numerical Control of Machine Tool
Introduction to CNC M/C tools - Types of CNC control system – CNC coordinate systems – Binary system and preparation of NC tapes – Preparation of CNC programming – cutter diameter and length compensation – APT language – Advantages and economics of CNC machine tools – Different examples and programming for turning and milling.

PRE5322: Machine Tool Design 1 (continuous course)

PRE5323: Factory Planning and Production Processes
Definitions – Types of production and industries - Aims of production planning – Production cycle – Processes layout – Pre-planning for factories location - Methods of department layout and services – Work measurement - Scheduling – Cost estimation – Material handling – Layout problems – Production methods and machine loading – Forecasting and preplanning for production – Methods of production planning – Loading and projects planning – Group technology and production planning – maintenance.

PRE5324: Statistical application in production
Data organization - Sets probability - Random variables and probability distribution - Mathematical expectation - Special probability distributions - Sampling theory - Estimation theory - Test of hypothesis - Curve fitting - Regression and correlation - Analysis of variance.

PRE5325: Machining Techniques and Equipments 3
Grinding – Types and elements of grinding machines – Grinding wheels – Coolants – Workpiece holding and grinding wheel fixation – General applications – Finishing processes with high quality (Center hole grinding – Jig grinding – Deep grinding and lapping) – Splines machining processes (Principles of broaching processes – Types of broaching machines – Force, work done and power requirements) – Introduction to non-traditional machining processes - Non-traditional Mechanical processes (Water pressure, ultrasonic and its applications) - Non-traditional electrical processes (Electrochemical, Electrochemical grinding) - Non-traditional thermal processes (Electron beam machining – Leaser beam machining – Plasma beam machining) - Non-traditional chemical processes.

PRE5326: Engineering Management 2
Modern management thought – Popular bases for management – Management theory and research –Incentives – Money incentives and moral situation – policy developing – Planning and decision making – Commanding –Using accounting in planning and commanding.

PRE5327: Elective Course 2

Fourth Year

PRE5411: Production System Analysis
Contemporary management systems - Methods of decision making - Systems of future forecasting - Economical analysis of projects - Marginal analysis of project feasibility study - Methods of capital investment - Optimal resource allocation - Mathematical methods for solving production problems by linear programming - Inventory control - Operation control - Depreciation and replacement.

PRE5412: Design of Production Tools and Equipment
Cutting tool design: Single point tools (Design of general purpose lathe tools – Shaping and planing tools – Rotary planing tools – Flat form tools – Circular form tools) – Twist drills – Peripheral and face milling cutters.
Design of jigs and fixtures: Locating and supporting principles – Centralizers - Chip problems – Clamping and work holding principles (Wedges – Screws – Lever systems – Direct clamps – Straps – Angular clamps – Cams, eccentrics and toggle – Power devices – Clamping odd shapes) – Equalizers – Loading and unloading - Drill bushing – Design principles of fixtures bodies – Drawings, dimensions and tolerances – Economics and materials – Standard and commercial fixture components – Types/Chick list of jigs and fixtures.

CSE5413: Automatic Control
Modeling of natural systems - Open loop and closed loop systems – Block diagram and transfer function – Signal flow chart – Modeling by transfer function – Analysis of frequency response - Feedback – Stability and root locust technique - Design methods of feedback systems.

PRE5414: Elective Course 3

PRE 5415: Design and Production Engineering Laboratory
Testing methods and techniques - Results representation by tables and graphs - Writing basics of engineering report - Laboratory instruments - Different training tests (10-12 test in design and production fields : material tests – meteorology – dynamics - production processes - force measurements - gear production - machine design).

PRE5416: Project (Continuous Course)

PRE5421: Machine Tool Design 2

Basic knowledge on machine tool joints (Classification of machine tool joints – Static loading criteria of jointed structure – Structure with joints loaded normally – Joints subjected to a bending moment – Effect of bolts in fixed joints)

Stiffness of machine tool foundations (Stiffness against cutting forces – Maintenance of alignment with stationary load – Misalignment due to the weight of a movable component)

Machine tool vibration (Effect of undeformed chip thickness variations – Effect of rake and clearance angle variation – Stability of the cutting operation – Regenerative chatter)

Acceptance tests and maintenance of machine tools (Geometrical tests – Machine tool maintenance – Test chart for finish turning lathes – Dynamic performance tests for lathes – test chart for other machine tools).

PRE5422: Quality Control

Control curves – Control chart for partly defects – Control charts for number of defects per unit – Cumulative control chart – Special methods – Accepting and rejecting sampling theory and applications.

PRE5423: Mechanical Maintenance and Faults Monitoring

Introduction – Failure systems - Recognition of fracture patterns - Tribological and surface failures - Surface and volumetric failures - Effect of creep and fatigue on failure – Geometrical errors of mechanical elements and machines - Functional failure – Failure analysis - Vibrational diagnostic of faults - Thermal and ultrasonic measurements - Monitoring of machine performance – Non-destructive testing - Surface failure repairing techniques - Importance of maintenance for mechanical systems - Maintenance types - Mechanical systems design - Maintenance and risks.

PRE5424: Elective Course 4

PRE5425: Fine Measurements

Pneumatic comparators and its applications – Measurements of roundness errors – Gear measurements – Surface texture measurements.

PRE5426: Project (Continuous Course)

Elective Course 1

PRE5316: Robot Arm Engineering
General construction of industrial robot - Kinematics analysis of robot - Coordinate control of robot arm - Direct and inverse kinematics of arm – Robot programming – Applications.

PRE5316: Production Technology
Forecasting and time series analysis – Production aggregate planning – Industrial costs – Material needs planning – Work distribution – Production quality control – Maintenance management and control – Marketing basis.

PRE5316: Nontraditional Measurements
Light wavelength for dimensional measurements – Light interference sources – Laser beam interference – Measurements of dimension and angles by laser– Computer aided surface roughness, Threads, gears and three dimensional measurements.

PRE5316: Packing and Packaging Engineering
Introduction to basic and general rules – Design according assembly – Design according packing requirements – Packing fees – Application and case studies.

PRE5316: Product Design
Standardization and human needs – Design for human needs – Design for maintenance needs - Design for reliability - Design for assembly – Economic and cost accounting - Design for corrosion and wear resistance – Energy saving – Applications and case studies.

PRE5316: Environmental Engineering
Introduction - Classifications and Sources - International regulations & standards - Egyptian regulations & standards - Methods of transportation & treatment - Economic of treatment projects - Applied case studies.

PRE5316: Industrial and Professional Safety
Industrial safety history – Occupational health – Industrial working conditions and safety – Industrial accidents – Industrial safety maintenance and development – Occupational and industrial dangers – Occupational dangers control – Analysis and evaluation for industrial safety performance.

PRE5316: Biomedical Engineering
Introduction to bioengineering – Anatomy and structure of natural and artificial joints – Failure of artificial joints – Biomaterials - Biomechanics of joints – Methods of analysis of artificial and natural joints – Lubrication of joints – Manufacturing and testing of artificial joints – International specification – Simulation of artificial joints.

Elective Course 2

PRE5327: Heat treatment
Principles of heat treatment - Cooling, solidification and refining processes - Effect of heating, cooling rate and temperature - The role of chemical composition of steel - Surface hardening processes - Heat treatment for different special steels.

PRE5327: Industrial oil Engineering
Types of industrials oils – Oils properties – Composition of engine oils - Influence of additives on oil properties –testing of oils - Basic of lubricating theory

PRE5327: Advanced Production technology
Advanced methods and techniques for metal forming and machining - Rolling – Extrusion – Wire and pipe drawing – Powder metallurgy - Gear cutting techniques – Grinding and supper finishing processes.

PRE5327: Work Study
Introduction to work study – Productivity measurement and improvement – Principles of motion economy – Design of work place – Study of work measurement – Techniques of work measurement – Reduction of ineffective time – Methods of operation productivity measurements – Performance time areas – Learning curves – Tables usage for studying performance time – incentives.

PRE5327: Industrial Relations and Regulation Laws
Introduction to industrial regulation laws - Scientific management development – Humanity factors in management – Incentive theories for leaders and individuals – Job definitions and analysis – Salaries and incentives planning – Individual performance evolution – Selection and training for individuals – Labor force management.

PRE5327: Design of Mechanical Equipments
Design of mechanical equipment and machine parts for different applications : (vehicles, agriculture machinery, production equipment, earth moving equipment) - Analysis of particular systems and considerations of loading. Mechanisms and frames. Special materials and their characteristics - Codes of engineering practice in design.

PRE5327: Engineering Materials Selection
Mechanical and physical properties of engineering materials – Engineering materials selection factors - Engineering materials selection criteria – Functional requirements of engineering materials - Materials selection based on strength and fatigue - Materials selection based on wear - Materials selection based on thermal properties - Materials selection software - Application and case study.

Elective Course 3

PRE5414: Methods and Techniques of Design
Design methods – Use of statistical methods in mechanical design – Probabilistic and reliability – Materials considerations in design – Theory of elasticity and plasticity – Stress/strain relations in elastic solids – Plane elasticity problems – Analytical and numerical solutions – Applications – Introduction to plasticity theory – Yielding considerations – Effective stress and strain – Applications.

PRE5414: Scientific Management Systems
Production systems – Forecasting methods – Moving average – Time series analysis – Cause models – Material requirement determination – Loss types – Material usage – Machine and machine tool requirements – Site selection – Individuals requirements – Regulation skeleton – Production planning and control – Project planning and follow up.

PRE5414: Design and Production of Dies
Dies design - Types of forming machines – Design of shearing and bending dies – Advanced applications of deep drawing – Calculation of deep drawing dies – Dies production – Heat treatment of forming dies – Design of special forming equipments – Analytical and numerical die design – Case studies.

PRE5414: Tribology
Friction theories – Wear phenomena – Wear mechanisms – Lubrication theories – Hydrodynamic bearings – Partial Bearings – Sliding bearings and sealing – Hydrostatic bearings – different tribological applications in industry.

PRE5414: Non-Traditional Shaping Processes
Forming processes with higher rate of energy – High plasticity forming – Hydrostatic forming – Foundry engineering – Melting furnace and heat treatment – Inspection and quality control – Case studies.

PRE5414: Reversing Engineering in Mechanical Design
Effect of reversing engineering in mechanical design - Reversing engineering techniques – 3D contact and non-contact scanning – Pattern recognition steps – Deriving standard and free surfaces equations – Recognition of other design characteristics – Pattern transfer to CAD/CAM systems.

PRE5414: Mechatronic
Electrical and electronics components - Logic gates - Sequences control - Counters and timers - Operation amplifier and control device – Sensors – Actuators - Power semiconductors - Switching operation and application in control - Computer control.

PRE5414: Design and Production of Cutting Tools
Cutting tools classification – Basic elements of cutting tools - Tool geometry – Cutting forces analysis – Cutting tools design – Cutting tool materials – Heat treatment of cutting tools – Different cutting tools production – Case study.

Elective Course 4

PRE5424: Computer Aided Manufacturing
Introduction – Computer Aided Manufacturing – System design by computer – Applications – Production system design - Planning and control – Production system assessment design – Case studies.

PRE5424: Optimum Design
Principles of optimum design in mechanical components – Desirable and undesirable factors in design – Functional requirements for mechanical components – Applied examples on optimum design – Design for simple and complex fatigue loading – High and low cycle fatigue – Design for fracture – Fracture toughness and stress intensity factors – Crack propagation modes and rate of intination and propagation – Design for creep – Evaluation of creep data under simple and complex loads.

PRE5424: Operation Research
Introduction – Operation research application steps – Modeling in production systems – Linear programming – Graphical and simplex method – Transportation problem – Assignment problem – Bridge and transportation problem – Maximum flow problem – Shortest route problem – Integer programming – Dynamic programming - Waiting lines model – Simulation and model design.

PRE5424: Non-Traditional Machining Processes
Non-conventional machining processes –ECM - Electrolytic grinding - Ultrasonic machining - Laser and plasma-jet machining - Electron beam - Numerical control machines NC - Continuous-path and point-to-point machining – Advanced machining techniques and methods - Applications.

PRE5424: Feasibility Studies
Investment project preliminary study – Feasibility study – Market study – Industrial establishment study – Recourses and project inputs – Site selection – Project technical and economical points – Labor force – Project installation, performance and planning methods – Resources and economic analysis for project.

PRE5424: Composite Materials
Definition and classification of composite materials – Fiber reinforcements – Matrix materials - Composites manufacturing processes – Micro and macro-mechanics of composites - Composite materials selection methods – Applications.

PRE5424: Hydraulic Control Systems
Introduction – Hydraulic systems classification – Hydraulic system elements – Hydraulic pumps – Hydraulic motors – Valves (types – functions - equations) – Design of hydraulic power systems – Applied examples for power and hydraulic control systems.

PTR 480 Project (3+0)

Studying and discussing elective topics in petroleum engineering related, but not limited, to drilling, production, and processing.

MIN 480 Project (2+2)

A graduation project on a mining engineering subject to be prepared during the academic year and presented by every student during four weeks at most after the end of the Bachelor Degree Examinations

CVE 480 Project

The student registers in one of a number of projects set by the councils of the three civil engineering departments. Work on the project is carried out in a four weeks period following the second term exams of the fourth year.

CHE 480 Project

Design project or search project in one of the chemical engineering branches .

Textile and Spinning Engineering

First year

6113 TXE Cotton yarn manufacturing

Cotton harvesting – ginning methods – effect of fibre properties on spinning process – spinning stages – parts of production line – operating methods – settings – control of raw material flow – drawing and roving – technological calculations - faults during cotton processing stages – opening and cleaning – carding – drawing and combing – roving – ring spinning – open end spinning – winding – twisting – produced yarn classification – yarn counting – cotton fibres – end uses.

6114 TXE Textile raw materials

Introduction – abstract for the basic stages of spinning, weaving, knitting, and nonwoven – general classification of man-made fibres synthetic and regenerated ones – special fibres and ultra tensile fibres – laboratorial tests for distinguishing textile fibres and its characteristics.

6115 TXE Computer applications in spinning

Programming with Fortran and C languages – applications in spinning, weaving and mechanical engineering – basic terms in files and data bases – applications and examples using C language.

6116 TXE Humanities in Textiles 2

introduction in economics – exhibition and request – costing – time for money handling – comparison between alternatives – economical feasibility – economical analysis for projects in public sector – break even point analysis – introduction to law – working legislation organizing engineering occupations – legislation for industrial security and environment.

6123 TXE Weaving preparation

Winding and twisting processes and its aims – methods of that processes and its developments – production calculations – yarn tension theories and different brake types – warping process: types and its aims – calculations of power consumed in driving breaking and production calculations – sizing process: theories and its aims – description of sizing stages – drawing-in and reeding processes: types and its developments.

6125 TXE Textile physics 1

Micro structure of fibres - mechanical properties of fibres – fibre length and crimp – traverse dimension of fibres: fineness – maturity (only of cotton) – fibres density –

fibre tensile properties – water absorption – water retention – swelling – friction – elastic tension elongation properties , fibre creeping and relaxation – fibre bending, torsion and shearing – heat transfer and heat setting – fibre properties.

6126 TXE Technical reports in textile

Texts in mechanical engineering – writing of technical reports – preparing of abstracts – workshops between students – reading papers and abstracting it.

Second year

6211 TXE Textile chemistry

Introduction in polymers – textile polymers – chemical structure of natural fibres – cellulosic and protein fibres – physical and chemical properties of regenerated fibres – synthetic fibres (polyester – polyamide - polyacrilic – polyolyvens – polypropylene ..etc) – chemical and physical properties – fibre recognition using chemical methods.

6213 TXE Wool fibre manufacturing

wool fibre specifications – wool types and sources – fibre properties – wool preparation for spinning – fibre sorting – mixing – washing – twisted sliver forming on worsted and woolen systems – sliver doubling and drafting – wool combing – roving – yarn producing on different spinning machine types – blended fibre producing – factors affecting processing and production – technological calculations in different process stages.

6214 TXE Weaving technology 1

Basic operations for woven fabric producing – basic mechanisms in weaving machines – shedding – shedding mechanisms types – weft insertion – weft insertion mechanisms and its motion equations – weft beating-up – beating-up mechanisms and its motion equations – let-off mechanisms – take-up – operating methods and take-up calculations – modern developments in weaving operations.

6215 TXE Computer applications in spinning engineering

Applications and programs aided in textile field – using of software packages for numerical analysis of that applications.

6216 TXE Humanities in textile 3

Management basics – new management thinking – management types and levels – management employment – organizing – research and theory – leadership – encouragement – financial and moral encouragement – monitoring – politics – planning and decision taking – control – using accounting in planning and control – human relations and psychological sciences.

6224 TXE Textile physics 2

Yarn structure and mechanics – yarn dimensions – systems of yarn naming – yarn tensile and friction properties – yarn regularity – fabric dimensions – fabric engineering – fabric bending hardness – fabric drape – fabric crease recovery – fabric wear resistance – fabric frictional properties – fabric piling – fabric flammability – fabric compressibility – air permeability – fabric relation with water – fabric tensile properties – fabric reinforcement.

6225 TXE Manufacturing of man-made fibres

Structure and mechanics of continuous filament spinning – operation conditions – effect of operation factors on the continuous filament properties – studying for the production methods and properties of cellulosic regenerated fibres – methods of synthetic fibres production – comparison between the properties of continuous filaments and spun yarns from the same origin – yarn properties improvement by changing solution properties during processing and after production – production methods of high elastic yarns.

Third year

6311 TXE Applied Statistics

Data presentation methods – Statistical scales – Mean – Diversion – random variables – Random variables functions – Distributions : Gause – Poisson – Binomial – continuous distributions – confidence limits – Statistical significant – using distributions to compare between readings – T test – F test – Chi square test – Linear regression and correlation – Simple nonlinear regression – Single and Multiple analysis of variance.

6312 TXE Textile Machine Design

Spinning machine design – Pedal mechanism theories – Drafting, Twisting and Building mechanisms – Kinematics of fibre stripping devices – Drawing systems – Cone design – Elastic beams – drafting rollers – Roving flyer – Cams – Power consumption in drawing, roving and spinning frames – Design of basic parts in production stages – Driving belts – Machine brake in warping , sizing and opening – Gear driving – Design of twisting rod on Sulzer machines – Shedding cams – reed cams – Springs – Fly wheel, levers and rods.

6313 TXE Textile Design

General classification of textiles – Basic weaving structures and its properties (plain – twill – sateen – double) – Mathematical models (cover – tightness – crimp – flattening – yarn spacing – wrap angles) – Fabric analysis – Practical applications on basic weaves.

6314 TXE Spinning theory 1

blending theory – mix homogeneity – opening theory – waste removal – opening and cleaning index and its measuring methods – fibre transfer through carding machine parts – fibre straightening and opening in carding machine – hook fibres generation and its removal – fibre motion through drafting systems and its effect on evenness – frictional forces between fibres – draw sliver evenness – combing theory and factors affecting quality and noil percent – roving formation and twist insertion – roving winding theory.

6315 Special course 1 *

6316 Special course 2 *

6321 TXE Knitting and Apparel Technology

knitting technology – raw materials – knit yarn preparation – knitting machine classification – loop forming mechanics – basic stitches and its characteristics and comparison between them – predetermine formed curve producing on knitting machines – knit fabric faults and its classification – production calculation and quality control.

Ready made garments technology – raw material and its assessment – human factors – size determining – basic procedures in production: patron design – spreading – marking – cutting – sewing – finishing and backing – sewing stitches – quality control and production calculations –ready made garments economics – modern development.

6322 TXE Measuring Engineering

Measuring definition – international criterias – signal behavior in ideal and practical measuring systems – measuring methods classification – measuring errors – error sources and its type – error classifying due to identifying validity – static and dynamic errors – complex measuring systems – measuring devices and its classification – measuring of temperature, pressure and density – measuring of concentration degree – measuring of flow rate with different types.

6323 TXE Weaving Technology 2

Secondary motion and complement parts of weaving machine – weft and warp stop motion devices – template types - selvage forming devices – weft preparation devices and its theory and its effect on twist loss – weft color selectors – Jacquard devices and its usage on weaving machines – electronic circuits on weaving machines.

6324 TXE Computer applications in spinning engineering 3

Applications and integrated programs using numerical analysis software packages in textile fields – polean algebra and logical gates – introduction in logical circuits – data receive systems and devices – connecting devices – case studies.

6325 Special course 3

6326 Special course 4

Fourth year

6411 TXE Textile mills organizing 1

Spinning mill planning and organizing – preliminary considerations of mill planning – building planning – site – lighting – ventilation – steam – electrical power – machine disturbing – areas – labor types – material handling.

Raw material technical requirements – spin plan – waste distribution – production plan – machine specification and its selection – operating load – power consumption – required area – project for producing yarns with different counts on different production lines of carded and combed cotton and blend of cotton / man made fibres and wool and wastes.

6412 TXE Quality Control

a- Spinning mills: quality system – assurance of quality, production, development and service systems – routine tests for fibres and yarns (evenness – faults – fault spectrum analysis – fault identifying systems) – yarn cleaning – Uster Statistics – production monitoring during spinning stages – quality charts and statistical methods for yarn quality design.

b- Weaving mills: fault description and its degree in different processing stages – sample size – knowing the required tests and comparing to quality tables in winding, sizing and final product – product status sheet after determining its quality degree.

6413 CSE Automatic control

System modeling in deferential equations – response in steady state – transfer function – vibration characteristics of control devices – Dynamic characteristics of units having and not having inertia – deferential and integrated units – memory unit – case studies in textile fields – measuring devices in control systems – control systems used in drawing, carding, spinning and weaving units.

6414 TXE Spinning methods

Modern developments in spinning processes: opening – cleaning – carding – drawing – roving – ring spinning – combing – open end spinning – studying new methods for yarn producing – twistless spinning – Bobtex spinning – air jet spinning – fascinated spinning – core and wrap yarn spinning – friction spinning – systems used hollow spindles – producing coated and fancy yarns.

6415 TXE knitting and sewing machines

a- Knitting machines: diagrammatic analysis for loop working elements – mechanisms of feeding, yarn setting and tension, fabric take-up and let-off, driving and mechanical harmony and yarn change – stock circular and full forming machines – mechanisms of needle selection for different stitches – knitting machine

performance and its measurement – maintenance – new developments in knitting machines.

b- sewing machines: detailed study for cutting, spreading, sewing, ironing and linen machines with study of driving system, settings and factors affecting machine performance and productivity – new developments in sewing machines.

6416 TXE weaving technology 3

weaving of different carpet types – manual and mechanical carpets and its manufacturing – mocquet types and its production methods – pile fabric production (towels – velvet ..etc) – narrow fabric weaving methods – fabric forming theories using multiphase weaving.

6417 TXE Graduation Project

Students select a project in any textile branch and make a survey about it and prepare the required calculations under supervision of project supervisor and make theoretical and statistical analysis and make the design.

6421 TXE Textile Finishing

Cellulosic fibres cleaning by desizing , boiling, beaching, mercerizing, Hydrocellulose , Oxicellulose – animal fibre cleaning – man-made fibre processing – sollet theories – dye classification – dye chemistry – dye preparation technology.

6422 TXE Nonwoven fabrics

Defining of nonwovens – application of nonwovens – the unique characteristics of nonwovens – raw materials for nonwovens – building of batt fibre – batt reinforcement – comparison between batt building method and end product properties – comparison between batt reinforcing method and end product properties – nonwoven fabric tests and its assessment – production calculations and process economics – studying the nonwoven fabric structure and the relation between it and fabric properties – nonwoven fabrics effectiveness in environment protection – recycling of textile wastes – filtering fabric structure – heat and sound isolation fabrics structure – producing fabrics composed of nonwoven fabrics – smart nonwoven fabrics.

6423 TXE Textile mills organizing 2

The basic requirements for weaving mill planning – building planning, site, lighting, driving power – machines distributing in the mill – areas – labor and its type – material handling – technological requirements: raw materials selection – wastes and its distribution – production lines – machine specifications – case studies in weaving mills.

6426 TXE Economics and Costing

Cost calculation introduction – basic definitions in costing – cost records design and organizing in industrial enterprises – accounting due to cost of materials and its monitoring – accounting due to cost of work and its monitoring – accounting of industrial cost and its monitoring – analyze the relation between fixed and variable costs, the profit and the production volume – economical study of machine and equipment selection problem – analytical method of economical comparison – investment period – equivalent monetary flow – case study in the field of: spinning , weaving, knitting and ready made garments.

6424 special course 5

6425 special course 6

6427 Graduation Project

Student continuing the preparation of the project and making theoretical and statistical analysis and design work and complement the project after final term exams.

Special courses

TXE Industrial fabrics technology

Textile fibres used to produce technical fabrics – basic weaving structure of technical fabrics – methods of technical fabric producing from woven , knitted (especially warp knit) and nonwoven fabrics – environmental technical fabrics – technical fabrics applications in (geotextile – building – medicine and surgery – agriculture – industries (filters)) – isolation (heat – sound – electricity – vibrations) – potechnological and nanotechnological applications.

TXE Mechanics of knit and garment machines

a- Description and analysis of the movement of different knitting machines parts and motion equations of different parts , displacement, velocity, acceleration and forces – description and analysis of weft and warp knit machines (basic mechanisms and its calculations).

b- mechanics of garment machines (mechanics of cloth spreading – mechanics of cloth cutting – mechanics of sewing and finishing) – mechanics of sewability – maintenance.

TXE Dying and finishing

Industrial debilitates (Dyes – industrial debilitates – starches) – debilitate mix and preparation – fabric preparation for printing – dyes used in printing – printing methods – color pastes and dyes – direct dyes – soluble vat dyes – preparation methods of printing templates – printing with slides – methods of design preparation for printing – different ratios for sensitive gelatin making.

TXE Weaving structures

Derivative structures from different basic structures – structure of triple fabrics – velvet , pile and other fabric types – special weft structures – fur knit, plush, higher piles, pleat and buerlin – warp knit – lokent knit shercusine and quinz – double cord stain, floor, velvet ..etc – multi owel warp structures – lace, gauze and stripped structures and its analysis – computer application in simulation and analysis of different knit structures.

TXE Spinning Theory 2

Yarn tension theory during its formation on spinning machine – balloon theory – balloon form and its length – yarn winding theory on spinning frame – relation between yarn amount and winding angle – twist insertion in yarn – twist propagation – twist effect on breaking down – theory of breaking down on spinning frame and factors affecting it – theoretical analysis for spun yarn regularity – theory of spinning on open end spinning – fibre collection , yarn forming and forces affect it – stress

analysis in the yarn during winding process – balloon control methods – plied yarn forming theory – twist balance – contraction – yarn strength and elongation.

TXE Mechanics of spinning machines

Studying balance and motion in different spinning machines – full analysis and description for spinning machines and identifying speeds, accelerations and forces applied on its parts – driving methods – control methods.

TXE Analysis of weaving yarn stresses

Studying balance and motion of different weaving machines with analyzing displacement, velocity and acceleration of different parts and motion reasons: forces and moments – shedding mechanisms – twist insertion mechanisms – beating up mechanisms – let-off mechanisms – take-up mechanisms.

TEX Mechanics of weaving machines 2 :

Study of balance and motion of different weaving machines parts. Analysis and expressing the displacement, velocity and acceleration of the different parts, also study of causes of motions such as forces, moments. Study of shedding mechanisms, picking mechanisms, beat-up mechanisms, knitting mechanisms, tack-up mechanisms.

TXE Spinning Theory 3

False twist theory on: friction spinning – electrostatic – open end – air jet spinning – twist insertion by friction – theory of yarn forming by friction – yarn forming in air jet spinning systems: single or double spinnerets – yarn forming by continuous coating by fibers – contraction in ring spun and open end spun yarns – continuous and coated yarns – theoretical model for conventional and nonconventional yarns.

TXE Machine noise

Basic definitions: sound pressure – sound velocity – sound power – auditory resistance – sound measurements: in air, solid and liquids – using of double and triple filters – measuring devices and methods – sound propagation in space – vectorial properties – radiant models of different sources – direction labs – damping with floors and absorbable walls – damper design – sound propagation through closed places – sound pressure – echo time – sound absorption factor measuring using frequency time – sound absorption – perforated absorbent – sound propagation through separating walls – double separators – sound propagation through pipes.

TEX Planning of knitting and Garment Factories:

Planning and organizing the different processes for producing both of knitting and garments, starting with the raw materials such as cone in case of knitting of fabrics in

case of garments. Study and analysis of productivity, efficiency, labors. planning the layout of the factory and machines distribution. Planning of material handling between the different processes.

TEX Operational research:

Linear programming – standard formula – solving the models of linear programming – graphical method – simplex method – transportation problem - applications in the sector of yarn production – determining the optimal blend to producing yarns – cost reduction – profit maximization – making the production orders for machines – planning of labor.

TEX Weaving Automatic control:

Appling the theories and routes of automatic control in weaving process, which governing the following actions (yarn breaks in winding and warping machines – temperature regulation in the sizing bathes – controlling the let-of in weaving and others) starting with winding machines, warping machines, sizing machines, weaving machines.

TEX Specifications and standards in textiles:

Basic definitions – the importance of measuring and its benefits – measuring on different levels – type of specification - specification writing – specification preparation and confirmation – similarity certification – systems of quality control – consumer problems - the practical effect of specifications in the industry.

Architectural Engineering

First year

7111 BAS Mathematics, Statistics, and Computers

Partial differential - maximum values of multivariable functions – quadratic integrals - applications - ordinary quadratic and first order differential equations - engineering applications - elementary theory of numerical analysis - approximation - finding equation roots - systems of linear equations - principles of statistics.

7112 ARE Architectural Design (1)

Introduction to architectural design – training the students to study and solve simple design problems – developing skills and abilities to multiple types and techniques of presentation for architectural design projects.

7113 ARE Building Construction (1)

Traditional construction - masonry - raw bricks & brick masonry - construction buildings types & techniques: the wall bearing type – construction of roofs, floors, and ceilings – building insulation against dampness, rain drainage - construction buildings types & techniques: the skeleton type and its construction components – mortars and finishing materials – applications and working drawings of simplified buildings - introduction to technical sanitary installations.

7114 ARE History &Theories of Architecture (1)

A. History of architecture: Prehistoric architecture – Ancient Egyptian architecture – Ancient Egyptian cities – Castles and forts – Houses – Temples (for life & funeral ceremonies) – Tombs – Mesopotamian architecture – Greek Architecture – Roman Architecture.
B. Theories of architecture: Study of the concept of architecture and its theories – Building types – Design constraints of private and public building elements – Human dimensions and used spaces and zones – vertical and horizontal circulation elements in buildings – criteria and principles of planning and designing parking lots.

7115 STE Theories of Structures

Basic concepts and analysis of structures - equilibrium – stability and compatibility – external and internal equilibrium of statically determined plane structures, beams, frames, and trusses – normal shear – torsion and combined stresses – elastic deformations – introduction to the analysis of statically indeterminate structures through consistent deformations and moment distributions – buckling of columns – introduction to space structures.

7116 PWE Surveying

The course aims to introduce the to basic elements of engineering surveying and its architectural applications:

A. Surveying and measuring operations: plotting scales, venires, linear and simple angular measurement devices.
B. Chain surveying: leveling and theodolites – map drawing – photogrommetry and its architectural applications.

7121 ARE Architectural Design (2)
Simplified projects dealing with aesthetic, cultural, environmental, functional, and structural constraints of architectural form and space – principles of using and designing building interiors and external spaces, services, and vertical and horizontal circulation, with reference to human needs and interactions with the surrounding built and natural environments – applications with architectural models and studying types and techniques of presentation in architectural design and projects.

7122 ARE Building Construction (2)
Study of different types and techniques of building construction - skeleton buildings – frames – sliding slabs – prestressed concrete – shell constructions – steel constructions – trusses – thermal insulation of roofs and external walls – construction details of stairs.

7123 ARE Shade and Perspective
A. Shade: Study of the shade of a dot, straight lines, plane shapes, and objects. Methods of shading projection – application on partial architectural drawings with recessed and protruded parts of buildings and regrouping.
B. Perspective: Study of rules and principles of drawing perspectives – theories of drawing the one and two-vanishing-point perspectives – bird's and ant's eyes perspectives – shades in perspectives – application on different architectural designs of buildings characterized with a variety of forms and levels.

7124 STE Properties and Test of Materials
Materials used in engineering products – standards, codes, and inspections – the development of innovative uses of building materials – concrete: components, manufacture, and quality control – partitioning materials: gypsum, lime, timber, and bricks – the effects of water on buildings materials – the mechanics of engineering materials.

7125 ARE Visual Training
A. Introducing various drawing principles and artistic techniques; pencil techniques, pen & ink - proportions perspective, scale and composition - foreground, middle and background - sketching architectural elements and landscapes - architectural presentation.
B. Theory of colors: Study of color circles, hues, grades, and schemes – use of colors in drawing built-up and natural elements - colors and presentation media - drafting and rendering, manual and mental skills – application on interior design of buildings.

7126 ARE Technical Reports in Architecture
Issues and subjects in the architectural engineering of projects throughout phases – preparation of preliminary and final reports – written exercises – oral discussions – ways and techniques of data presentation.

Second Year

7211 ARE Computer Applications in Architecture (1)
Prevailing operating system – trainings – architectural drawing programs – applications on architectural-related cases.

7212 ARE Architectural Design (3)
Study and analysis of building elements for average-scale project programs and compositions – principles of the environmental impact assessment in the design phase – study of the importance of structural significance in forming architectural spaces.

7213 ARE Building Construction (3)
Working steps to implement different construction and finishing procedures in buildings: Detailing of site works – excavation and foundation works - concrete and reinforced concrete works - masonry, raw bricks & brick masonry - wooden construction details - drawing details of doors, windows, and wardrobes - plaster and finishes of internal and external building surfaces - water and damp proofing - thermal insulation techniques – flooring works – sanitary and electrical works – applications.

7214 ARE History &Theories of Architecture (2)
A. History of architecture: Medieval architecture in the Western and Islamic Worlds – Islamic Architecture.
B. Theories of architecture: Analytical study of the factors affecting architectural design (economical, functional, social, human, psychological, and environmental) – building technology and construction techniques – architectural theories and criteria of designing for building elements – vertical circulation in buildings – residential buildings – office buildings – commercial buildings.

7215 STE Concrete Structures
Reinforced Concrete (RC) – principles of designing RC constructions – analysis and design of sections that are subject to bending – load distribution – reinforcement details of beams, flat slabs, columns, and stairs.

7216 ARE History of City Planning
History of the earliest human settlements in different civilizations and study of the evolution and historical development of city planning in ancient Egypt, Mesopotamia, Greek and Roman civilizations and a comparison, Medieval periods in the Western and Islamic Worlds and a comparison, Renaissance, Industrial Revolution age and its impact on city planning, modern theories and trends of city planning – researches and trainings.

7221 ARE Architectural Design (4)
Making researches and field visits and their application on architectural design projects – ways of identifying dealing with problems – design approaches to average-scale projects – studies of environmental impact assessment.

7222 ARE Building Construction (4)
Steel works and details – ways and techniques of expansion joints and treatments of different building cracks and caulks – prefabricated buildings, prestressed, and precast concrete – concrete and reinforced concrete and their ratios of their components – ways and techniques of mixing and casting concrete – laboratory setups of quality assurance – thermal and damp proofing, noise-reduction, antistatic, and anti-radiation materials – recent finishing materials and buildings and attributed physical and mechanical features.

7223 ARE Urban Design
Definition of urban design: aims, programs, constituents, and attributes – study of principles of urban design – ecological and environmental effect on urban shaping.

7224 ARE Building Physics and Environmental Control
A. Building physics: Physical and mechanical properties of building materials – thermodynamics and heat transfer – thermal behavior of building elements (walls, roofs, and floors) – time lag – thermal storage – thermal insulation – acoustics – acoustical behavior of building elements – noise pollution and controls – dampness in buildings and controls – a number of applications on building envelopes to adapt with their surrounding environments.
B. Environmental control: The natural environment and climatic factors – human thermal comfort in building interiors – buildings and streets orientation – natural ventilation in buildings – solar control in windows – design of buildings and windows to adapt with the surrounding environment – landscaping and use of trees for shading, air purification, and control of ventilating patterns – protection from desertification.

7225 STE Steel Structures
Structural systems of steel constructions – design loads – design of members which are subjected to central forces, moments, or shear forces – design of bolted and welded connections.

7226 ARE Computer Applications in Architecture
Defining methods and techniques of computer applications in the architectural and urban design fields – use of computer in programming, architectural design aiding, working drawings, quantities, and descriptions. Drawing and presentation – preparation of two and there-dimensional drawings. – use of computers in preparing researches and environmental studies.

Third Year

7311 ARE Architectural Design (5)
Study of external environmental conditions and development of students' perception of urban forms – the kind of relationship between external volumes and building shapes – significance of structural concept in shaping and formulating architectural spaces – raising efficiency in the design process architectural projects characterized with complicated, diversified elements – introduction to the strategic environmental studies of projects.

7312 ARE Executive Designs (1)
Detailed study and preparation of the various and recent structural systems covering wide spans in buildings – preparation of the complete working drawings and details of major projects with wide-span facilities – field visits to similar projects.

7313 ARE Theories and Philosophy of Architecture (1)
Study of design theories and philosophy of architectural shaping and forming – creation in architectural design in the twentieth century – study of philosophy of design principles of art and architecture in the Islamic world – study of revival and renewal possibilities for conservation - study of environmental, economical, and social compatibility of design in the local communities of the Arab world.

7314 ARE Urban Planning and Design
Study of the carious levels of planning (national – regional – local) – development studies – structural planning – environmental, social, economical, and demographic studies – legislations and laws – the city master plan – elements and factors of city planning – development of planning goals and programs – population density – activities and economical bases – social and population possibilities – analysis and design of urban spaces – characteristics of visual conception in the urban environment – visual shaping and forming of the city.

7315 STE Foundations
Study of calculating soil properties and stresses - characteristics and mechanics, and the selection and design of foundations - soil classification – soil compaction – soil compressibility – theory of consolidation – lateral earth pressure – design of shallow and deep foundations – retaining walls – selection of suitable foundations – design of foundations subjected to centralized and decentralized loads.

7316 ARE Option (1)

7321 ARE Architectural Design (5)
The course concentrates on enhancing the students' skills in developing architectural solutions and alleviating the environmental design problems – studying a variety of structural solutions to help construct wide-span structures and study their potential associated complications - study of natural and mechanical ventilation – study of artificial and daylighting – use of computer applications and programs in designing, developing, and presenting architectural projects – applications with help of simplified architectural models.

7322 ARE Executive Designs (1)
Preparation detailed working drawings of buildings both architectural and structural connections and elements – preparation of sanitary, electrical, and mechanical drawings of architecturally design projects.

7323 ARE Housing and Urban Design (1)
Problems of city planning and housing in Egypt from their economical, social, and cultural dimensions – approaches and concepts of urban planning and housing – analytical study of different housing types: economic, average, above-average, and luxurious – planning and design of housing areas and districts – social, economical, and environmental factors affecting housing and urban design.

7324 PWE Sanitary Engineering
Hydraulic services and plumbing fixtures in buildings – hot and cold water supply ad distribution, sewage systems and waste disposal – ovens and kitchen appliance – fire distinguishers in buildings.

7325 ARE Option (2)

7326 ARE Option (3)

Fourth Year

7411 ARE Architectural Design (6)
Application of knowledge and skills of the professional, technical, architectural, structural, and technological sciences in the architectural and urban design processes for applicable projects – using architectural modeling as a design aid – discussion of design alternatives and solutions of the same problem – study, analysis, and criticism of the alternatives – studies of the environmental strategy applied to the architectural and urban projects.

7412 ARE Executive Designs (2)
Preparation of a complete group of executive architectural design drawings for a project with a specific function, characterized with wide span – making studies and detailed architectural drawings of cladding, (internal and external), suspended ceilings, acoustical treatments, damp and water proofing, thermal insulation, lighting, furniture, technical facilities and supplements – legislations and building codes – use of computer programs in calculating and preparing the qualitative and quantitative preconditions.

7413 ARE Theories and Philosophy of Architecture (2)
Study of architectural theories and constraints of public buildings: institutional, governmental, educational, cultural (museums - exhibitions – theaters - cinemas), healthcare, and touristic – study of the design philosophy of intelligent buildings and recent projects with advanced techniques.

7414 ARE Interior Design
Principles of design and shaping the interior design of public and private buildings – building interior components and technical systems: lighting - acoustics – industrial design and furniture – materials and tools – textures – finishing – aesthetics of architectural spaces – visual perception of spaces – researches and applicable researches – study of colors and their psychological effects – application of the color theory on the interior design of buildings.

7415 ARE Urban Planning (2)
Landscaping and site arrangements – analytical study of site characteristics and its surroundings – urban database – social, economical, and cultural database - detailed study of the city's transportation network – numerical analysis of functional relationships within the site – applicable project in one of the old or new cities.

7416 ARE Option (4)

7421 ARE Housing and Urban Design (2)
Principles and theories of land use – residential, commercial, and industrial areas – open areas – green areas city centers –transportation network and paths – services and feasibilities – Defining the housing problem in developing countries – the variety of approaches and trends dealing with the housing problem – social, cultural, and economical factors – user participation and role in the study phase and problem solving – composite planning and housing project with surveying and assessment of planning and housing problems of an existent area – redesign and planning of the existent area and making use of the results in planning for a new area.

7422 ARE Specifications, Quantities, and Quality Control
General and detailed specifications for building items - quantity and surveying methods - tendering and bidding – contracting - bids analysis – commissioning - project management (time, labor, cash flow, machinery and equipment) - professional practice - designer and supervisors responsibilities - quality and quality control - contractor and owner responsibilities - actors relations and roles – using computer programs in preparation of executive plans.

7423 ARE Option (5)

7424 ARE Project

Optional Courses

7316 ARE Option (1) a- Environmental design
The variety of existing environments – climate and climatic regions – human thermal comfort – environmental impact on architectural designs – case studies and applicable researches.

7316 ARE Option (1) b- Computer Aided Design
Defining the tools, programs, and techniques needed – setting up and analyzing programs – design presentation and evaluation – preparation and presentation of two and three-dimensional architectural designs – computer aided examples and case study applications.

7325 ARE Option (2) a- Landscape Design
Analytical studies of site characteristics and its surrounding environment – urban database – social, economical, and cultural database – detailed study of transportation networks within the site – numerical analysis of functional relationships of the site – study of design and shaping the space and the visual form – project of urban design and infrastructure planning.

7325 ARE Option (2) b- Urban Conservation and Maintenance
Concepts of urban conservation and maintenance – historical and invaluable buildings – methodologies of dealing with urban heritage: protection – reclamation – character preservation – elimination – reformation– renewal – upgrading – rehabilitation.

7326 ARE Option (3) a- Advanced Building Technologies
An approach to the study of advanced construction systems improved with the development of sophisticated technologies – loads and construction methods – structural materials – examples and case studies.

7326 ARE Option (3) b- Architectural Projects' Management
Study of making executive programs for site management (time, labor, equipment) - cash flow and time plans - project management methods – management principles – implementation policies, programs, and schedules – practice principles – evaluation quality control – economical management of projects – case studies, applicable researches, and field visits.

7426 ARE Option (4) a- Architectural Criticism and Competitions
Defining the concepts and history of architectural criticism – tools and parameters of architectural criticism – outlines of architectural criticism trends and concepts – criteria and principles of architectural criticism, evaluation and assessment - defining the concept of architectural competitions, their importance, and their aims – concepts and trends of design – preparation of drawings and technical reports – application studies of architectural criticism processes.

7426 ARE Option (4) b- Advanced Architectural design
Issues and subjects of the advanced architectural design trends – study of design principles and constraints of the advanced trends – case studies covering the advanced trends.

7423 ARE Option (5) a- Detailed Planning

The role of planning in achieving a strong relationship between the built-up areas and spaces – forming of spaces, their sequential arrangement, dimensions, detailing, and relationships – visual forming with its variable parameters – circulation paths – landscaping and its corresponding parameters and details.

7423 ARE Option (5) b- Urban Renovation and Upgrading

Maximum use of available environmental possibilities and human and urban resources – study of local and global experiments in development and upgrading – standing problems of urban decay, its causes and factors – tools and techniques of rectification used in renovation and upgrading – conservation and maintenance – case studies and applications.

Civil Engineering Department

First Year

First Term

BAS 8111 MATHEMATICS-3

Applications of partial differentiation – Maximum and minimum values of multivariable functions – Vector analysis – Vector differential operators – Multiple integrals and its applications (curve-linear coordinates – Gauss and Stokes theories) – Infinite series and functions expansion – Principles of convergence and divergence – Ordinary differential equations of the first order - Ordinary differential equations of the second order – Complementary function's particular solution and its significance – LaPlace transformation and its applications in the solution of differential equations

IRH 8112 LAW OF FINANCING SOURCES

Introduction in low-legislation of work and regulated laws for engineering works - contracts of engineering works - liabilities and arbitration-legislation of industrial safety and environment.

Introduction in economy - request, offering and balance-costs - time value for money currency - comparison between alternatives - economical evaluation - economical analysis in construction department - analysis of money fluxes of investments - applications in construction projects.

PWE 8113 STATISTICAL APPLICATIONS IN CIVIL ENGINEERING

Date representation and analysis – measures of central tendency and dispersion – probability theory – probability distribution functions – relation between sample and population – test of hypothesis on the mean – hypothesis and level of confidence on standard deviation – linear and multi-linear regression analysis and correlation

IRH 8114 CIVIL ENGINEERING DRAWING

Structures of irrigation works: cross sections of canals and drains – roads crosses – brick retaining walls, plain concrete retaining walls and reinforced concrete retaining walls – bridges – weirs – syphons.

Reinforced concrete structures: slabs – beams – columns – foundations – stairs.

Steel structures: connection of angles with plates – connection of columns with beams – joints of bridges – foundations of columns.

PWE 8115 PLANE SURVEYING *

Introduction - methods of measurements and setting-up – shape of earth – surveying branches – instruments and methods of linear measurements – simple surveying techniques – chain surveying – surveying using compass – common parts of surveying instruments – plane table – verniers – maps and its arrangements - leveling and contour lines – areas and volumes – land leveling – surveying using theodolites – introduction to theory of errors

STE 8116 THEORY OF STRUCTURES-1 *

Elements of plane static, Loads and reactions, Internal force (Normal – Shear – Bending moment), Statically determinate beams, frames, arch and trusses, Influencelines of statically determinate structures, Analysis of beam under moving load.

Second Term

BAS 8121 MATHEMATICS-4
Fourier series – Partial differential equations – Special functions: Bessel – Lagendre – Gamma – LaPlace – Numerical methods: Theory of errors – functions approximations – numerical integration – roots of algebraic equations - sets of linear equations – Numerical solutions of ordinary differential equations – the finite difference method

STE 8122 STRENGTH OF MATERIALS-1
General Classes of materials, testing, inspection, specifications – Testing machines, strain gauges – General features of mechanical behavior of metals, static tension, static compression, static bending, static shear - Hardness metals – Building stone, Classification, properties, mineral aggregates classification, properties, test – Cement (composition, types, manufacture, properties, test) – Lime (classification, manufacture, properties, uses, tests) – Timber (general , growth and structural characteristics, properties, tests) – plastic materials.

EE+MPE 8123 ELECETRICAL AND MECHANICAL INSTALLATIONS
Introduction to heat engineering – First law of thermodynamics and its applications in different systems – Second law of thermodynamics and its applications – Principles of heat transfer – Cooling and air-conditioning systems and components – Principles of internal combustion engines – Introduction to heavy equipment – scrapers – bulldozers – cranes – concrete mixers
Electric current and Ohm's law – AC and DC electric circuits - Principles of electric machines – Equipment and instruments of electric network and connections for buildings

IRH 8124 TECHNICAL REPORTS IN CIVIL ENGINEERING
Texts in civil engineering - writings of scientific and artistic reports- summary preparation for specialist articles - discussions and training between students-summary preparation of readings articles.

PWE 8125 PLANE SURVEYING* :
"Continuous course for two semesters"

STE 8126 THEORY OF STRUCTURES-1 *
"Continuous course for two semesters"

Second Year

First Term

IRH 8211 Hydraulics-1
Liquids characteristics - units and dimensions - hydrostatics-pressure – floating - liquids kinematics - fluid motion - continuity equation - total energy equation - fluid dynamics - momentum equation - network hydraulic - time of tanks emptying – flow between tanks - dimensional analysis – resistance study in pipes and moody diagram - water hammer - nozzles.

IRH 8212 IRRIGATION AND DRAINAGE ENGINEERING
Introduction in irrigation - types of irrigation - summary about large projects in Egypt - sources of irrigation water - relations between soil, water and plant – water requirements for irrigation - methods of surface irrigation - sprinkler irrigation - dripping irrigation planning and design of irrigation and drainage networks - management and distribution of irrigation water - lining of irrigation canals - surface drainage-design of covered drainage networks.

STE 8213 STRENGTH OF MATERIALS-2
General ideas about uses of concrete – mixing water – admixtures and reinforcement concrete –Design of concrete mix – empirical, trial, and collective data method – Properties of fresh concrete – consistency, workability, segregation, bleeding – Properties of hardened concrete – compressive strength – tensile strength – abrasion strength – shear strength – bond strength – durability – permeability – thermal properties – dimensional changes – Quality control – Special concrete – Behavior of structural materials – Creep of concrete – Thermal properties of material – Analysis of stress and strain – Nondestructive test

PWE 8214 ENVIRONMENTAL SCIENCE
Pollution – water resources, quality and specifications - natural purification of surface water – recycling of sewage water – waste water management – air pollution and environmental control methods – evaluation of environmental projects

STE 8215 ENGINEER BEHAVIORS
The system of engineering career – Relationship between engineer and the system of engineering union – Relation between Engineer and owner, contractors and consultant – The role of engineer to serve environment and society.

STE 8216 THEORY OF STRUCTURES-2 *
Properties of plane area – Normal stress – shear stress – torsion stress – combined stress – Elastic deformation in beam – Determined the elastic deformation for beam, frame and truss statically determined structure by virtual work – Analysis of statically determined structural by force method – Three moment equation for beam and frame statically determined structural – Buckling of columns.

PWE 8217 TOPOGRAPHIC SURVEYING AND GEODESY*
Surveying using theodolite – electronic distance measurements – traverse networks – alignment of simple and compound horizontal and vertical curves – shape of earth and coordination systems – theory of errors – photogrammetry and remote sensing.

Second Term

ARE 8221 ARCHITECTURAL SYSTEMS

Construction details, finishing and maintenance – Different stages of building construction – plain and reinforced concrete works – type of joints – doors and windows carpentry – retaining walls – internal separators – wooden construction – external and internal finishing – maintenance works in building – cracks – water and humidity insulation – principles of architectural theory – basic architectural elements: usage – utilization – illumination – ventilation – beauty – integrity – proportioning and stability.

PWE 8222 GEOLOGY AND SOIL MECHANICS

Existance of earth and its layers – minerals – rocks – ground water – geological maps – Applications of engineering geology – physical properties of soils – Soil classifications – Atterberg's limits – water in soil – compressibility – shear resistance.

STE 8223 REINFORCED CONCRETES-1

Introduction of reinforcement concrete – The design philosophy and methods of design – Design of sections under bending moment – Bond length between concrete and joints of steel - shear in beam - Deformation in continuous beam design – design of solid slab.

IRH 8224 HYDROLOGY

Hydrologic cycle - participation and its type - hydrologic losses and types of their measurements – evaporation – transpiration – infiltration - surface flow - relation between surface flow and rains - discharge curve (hydrograph) - unit hydrograph - S curve and its applications - hydrology of river Nile - relation between rains, surface flow and storage-reservoirs design - calculation of storage in rivers-ground water in Egypt - ground water characteristics –hydraulics of steady and unsteady wells-types of reservoirs - methods of wells construction-control of salt water intrusion in coastal regions.

PWE 8225 CONSTRUCTION EQUIPMENT AND TECHNOLOGY

Different construction techniques – general discussion of equipment for different construction fields – detailed study for construction equipment – applications and field case studies – design of wooden formworks – modern constructional techniques for the erection of reinforced concrete structures – constructional techniques of reinforced concrete bridges.

STE 8226 THEORY OF STRUCTURES-2 *

"Continuous course for two semesters"

PWE 8227 TOPOGRAPHIC SURVEYING AND GEODESY*

"Continuous course for two semesters"

Third Year

First Term

IRH 8311 DESIGN OF IRRIGATION WORKS-1
Hydraulic design for bridges openings - arch bridges - reinforced concrete bridges - rolled steel joist bridges - retaining walls – culverts - syphons – aqueducts - tail escapes of canals.

STE 8312 QUANTITIES ESTIMATION
Quantities determining science – Analysis of different item – element of price – Schedule unit price for different items – Quantity surveying for different projects and use bill of quantities – Quantities and measurements for excavation and filling concrete works – bricks and block works – Damp proof course – stairs – plaster – carpenter and joinery – painting – Sanitary works – Electrical works – Piles work – elevator works – The work condition of contractor – tender forms – Writing the specifications – Elements of writing specifications – General specifications.

STE 8313 THEORY OF STRUCTURES-3 *
Statically indeterminate analysis using (Slope deflection - moment distribution using matrix – Stiffness method) – Introduction of dynamic structures analysis.

PWE 8314 RAILROAD ENGINEERING
Running dynamics of trains – Calculation of drag and resisting forces – Engineering fundamentals of railway lines alignment – Structure and design of railway track elements and its details – Railway stations: types, utilizations, planning and detailing of different elements –Signaling systems: types, locations and safety of railways and stations - Railway turnouts and rail networks – Railway planning – Horizontal and transition curve alignment.

IRH 8315 HYDRAULICS-2 *
Water flow in open channels: types of flow - specific energy and specific discharge - transitions - momentum and specific force - hydraulic jump and its types – resistance of open channels - gradually varied flow - water surface profiles and the different methods for the computation of their lengths - different methods for canals design - introduction of river hydraulics and sediment transport - natural models and their types.
Hydraulic machines: water turbines – Pelton – Francis – Kaplan – pumps: centrifugal pumps - reciprocating pumps - pumps of wells - operation of pumps with pipes lines.

STE 8316 REINFORCED CONCRETE-2 *
Design of hollow block slabs according to Egyptian code – Design of Paneled beams (Using relative deflection and approximate analysis methods) - Design and analysis of sections under torsion – Details of steel under torsion - Design of Flat slab according to Egyptian code – Shear analysis of a flat slab – Moment transfer form flat slab to column - Design of stairs.

STE 8317 STEEL CONSTRUCTIONS-1 *
Design force in members – design of members - design of beams such as purloin, cran-track, glider – design of riveted connection – design of bolted connection – design of eccentric connection – design of welded connection – design of column and lattice system – design of beam column – design of column base – design of wind tracings – design of steel frames design of composite section.

Second Term

STE 8321 SOIL MECHANIC AND FOUNDATION-1
Stresses in loaded soil – study of foundation settlement - Bearing capacity and soil stability – slopes – earth pressure – Design of isolated footing and strip - design of combined footing - Raft foundation

PWE 8322 TRANSPORTATION AND TRAFFIC ENGINEERING
Definition of transportation engineering – urban transportation planning – data collection – Traffic modeling – evaluation and analysis of different alternatives – definitions of traffic engineering – roads efficiencies – relation between speed, traffic volumes and traffic intensity – design of traffic signals – queuing theory – study of vehicles parking

STE 8323 TECHNICAL REPORTS IN CIVIL ENGINEERING-2
The rule of preparing the technical reports - The content of technical reports – Analysis of data – view of data – Studies, testing and review

IRH 8324 HYDRAULICS-2 *
"Course continued in two semesters".

STE 8325 REINFORCED CONCRETE 2 *
Design of Halls and saw tooth (Frames – Arches – Verindeel girder – Trusses – Suspended roofs) - Design of circular frame – Design of different footings for frames – design of arches with ties – design of R.C. circular and arched slabs – design of Verindeel girder frames – design of different R.C. trusses – analysis and design of saw-tooth roofs – structural systems of north-bound halls.

STE 8326 STEEL CONSTRUCTIONS-1 *
"Course continued in two semesters".

Fourth Year

First Term

STE 8411 SOIL MECHANIC AND FOUNDATION-2
Types of piles and methods of execution – Design of piles – Bearing capacity of piles – Analysis of piles group – Piles settlement – design a cap of piles- Piles testing – Design wall sheets - Soil hydraulic – Theory of seepage – flow net in soil – application of seepage problems – drying the excavation work in soil.

IRH 8412 DESIGN OF IRRIGATION WORKS-2
Seepage theory and design of foundations for heading up structures; weirs - regulators – locks - reinforced dams, earth dams and rock fill dams.

PWE 8413 HIGHWAY AND AIRPORT ENGINEERING
Roads structural design – soil properties – soil tests for highway and airport construction – properties of pavement materials – stress analysis in pavement layers – design of pavement layers thickness – highway constructional steps – road geometric design – roads cross-sections – design of horizontal curves - design of vertical curves – design of intersections – airports components and design – design of runways and taxiways.

STE 8414 CONSTRUCTION PROJECT MANAGEMENT
Planning and scheduling Construction Projects : CPM, PM, PERT, resource allocation., LOB, time location – Contract Strategy: Concept, Organizational structures, types of contract, contract administration, tendering process – Estimating, Tendering and controlling: Cost estimating, risk management, pricing policy and cost control – Contract and project cash flow, Investment appraisal using NPV, IRR and EUAC, Effect of inflation.

STE 8415 ELECTIVE COURSE-1
" see next illustrations"

PWE 8416 ELECTIVE COURSE-2
" see next illustrations"

Second Term

STE 8421 REINFORCED CONCRETE-3
Design of water structure – Design of sections under bending without cracking – Design of circular tanks – Design of rectangular tanks – Design of shell structure - Design of prestressed concrete.

STE 8422 STEEL CONSTRUCTIONS-2
Layout of railway bridge – Calculate the load on the different elements – Design of M. girder and plate girder – design of bridge floor – design of connection between stringer and x girder – design of stiffener – design of splices – layout of roadway bridges – design of bridge floor – design of M. girder as trusses - design of truss joints.

IRH 8423 HARBOUR ENGINEERING
Introduction - wind analysis - waves and coastal currents - waves predictions - waves theory - waves analysis - waves transmissions – tides - coastal currents.
Ports planning and their types: introduction for port components and their types- port planning - breakwater design - design of anchorage structures - design of special structure.
Protection works of shores and navigation canals: types of protection - design of protection works and pitching-design of navigation canals.

PWE 8424 SANITARY ENGINEERING
Preliminary design studies for potable water supply projects – Water pollution and waste water hazards on health – study and design of potable water treatment techniques – study and design of potable water networking systems – study and design of different waste water treatment methods – study of sludge treatment and disposal methods.

IRH 8425 ELECTIVE COURSE-3
" see next illustrations"

STE+PWE+IRH 8426 GRADUATION PROJECT
" to be arranged by different departments"

Electives Courses

8415 ELECTIVE COURSE-1

STE 8415-1 NEW CONSTRUCTION MATERIALS
Introduction of a new technology in material science – new material classification in construction – Compound material and applications – Carbon Fibers and uses in construction – Damp proofing material – Heat insulation

STE 8415-2 EARTHQUAKE CONSTRUCTION DESIGN
Nature of earthquake – Sources of earthquake – Earthquake waves – Introduction of the behavior of structure under earthquake – Response Spectrum – Modal analysis for multi story structure – Soils under earthquake

STE 8415-3 BRICK CONSTRUCTIONS DESIGN
Manufactories and properties of brick – properties of plaster - Properties of brick construction – Normal and shear strength of brick structures.

PWE 8415-4 MODERN ECONOMICAL TECHNIQUES IN WASTE WATER COLLECTION AND TREATMENT
Type and properties of waste water – classical methods in waste water treatment – modern techniques used for waste water treatment – comparative study between classical and modern methods.

IRH 8415-5 WATER RESOURCES ENGINEERING
Water cycle, water sources and lakes - surface water - rains and their measurements and analysis - hydrologic losses-statistical analysis of rains and floods - relation between rains and surface flow - discharge hydrographs for water streams and their analysis - ground water: types of ground water reservoirs - permissible rate of pumping from wells - utilities of water and its requirements – integral water resources management.

8416 ELECTIVE COURSE-2

PWE 8416-1 MODERN TRENDS IN ASPHALT PAVING DESIGN MIXES
Components and materials of the asphalt paving mix – Marshall method of the asphalt mix design – Supepave method for the design of asphalt mixes – modern mechanistic based method for mix design.

PWE 8416-2 REMOTE SENSING
Classical methods for surveying instruments use in site – modern techniques and methods used in precise leveling – Total stations and remote sensing instrumentations.

PWE 8416-3 NON-CLASSICAL METHODS IN POTABLE WATER PURIFICATION
Specifications of potable water and classical methods of water purification – modern water purification techniques – comparative study between classical and modern methods with respect to economy and efficiency.

STE 8416-4 REPAIR AND STRENGTHENING OF CONSTRUCTION
The reasons of defect the construction – The methods of scanning the concrete structure – The method to avoid the cracking in concrete – The materials uses in repair and strengthening – The methods of protect the construction from wild weathers.

IRH 8416-5 INTERNAL NAVIGATION ENGINEERING
Introduction - economics of internal navigation - hydraulics and design of navigation canals - navigation aids - hydrodynamics of ship movements – navigation streams improvements for rivers and stability of side slopes - planning and design of river ports - design of locks - evaluation of environmental impact.

8425 ELECTIVE COURSE-3

IRH 8425-1 DESIGN OF ADVANCED IRRIGATION SYSTEMS
Introduction - sprinkler irrigation systems: types - efficiency and regularity of distribution – planning - types and characteristics of sprinklers - hydraulic design of lateral lines and main lines - pumps requirements.
Dripping irrigation system: elements of system - selection of dripping and design bases – planning - design of network - filters and blockage phenomenon - selection of an advanced irrigation system.
Design of advanced ditches: low pressure pipe networks - concrete canals - works of pumping and intakes - field structures.

IRH 8425-2 DESIGN OF LARGE IRRIGATION STRUCTURES
Locks: horizontal planning - locks types - filling and emptying systems-design of walls and foundations.
Dams: purposes of dams - yearly and decade storage-design and operation of reservoirs-design of concrete dams and effect of earth quacks on dams - design of earth and rock filled dams and control of infiltration.
Spillways: spillways types - spillways design - stilling basins.

IRH 8425-3 DESIGN OF COASTAL PROTECTION WORKS
Introduction - hydrodynamics of coastal zones - sediment transport movements-changes of shore line - reasons of shores erosion - design of structure features for shores protection: sea walls - jetties – groins – floating structures – breakwaters – design of domestic features – selection of methods and materials of construction - evaluation of environmental impact.

PWE 8425-4 AIR TRANSPORTATION SYSTEMS
Fundamentals of air transportation – nature and importance of air transport systems – air transportation planning with respect to safety and economy considerations.

STE 8425-5 STRUCTURAL ANALYSIS USING COMPUTER
Introduction of theoretical models for structural analysis – Comparison between the models to structural analysis – Program preparing using stiffness matrix – Using the available software programs.

Electronics and Communications Engineering

First Year

BAS 9111 Mathematics (3)

Applications of partial derivatives- maximum of functions of several variables- vector analysis- differential operators- multiple integrals and its applications (curve linear coordinates, Stock's and Gauss's theorems) – infinite series and function expansions- basic concept of convergence and divergence- first order differential equations with constant coefficients- complementary functions and particular solutions- Laplace's transform and its applications.

COM 9112 Solid State Electronics

Atomic structure-Introduction to quantum mechanics-Crystalline structure of solids-Energy bands and charge carriers in semiconductors-Carrier concentration-Carrier Deflection in electromagnetic field-Excess carrier concentration in semiconductors-The PN junction-Insulating Materials-Polarization-Piezo-elecricity-Losses in Insulating Materials-Ferrites-Superconductors.

COM 9113 Circuit Theory

Electronic circuit elements-Resistive circuits-Circuit analysis and source transformations-Network theorems-Delta-Star transformations-Alternating current circuits-Phasor representations-Power and power factor-Resonance-Magnetically coupled circuits-Three phase circuits.

COM 9123 Electronic Measurements (1)

Measurements error analysis–Units–Moving coil instruments–D.C. measuring instruments–A.C. measuring instruments–Measurements of power, energy, power factor, and frequency–D.C. bridges–A.C. bridges–Oscilloscope–Transducers-Digital multimeters

BAS 9121 Mathematics (4)

Special functions (Gamma, Beta, Bessel, and Lagender)- Fourier series and Fourier transform- series solutions of ordinary differential equations- partial differential equations- complex analysis (functions of complex variables, analytic functions, derivatives, complex integrals, Green's theorem, Couchy's theorem and its applications, and residue theorem).

COM 9122 Basic Electronics

Conduction in semiconductors-The PN junction-General characteristics and current components in the PN junction-Diode under different bias conditions-Other types of diodes-Bipolar junction transistors-Current components-Static and dynamic characteristics-Unipolar semiconductor devices-Field effect transistors-Phototransistors.

COM 9124 Logic Circuits (1)

Boolean algebra and binary system–Logic gates–Boolean functions–Combinational logic-Encoders and decoders-Sequential logic circuits-Synchronous and asynchronous logic circuits- Shift registers-Counters-Memory circuits.

COM 9125 Electronics Lab (1)

Basic circuit elements and lab equipments, Oscilloscope, Circuit simulators, basic circuits theorems, RC and RL circuits, resonance circuits, diode characteristics and applications, BJT characteristics, FET characteristics, and projects.

COM 9116 Technical Reports in Communications

English Scripts in Electronics and communications-Scientific Technical reports-preparing summary of technical papers-Students discussion and language practice-Preparing summary of reading text

COM 9126 Humanities in Communication (2)

Introduction- nature and theory of cost-profit maximization- capital investment-market structure- models of revenue-externalities and market failure- production relations- decision making- cost- volume-profit analysis and sensitivity analysis- input choice with fixed output level- concept of time value of money.

Second Year

BAS 9211 Mathematics (5)
Introduction to numerical analysis- least square method and curve fitting- numerical solutions of algebraic equations- numerical solutions of linear differential equations- initial value and boundary value problems- interpolations- numerical solutions of partial differential equations- iteration methods.
Probability theory- set theory- conditional probability- random variables- probability distribution functions- function of random variables- random processes- correlation functions.

COM 9212 Electronics Lab (2)
Set of lab experiments to cover electronic circuits:
Diode applications in rectifiers- BJT transistor characteristics-JFET characteristics-Transistor amplifiers-Thyristor characteristics and Applications-DIAC-TRIAC-Operational amplifiers and active filters-Logic circuits.

COM 9213 Electromagnetic Fields
The static electric field- The electric flux and Gauss's law- The electrostatic potential- Energy density in the electrostatic field- Boundary conditions in electrostatics- Poisson's and Laplace's equations- The electrostatic capacitance- The steady electric current- Resistance and Ohm's law- The static magnetic field and Biot-Savart law- The magnetic flux and Gauss's law- Ampere's law- Force and energy in the static magnetic field- The static vector magnetic potential- Self and mutual inductance- Dielectric and magnetic properties of matter- Time varying fields- Maxwell's equations- Boundary conditions- Poynting's theorem- The uniform plane wave in free space- Phase velocity and wave impedance- Propagation in isotropic lossless or lossy media- Plane wave in an ionized medium- Reflection and refraction at plane boundaries.

COM 9214 Electronic Measurements (2)
Digital voltmeters-Digital storage and sampled data oscilloscope-plotters-Measurement of impedance, power, time, frequency, and phase angle-spectrum analyzers-Automatic gauges-data acquisition systems-noise in measurement systems

COM 9215 Logic Circuits (2)
Computer architecture- Harvard and Von Neoman architecture-Design of arithmetic and logic unit-design of control unit-Interface circuits-input and output processes under programming control- programming for input and output interrupt

COM 9216 Humanities in Communications (3)
Principal of management- importance of strategy- levels and types of managements- distinction between financial and management accounting- resources and claims- assets- different forms of balance sheets- basic financial accounting- rewarding economic transactions- companies degradation and failures- the cash account- revenues and expenses- the economics, business strategies, and technology of telecommunications markets: including markets for wireless communications, local and long-distance services, and telecommunications customer equipment.

COM 9221 Applied Statistics
Basic definitions- frequency distributions- measures of central tendency and dispersion – univariate analysis- multivariate analysis- sampling analysis- estimation and inference- hypothesis tests- nonparametric tests- time series analysis- applications.

COM 9222 Electronic Circuit 1
BJT DC- analysis and biasing stability- BJT small – signal analysis- transistor amplifiers configurations – classifications of transistor amplifiers- audio and RF amplifiers- audio power amplifiers – Feedback amplifiers –diffrentional amplifiers – Operational amplifiers- Linear-digital ICs

COM 9225 Linear Systems and Networks
Series and parallel resonance-passive filters applications (LPF, HPF, BPF, BSF)-resonance in mutually coupled circuits and its characteristics-two ports network (analysis and calculation of its parameters)-two port network as a part of multiple circuits-State space analysis-multi-port networks-analysis for active element circuits-reactance circuits and inductance simulation-negative impedance circuits

COM 9226 Computer Application in Communications Eng.
Planning and organization of software systems- concepts of software systems-modeling- software production- analysis and design of object oriented software systems- UML- USDP- alternate methods of analysis and design- case studies.

Third Year

COM 9311 Communication Theory (1)
Introduction to communication systems-Signals and systems-Power spectral density-Amplitude Modulation suppressed carrier-Amplitude modulation large carrier-Single side band-Vestigial side band-Demodulation of amplitude modulation (DSB-SC, DSB-LC, SSB-SC, SSB-LC)-Angle modulation-Narrow band F.M.-Wide band F.M.-Phase Modulation-Demodulation of angle modulation-A.M. and F.M. receivers-FDM-Pulse Modulation (PAM, PWM, PPM)-TDM-Noise in analog modulation systems.

COM 9312 Electronic Circuits 2
Cascade Amplifiers – Feedback amplifiers – frequency response- Distortion in amplifiers – Power amplifiers – Buffer amplifiers- Linear-Digital ICs- Shmitt trigger-Oscillators and wave generators – wave shaping .

COM 9313 Signal Analysis
Signals and systems- signal representations- Sampling and sampling theory- linear-time invariant systems- frequency response-discrete time signals-Z-transform and its inverse-discrete time Fourier transform- random processes-correlation-convolution-basic concepts of analog and digital filters.

EE 9314 Electrical Power
Generation and distribution of electric energy- transmission lines- insulator design for transmission lines- choice of transmission and distribution systems- cables- short circuit analysis- protection systems and circuit breakers- economic operation of generating units.

COM 9316 Humanities in Communication (4)
Language processors- compilers- interpreters- structure of a compilers- its context: editors and loaders- phases and passes- code generation for arithmetic expressions using stacks and registers- lexical analysis- semantic analysis and the use of symbol tables- static and dynamic chains- nested procedure declarations- grammars- top down passing- back tracking context free grammar, finite state automata, code generation and optimization- operator procedure.

COM 9321 Communication Theory (2)
Introduction to digital communication systems-Probability theory-Digital communication channels-Source coding (PCM, DPCM, DM)-Matched filter receiver-Detection of base band PCM signals and probability of error-Information theory-Channel coding for error detection and correction-Digital modulation (ASK, FSK, PSK, MSK, M-ary modulation)-PN sequence generator-Spread spectrum communication-Satellite communications.

COM 9322 Electromagnetic Waves
Classification of electromagnetic waves- Transverse electric, transverse magnetic, and transverse electromagnetic waves- Guided electromagnetic waves- Transmission line theory- Transmission line fields and distributed parameters- Characteristics of coaxial lines, two-wire lines, and shielded pairs- Voltage, current, and impedance disribution-Smith chart and its applications- Lossy transmission lines- Transmission line as

circuit element- Guided waves between two parallel conducting plates- Rectangular and circular waveguides- Attenuation and quality factor- Cavity resonators- Microwave passive components- Microstrip transmission lines- Dielectric surface waveguides- Optical waveguides and fibers- Single and multimode fibers- Losses and dispersion in optical fibers.

COM 9323 Microprocessors
Basic construction of microprocessors-Construction and instruction sets for 80486 and Pentium processors-Assembly language programming- interrupt instruction set – drivers interface and input/output units- input/output timing and control-interrupt processing-applications in instrumentation, signal processing, and communications.

COM 9324 Electronics Lab (3)
Spectrum analyzers- Digital meters- Lab experiments including topics in electronic circuits, communications, microwave, and optoelectronics engineering.

COM 9325 Optical Electronics
Semiconductor optical sources- Recombination processes and the spectrum of recombination radiation- Double heterostructures- Light emitting diodes- Photocells- Liquid crystal displays- Coherent light sources- Lasers: gas and die lasers, semiconductor lasers, quantum well lasers- Electro-optic modulators- Semiconductor photo diode detectors- Planar dielectric waveguides- Optical fibers.

COM 9315 Elective (1)

Microwave Electronics
Fundamentals of microwave amplifiers and oscillators- Klystron amplifiers and oscillators- Magnetrons- Traveling-wave amplifiers- Crossed-field amplifiers- Parametric amplifiers- Microwave solid state devices- Microwave semiconductor amplifiers and oscillators- Distributed amplifiers.

Industrial Electronics
Data acquisition systems-sensors-signal conditioning-digitizing-microprocessor based systems-memory interface- I/O interfaces-applications in industry.

Biomedical Electronics
Biological measurements: pressure, liquids flow, displacements, and velocity
Transducers types and its circuit's analysis- electric dipoles- biological signals: Electrocardiogram ECG, Electroencephalogram EEG, electromayogram EMG, elctroretinogram and its circuits- Biological amplifiers- logarithmic amplifiers- data acquisition circuits and examples for biomedical electronic systems.

Acoustic Engineering
Plane and spherical waves- simple and compound sound sources- dynamically analogous mechanical and acoustical circuits- acoustic transducers- loudspeakers types and systems- microphones type and systems- sound measurements- acoustics and hearing- acoustic environment outdoors- acoustic environment indoors- ultrasonic applications.

Computer Control Systems
Types of control systems- structure of programmable logic controllers-basic set of instructions-timers-registers-applications-control systems using sequential PLC-development of step programs-controllers of displacement- step function- followers-microprocessor control systems- three terms control using microprocessor- interfacing between controllers- sensors- actuators.

COM 9326 Elective (2)

Information Systems
Objective of information systems- types of information systems- information characterization and sources- role of information in organizations- types of decisions-information requirements- information technology- IS developments- analysis of IS-design methodologies-implementation methodologies- operation and maintenance of IS-DSS and applications.

Programming and Algorithms Design
Analysis of algorithms-insertion sort- merge sort- recurrences: substitution, iteration, master method-divide and conquer: strassen's algorithm, Fibonacci numbers, polynomial multiplications- quick sort- randomized algorithms-linear time sorting-counting sort-radix sort-red black trees- rotation-insertions-deletions-augmenting data structures-computational geometry-Amortized algorithm-Greedy algorithm-dynamic programming-network flow-Edmonds Karp algorithm.

Operation Research
Introduction: Art and Science of operations research- Elements of a decesion model-Modeling in production systems- Linear programming: Formulation and graphical solution- The simplex method- Transportation model- The assignement model- The transshipment model- Network models: Shortest route problem- Maximal flow problem- Integer Programming- Dynamic programming- Queing models- Simulation modeling.

Power Electronics
High power rectifiers- applications of SCR in high power rectifiers-triggering circuits-high speed switching transistors-D.C. voltage regulators-Inverters and converters-A.C. voltage regulators-non-interrupting power supplies.

Artificial Intelligence
Explain the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence- Assess the applicability, strengths, and weaknesses of the basic knowledge representation- problem solving, and learning methods in solving particular engineering problems- Develop intelligent systems by assembling solutions to concrete computational problems- Understand the role of knowledge representation- problem solving, and learning in intelligent-system engineering- Appreciate the role of problem solving- vision, and language in understanding human intelligence from a computational perspective

Fourth Year

COM 9411 Communication Networks

Data Communication-Communication channels-Encoding and decoding-Asynchronous and synchronous transmission-Error detection techniques-Data link control-Data communication networking-Circuit switching-Packet switching-Protocols and architecture-Integrated Services Digital Networks-Asynchronous transfer mode network (ATM)-Mobile communications (GSM, IS-95, CDMA, WBCDMA).

COM 9412 Electronic Circuits (3)

Network functions and their realizability, The approximation problem, Analysis of network sensitivity, passive network synthesis, active network synthesis, applications of electronic circuits, phase locked loop, Analog-to-digital circuits, and Applications on modern communications.

COM 9413 Antennas and Wave Propagations

Radiation of electromagnetic waves- Fundamental parameters of antennas- Simple antennas: the small dipole and the thin circular loop antenna- The biconical antenna-Medium wave antennas- Antenna arrays- Broadband antennas- Microwave antennas-Microstrip antennas- Feeding and matching circuits- The receiving antenna; antenna noise temperature. Radio wave propagation- Tropospheric wave propagation-Propagation and reflection from the ionsphere- Propagation of microwaves and millimeter waves- Microwave links.

COM 9414 Electronics Lab 4

Experiments in Digital communications systems-phase looked loop characteristics-optical communication systems-television circuits characteristics-Antenna-microwaves-Integrated circuits

COM 9415 Elective (3)

Neural Networks

Biological Neuron-Artificial Neuron Models-Tpes of Neural Networks -Analog and digital Neuron Networks-learning Rules-Single Layer Perceptron-Multilayer Perceptron-Hopfield Model-Neural Network Applications

Computer-Aided Circuit Design

Basic techniques in computer aided analysis and design of networks-fundamental programming techniques pertinent to computer-aided network analysis and modeling-Sensitivity calculation, system analogies, and/or design optimization- presentation of complete computer program algorithms which solve specific model problems-algorithms intended to solve general classes of circuits (including passive and active components, time, and frequency analysis, etc.)- automatic design- Utilization of commercially available software for analysis and design; schematic capture, printed circuit board design, and circuit simulation.

Communication Circuits
Modulators/demodulators circuits- Audio power amplifiers-Tuned R.F. voltag amplifiers-Tuned R.F. power amplifiers- High frequency oscillators- Broadcastin transmitters and receivers block diagrams- video amplifiers- video transmitters an receivers block diagrams-Sync separators-Horizontal anmd vertical circuits-EH circuits-data transmission circuits-satellite communication circuits.

Microwave Circuits
Analysis of transmission line and waveguide circuits- Design of microstrip lines and circuits- Coupled and multilayer microstrip lines- Microwave passive components- Ferrimagnetic components- Planar microwave circuits- Microwave filters- Power dividers and directional couplers- Design of microwave amplifiers and oscillators.

Computer Interface Circuits Design

Switching and Telephone Systems
Classification of switching configuration- function of switching- electronic automatic exchange- space division switching- multiple stage switching- non-blocking switching- blocking probabilities- stored program control (SPC)-electronic exchange-AXE telephony- internal call establishment- transmit calls- AXE system structure-traffic analysis- traffic characterization- random nature of traffic- traffic measurements- arrival distribution- inter arrival times- holding time distribution- lost calls cleared- lost calls returning- lost calls held-TDM of telephone channels- PCM coding and encoding- PCM/TDM- 1st. order PCM/TDM- 2nd. Order PCM/TDM-hierarchies of digital transmission systems- analog and digital time division switching- digital memory switch- 2-D switching- implementation complexity of time division switching- multiple stage time and space switching- STS, TST, TSSST switching- modular switch structure.

Optical Communication Systems
Optical communication system architecture- Optical fibers: Graded index fibers-Stepped index fibers- Single and multimode fibers- Dispersion and losses in optical fibers- Optical sources and detectors- Semiconductor lasers-Light emitting diodes-Semiconductor photodiode detectors- Avalanche photodiode detectors- Electrooptic modulators- Analog and digital optical communication systems- Modulation and multiplexing (WDM).

Radar Systems
Fundamentals of radar- The radar equation- Continuous wave and frequency modulated radar- Moving target identification and pulse Doppler radar- Tracking radar- Transmitters and receivers- Detection of radar signals in nise- Radar antennas-Civil and military applications- Remote sensing.

COM 9421 Integrated Circuits
Introduction of Integrated Circuis-Fabrication of MOS and CMOS transistors and layout-Design Rules and Basic electrical properities of MOS Circuits-Analog and Digital MOS Switch Application-MOS and CMOS Inverter-Bi-CMOS invrter-Dynamic CMOS invrter-Gallium Arsenide (GaAs) Circuits

COM 9422 Digital Signal Processing
Signal conversion- discrete time Fourier transform- fast Fourier transform (FFT)- random processes- linear time invariant filters- analysis of filter response and stability- digital filter design: FIR, IIR filters- digital filter implementations- effect of finite word length- Wiener filter- adaptive digital filters- data coding and compression- signal restoration- applications.

COM 9423 Communication Systems
Information theory- entropy- Shannon's rules- entropy of Markov sources- channel capacity analysis and performance- channel coding: linear block code, convolutional code, Trellis code- mobile communication systems- radio and T.V. broadcasting systems- satellite communication systems- spread spectrum, CDMA, and WCDMA communication systems.

COM 9425 Graduation Project
It is a continuation of the project subject started in the first term. The students are required to continue the theoretical analysis and practical implementation of the project. This takes the full second term and four extra weeks after the final exams.

COM 9424 Elective 4

Satellite Communication Systems
Architectureof satellite communication systems- Orbits and launching methods- Link analysis- Transmission and modulation techniques- Multiple access- The INTELSAT network- Direct broadcast services DBS- Global positioning satellite system GPS- Personal and mobile satellite systems MSAT.

Recording and Broadcasting Systems
Radio and T.V. recording and broadcasting systems- acoustics and stadium design for sound recording-Hi.Fi systems- T.V. cameras and video recording technology- video tapes and CD's technology.

CSE Computer Engineering
Operating systems- process management-process scheduling- interprocess communication-memory management techniques- virtual memory-I/O management- deadlock avoidance-file system design- introduction to compiler design.

Mobile Communication Systems
Conventional telephone systems- traffic theory- conventional mobile system- frequency spectral efficiency- methods of increasing system capacity-system- architecture- access schemes-interference in cellular systems-hand off propagation models- fading and Doppler in cellular systems-GSM system architecture- GSM channel coding, ciphering, and modulation- system management.

Computer Networks
Classification of computer communication networks- Net work topologies- transmission media- error control- fundamentals of queuing theory- performance of local area networks- LAN standards- WAN- LAN and WAN security.