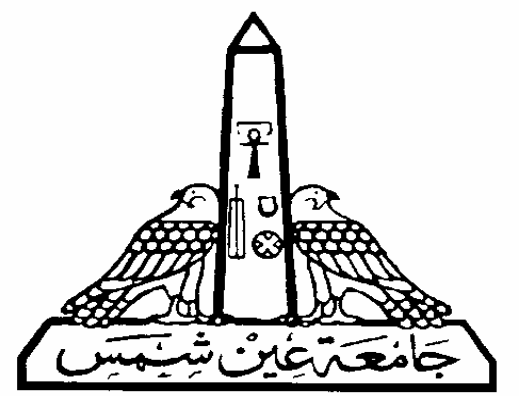


Faculty of Engineering

Curriculum Plan
For
Undergraduate Program

April - 2003

بسم الله الرحمن الرحيم

CHAPTER ONE

The Faculty Departments and Academic Degrees:

Article (1)

The faculty is composed of the following departments:

1. Department of Engineering Physics and Mathematics.
2. Department of Structural Engineering.
3. Department of Irrigation and Hydraulics
4. Department of Public Works
5. Department of Architecture Engineering
6. Department of Urban Planning
7. Department of Electrical Power and Machines Engineering
8. Department of Electronics Engineering and Electrical Communications
9. Department of Computer Engineering and Systems
10. Department of Design and Production Engineering
11. Department of Mechanical Power Engineering
12. Department of Automotive Engineering

Article (2)

The following subjects are assigned to the relevant department to teach and to carry out research work:

1- Engineering Mathematics and Physics

Mathematics, Physics, Mechanics, Chemistry.

2- Structural Engineering

Structural Analysis, Design of Concrete Structures, Design of Steel Structures, Properties Testing & Strength of Materials & Quality Control, Geotechnical & Foundation Engineering, Construction Engineering & Project Management.

3- Irrigation and Hydraulics

Irrigation & Drainage Engineering, Fluid Mechanics, Hydraulics, Water Structures Design, Inland Navigation & Harbour Engineering, Engineering Hydrology, Water Resources Engineering & Water Management, Dams & Tunnels Engineering.

4- Public Works

Surveying & Geodesy, Photogrammetry & Remote Sensing, Traffic Engineering, Sanitary Engineering, Environmental Engineering, Transportation Planning, Highway & Airport Engineering, Railway Engineering.

5- Architectural Engineering

Architectural Design, Theory of Architecture, History of Architecture, Computer Applications in Architecture, Working Drawings, Building Technology, Legislations & Project Management, Building Conservation & Restoration of Architectural Heritage.

6- Urban Planning

Urban Design, City Planning, Urban Planning, Landscaping, Environmental Studies, Sociology & Urban Geography, Urban Economy.

7- Electrical Power and Machines Engineering

Fundamentals of Electrical Engineering, Electrical Machines, Electric Power Systems, High Voltage Engineering, Power Electronics, Protection & Switchgear Engineering, Electrical Measurements & Testing, Control of Power Systems.

8- Electronics and Electrical Communication Engineering

Electrical Materials, Electronic Measurements, Electronic Engineering, Electronic Circuits, Communications, Electromagnetic Waves, Electrical Testing, Integrated Circuits.

9- Computers and Systems Engineering

Computer Organization, Software Engineering, Computer Networks, Computer Applications, Industrial Measurements & Testing, Systems Engineering, Automatic Control, Artificial Intelligence & Applications.

10- Design and Production Engineering

Casting & Welding Technology, Industrial Engineering, Materials Engineering, Mechanical Measurements, Mechanics of Machines & Automatic Control, Design & Engineering Drawing, Metal Cutting, Metal Forming, Mechatronics.

11- Mechanical Power Engineering

Thermodynamics & Gas Dynamics, Heat & Mass Transfer, Fluid Mechanics, Combustion, Thermal Power Systems, Internal Combustion Engines, Air Conditioning & Refrigeration, Automatic Control & Measurements.

12- Automotive Engineering

Automotive Engines, Automotive Design, Systems & Programs of Maintenance, Vehicle Repair, Control Systems in Vehicles, Electronic Systems in Vehicles, Automotive Technology.

Article (3)

The faculty council shall assign one department or more to supervise the general subjects belonging to humanities and social sciences, viz:
Technical English Language, Technical Report Writing, Management and Marketing, Engineering Economy, Project Management, Legislations & Contracts, Environmental Impact of Projects.

Article (4)

The Ain Shams University, upon the request of the faculty of engineering council, awards the following academic degrees:

1. Bachelor degree in one of the branches indicated in article (5) in this statute.
2. Diploma of high studies in one of the branches indicated in this statute.
3. Master degree in engineering.
4. Doctor of philosophy degree in engineering.

CHAPTER 2
The Bachelor Degree of Science

Article (5)

The Ain Shams University, upon the request of the faculty of engineering council, awards the bachelor degree of science in one of the following specializations:

1. **Civil Engineering in one of the Following Sections:**
    a) Constructional
    b) Water And Hydraulic Structures
    c) Public Works
2. **Architectural Engineering in one of the Following Sections:**
    a) Architecture
    b) Urban Planning and Design
3. **Electrical Engineering in one of the Following Sections:**
    a) Electrical Power And Machines
    b) Electronics and Electrical Communications
    c) Computers and Systems
4. **Mechanical Engineering in one of the Following Sections:**
    a) Production
    b) Mechanical Power
    c) Automotive
    d) Mechatronics

Article (6)

The required period of study in the faculty to obtain a B.Sc. degree is five academic years. It starts with a preparatory year, which is general and common for all students. Specialization follows from first year according to the tables of the curricula shown in article (15) of this statute.

Article (7)

A student may be exempted from the attendance of some courses, other than those of the final year, if he produces evidence of attending equivalent courses in another recognized university faculty or scientific institute.

Also, a student may be exempted from examinations of some such courses if he produces evidence of successfully passed equivalent examinations in a university or scientific institute recognized by the university. Exemption will be issued by a resolution of the university president after the approval of students affairs council upon the proposal of the faculty council and the recommendation of the department council or the relevant departments councils, without breaching the ruling of article (36) of the universities organization law.

Article (8)

Each department will prepare a scheme for practical training for its first, second and third year students during the summer vacation for at least three weeks annually inside or outside the faculty. This training is to be exercised under the supervision of members of staff within the available facilities.

Article (9)

Promotion and B.Sc. degree examinations are held at the end of each semester in all courses the student has studied in his class and in referred courses from previous classes, according to the tables given in article (15) of this statute.
Upon the request of the relevant department councils, the faculty council issues a resolution prohibiting the student to sit for the examination in the courses not satisfying 75% attendance. In this case the student is considered to have failed in the courses he has been prohibited from sitting their examination unless he provides an excuse acceptable to the faculty council. In such a case the student is considered absent with acceptable excuse.

Article (10)

The fourth year students are required to prepare and submit their final graduation project. The relevant departmental councils select the topics of the project. An extra period of four weeks after the final examinations is devoted for all specializations to work on the project. Moreover, the second semester is dedicated for the project for the architectural students in both architecture section and the urban planning and design section.

Article (11)

a. The student is considered successful if he passes the examinations in all courses of his class.
b. The student is promoted to the next higher level if he fails in not more than two subjects of his class or from lower classes.
c. In addition to the two subjects mentioned in the pervious item, the student who fails in two subjects in humanities and social sciences, whether from his class or from lower classes, is admitted to the transfer to the consecutive higher level. Passing successfully in all courses before obtaining the B.Sc. degree is a prerequisite.
d. The referred student has to sit the examination in the courses in which he has failed together with the students studying the same courses. The student gets a pass grade when he passes the examination successfully. In case the student was considered absent with acceptable excuse in a course, he gets the actual grade.

Article (12)

Supplementary examinations are to be held yearly in October for the fourth year students failing in at most two courses from their class or from any lower level, in addition to the courses in humanities and social studies the students have failed in them. However, the project has no supplementary examination.

Article (13)

If the examination in one course includes a written paper as well as practical or oral examination, the total mark in this course consists of the sum of the written, practical, oral and the year's work. The student who absents himself in the written examination is considered absent in the course and no mark is recorded for it.

Article (14)

The grades of the successful student in a course and in the general grade are evaluated as follows.

Distinction : from 85% of the total mark and upwards.
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 grades of a failing student in a course is estimated in one of the following grades:

Weak : from 30% to less than 50% of the total mark
Very weak : less than 30% of the total mark.

The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study. The students are then arranged serially according to their cumulative sum.

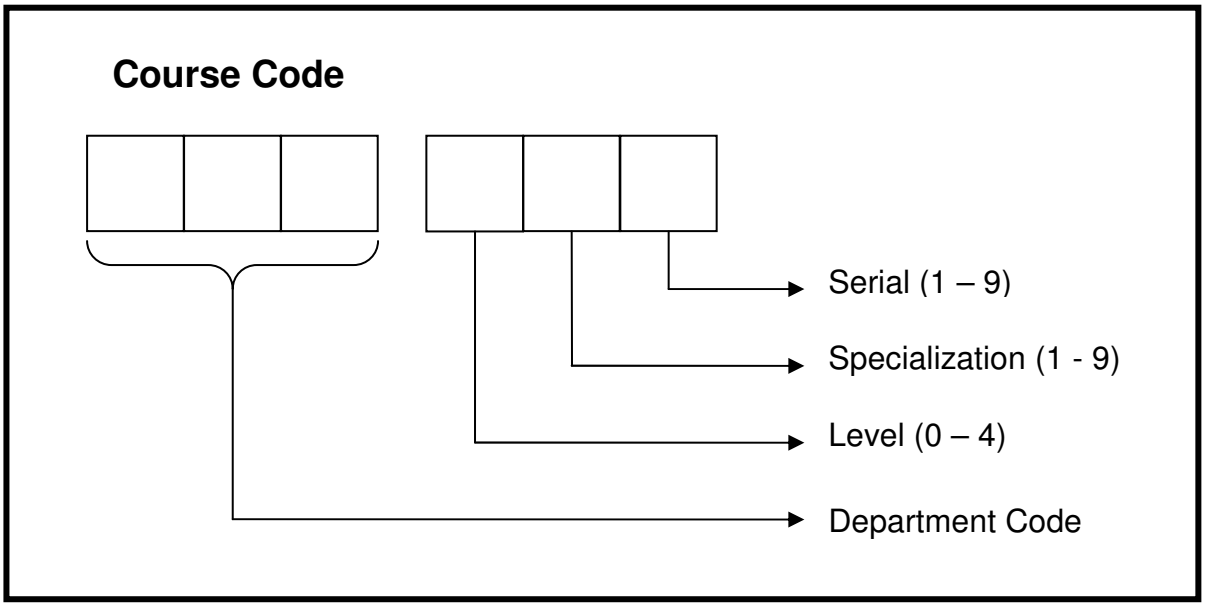
The student is awarded an honor degree if his cumulative sum is distinction or very good provided that he gets a grade not less than very good in any class of study other than the preparatory year. Moreover, he should have not failed in any examination he has sat in any class other than the preparatory year.

Article (15)

Annexed tables (1 to 31) give the courses and the weekly hours allocated for lectures and the laboratory exercises for each course and the corresponding examination time allowed for the written paper as well as the practical and oral examination divided among the two semesters. The faculty council approves the contents of each course upon their determination by the relevant departments.

Distribution Sketch of Faculty Specializations and Sections

Year	Specializations and Sections											
Preparatory	General											
First	Civil Engineering			Architectural Engineering		Electrical Engineering			Mechanical Engineering			
Second												
Third				Architecture	Urban Planning and Design	Electrical Power and Machines	Electronics and Electrical Communications	Computers and Systems	Production	Mechanical Power	Automotive	Mechatronics
Fourth	Structure	Water and Hydraulic	Public Works									



Scientific Departments

Department	Code
Department of Engineering Mathematics & Physics	PHM
Department of Structure Engineering	CES
Department of Irrigation & Hydraulics	CEI
Department of Public Works	CEP
Department of Architecture Engineering	ARC
Department of Urban Planning	UPL
Department of Power & Electrical Machines Engineering	EPM
Department of Electronics & Electrical Communication Engineering	ECE
Department of Computers & Systems Engineering	CSE
Department of Design & Production Engineering	MDP
Department of Mechanical Power Engineering	MEP
Department of Automotive Engineering	MEA
Department of Humanities & Social Sciences	HUM

Note: Humanities & Social Sciences is not one of the faculty's departments

Study Program

Engineering Mathematics & Physics

PHM 011 Mathematics (1)

Preparatory Year: General Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(110+40+0) + (110+40+0)] = 300

Course Contents

Differentiation and integration: Limits and continuity, Derivatives and its applications including asymptotes and curve sketching, Indefinite and definite integrals with applications to volumes, Arc length and surface area, Properties, Derivatives and integrals of transcendental functions, Techniques of integration including integration by substitutions, by parts, by partial fractions and by reduction, Mean value theorems and L'Hopital's rule, Integration and its applications in parametric and polar coordinates. Geometry and algebra: Conic sections, Analytical geometry in three dimensions including planes, Lines and surfaces of the second degree, Cylindrical and spherical coordinates, Theory of algebraic equations, Properties of the roots, Numerical methods for finding the roots, Linear algebra including the study of determinates and matrices, Systems of linear equations and eigenvalues and eigenvectors, Complex numbers including polar form, De Moivre's theorem and its applications and elementary functions of a complex variable.

References:

* Thomas, G. B. and Finney, R. L., Calculus and Analytic Geometry, Addison Wesley Pub. Co., 1992.
* Swokowski, E. M.; Olinick, E. and Pence, D., Calculus, PSW Pub. Co., 1994.
* Anton, H., Elementary Linear Algebra, Addison Wesley Pub. Co., 1997.

PHM 021 Physics (1)

Preparatory Year: General Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(90+30+0) + (90+30+60)] = 300

Course Contents

Properties of matter: Units and dimensions, Physical mechanics, Potential energy gradient, Circular motion, Moment of inertia, Elastic properties of materials, Hydrostatics and surface tension, Hydrodynamics and viscosity. Electricity: Vectors, Electric field, Electric potential, Capacitors and dielectrics. Electromagnetism: Magnetic field, Magnetic force, Biot-Savart law, Ampere's law, Electromagnetic induction. Heat and thermodynamics: Heat transfer, Kinetic theory of gases, First law of thermodynamics. Geometrical optics: Refraction of light, Prisms, Reflection of light, Lenses, Lens aberration.

References:

* Zemansky, M. W. and Young, H. D., University Physics by F-W Sears, Addison Wesley Co., 1982.
* David Halliday and Robert Resnick, Physics, John Wiley Co., 1992.

Laboratory: *Physics Lab*

01 Determination of thermal conductivity of a bad conductor

02 Determination of the coefficient of surface tension of a liquid

03 Determination of Young's modulus
04 Determination of shear modulus
05 Determination of the resistivity of a material (metal wire)
06 Determination of the power of lenses
07 Determination of the coefficient of viscosity of a viscous liquid
08 Comparison and determination of an e.m.f and R using potentiometer and meter - bridge

PHM 031 Mechanics (1)

Preparatory Year: General Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]
Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Concurrent force systems and particle equilibrium: Forces, Vector algebra, Resultant of a concurrent force system, Equilibrium of a particle. Moment, Couples and force systems: Moments, Couples, System of forces (general, coplanar, parallel) and their resultants. Equilibrium of rigid bodies: Forces due to supports, Free body diagrams, Condition for static equilibrium, Static indeterminacy and partial constraints. Frames and machines: Frames, Trusses and machines. Friction: Dry friction, Sliding and tipping, Basic machines having friction (wedges, belt friction). Kinematics of a particle - rectilinear motion: kinematics of a particle, kinematical description of motion, Rectilinear motion, Freely falling bodies. Kinematics of a particle - Curvilinear motion: Rectangular components, Cylindrical components, Path variables components, Kinematical applications (projectile motion, Joint kinematical description, relative motion). Kinetics of a particle - force - acceleration method: Rectilinear motion, Curvilinear rectangular motion, Curvilinear cylindrical motion, Curvilinear intrinsic motion, Orbital motion. Kinetics of a particle - work -energy method: Work done by forces - fields and forces, gravitational force, Elastic spring force, Potential energy, Work and potential energy, The kinetic energy, Work - energy principle, Conservation of energy. Kinetics of a particle - impulse - Momentum method: Linear impulse and momentum, Impact.

References:

* Beer, F. P. and Johnston, Jr., E. R., Vector Mechanics for Engineers (Statics and Dynamics), McGraw Hill, .
* Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, .
* Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, .
* Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley and Sons, .

Laboratory: *Mechanics Lab*

01 Statics
02 Friction
03 Newton's second law, linear and angular momentum, kinetic energy
04 Free fall
05 Projectiles

PHM 041 Chemistry

Preparatory Year: General Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Physical chemistry: Gases, Liquid state, Thermo chemistry, Thermodynamics, Solutions, Ionic equilibrium. Applied chemistry: Electrochemistry, Corrosion of metals, Water treatment, Chemistry of cements, Chemistry of polymers, Fuels combustion, Pollution and its control.

References:

* Steedman, W.; Snadden, R. B. and Anderson, I. M., Chemistry for the Engineering and Applied Sciences, Pergamon International Library Pergamon Press, 1980.
* Brady, J. E. and Holum, J. R., Chemistry, The Study of Matter and its Changes, John Wiley and Sons Inc., 1996.

Laboratory: *Chemistry Lab*

01 Acidic radicals
02 Basic radicals
03 Scheme for identification of simple inorganic salt
04 Acid Base Titrations
05 Total alkalinity of water samples
06 Total hardness of water samples
07 Properties of lubricating oils (Study of some instruments for characterization of physical data of lubricating oils)
08 Experiments of applied chemistry

PHM 111 Mathematics (2)

1st Year: Civil Engineering - . (Cont.) Hrs/Week: [(3+2) + (3+2)]

Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Functions of several variables including limits, Continuity, Partial derivatives, Chain rule, Extreme values and laGrange multipliers, Double, Triple, Line and surface integrals, Green's theorem, Infinite series and its tests of convergence, Power series, Expansion of functions of one and several variables, Differential equations of the first order including basic concepts, Method of solving separable, Homogeneous, Exact and linear equations and by integrating factors and some applications, Differential equations of higher orders and their solutions by undetermined coefficients, Operator method and variation of parameters, Euler's equations and systems of linear equations, Solution by matrices, some applications, Fourier series, Partial differential equations including D'Alambert's and separation of variables methods for solving heat, Wave and laplace equations, Introduction to probability theory including basic concepts, Discrete and continuous random variables and probability distributions.

References:

* Swokowski, E. M.; Olinick, E. and Pence, D., Calculus, PSW Pub. Co., 1994.

* Kreysig, E., Advanced Engineering Mathematics, John Wiley Pub. Co., 1998.

PHM 112 Mathematics (2)

1st Year: Electrical Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(110+40+0) + (110+40+0)] = 300

1st Year: Mechanical Engineering - . (Cont.)

Course Contents

Functions of several variables including limits, Continuity, Partial derivatives, Chain rule, Extreme values and lagrange multipliers, Double, Triple, Line and surface integrals, Green's theorem, Infinite series and its tests of convergence, Power series, Expansion of functions of one and several variables, Differential equations of the first order including basic concepts, Method of solving separable, Homogeneous, Exact and linear equations and by integrating factors and some applications, Differential equations of higher orders and their solutions by undetermined coefficients, Operator method and variation of parameters, Euler's equations and systems of linear equations, Solution by matrices, Some applications, Fourier series, Partial differential equations including D'Alembert's and separation of variables methods for solving heat, Wave and laplace equations, Laplace transform and its use in solving differential and integral equations, Dirac delta and periodic functions, Some applications to electrical circuits, Vector analysis including quantities related to scalar and vector fields, Gauss and stokes theorems and curvilinear coordinates.

References:

* Swokowski, E. M.; Olinick, E. and Pence, D., Calculus, PSW Pub. Co., 1994.
* Kreysig, E., Advanced Engineering Mathematics, John Wiley Pub. Co., 1998.

PHM 121 Physics (2)

1st Year: Electrical Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Modern physics: Plank's theory of quantization of energy of radiation, Photo-electric effect, x-rays and compton effect, Wave properties of matter and wave function, Principles of quantum mechanics and schrödinger equation, Atomic structure and study the tunnelling phenomenon, Quantum theory of the free electrons in metals, Statistical distribution laws, Lattice vibrations and thermal properties of solids, Super conductivity. Vibrations and waves: Simple, Damped and forced vibrations, Wave motion and acoustics, Interference, Diffraction and polarization of light.

References:

* Zemansky, M. W. and Young, H. D., University Physics by F-W Sears, Addison Wesley Co., 1982.
* David Halliday and Robert Resnick, Physics, John Wiley Co., 1992.

Laboratory: *Physics Lab*

Laboratory: *Physics Lab*

01 Stefan's fourth power law of radiation
02 Photo cell
03 R-C circuit
04 Thermocouple
05 Meld's experiment
06 Measuring of wave length by diffraction grating
07 Newton rings
08 Determination of the specific rotation of sugar solution
09 The cathode ray oscilloscope to investigate the superposition principle
10 Forced mechanical oscillation
11 The inverse square and Stefan - Boltzmann's law of radiation

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PHM 122 Physics (2)

1st Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]
Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Modern physics: Plank's theory of quantization of energy of radiation, Photo-electric effect, x-rays and compton's effect, Wave properties of matter and wave function, Principles of quantum mechanics and Schrodinger equation, Atomic structure and study of the tunnelling phenomenon. Vibrations and waves: Simple, Damped and forced vibrations, Wave motion and acoustics, Interference, Diffraction and polarization of light.

References:

* Zemansky, M. W. and Young, H. D., University Physics by F-W Sears, Addison Wesley Co., 1982.
* David Halliday and Robert Resnick, Physics, John Wiley Co., 1992.

Laboratory: *Physics Lab*

01 Stefan's fourth power law of radiation
02 Photo cell
03 Thermocouple
04 Meld's experiment
05 Measuring of wave length by diffraction grating
06 Newton rings
07 Determination of the specific rotation of sugar solution
08 The cathode ray oscilloscope to investigate the superposition principle
09 Forced mechanical oscillation
10 The inverse square and Stefan - Boltzmann's law of radiation

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PHM 131 Mechanics (2)

1st Year: Electrical Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Kinematics of rigid bodies: (translational motion, rotational motion, general motion,

instantaneous center of zero velocity, rolling motion). Kinetics of rigid bodies (force, acceleration method): (mass properties (center of mass and inertia), pure translational motion, pure rotational motion, general motion). Kinetics of rigid bodies (work, energy methods): (work done by a force, kinetic energy, work, energy principle, field forces, the potential energy, energy conservation principles). Kinetic of rigid bodies (impulse momentum methods): (linear impulse momentum relations, angular impulse momentum relations, impulsive forces). Introduction to Analytical Mechanics: (generalized coordinates and constraint equations, LaGrange's equations, Hamilton's equations of motion).

References:

* Beer, F. P. and Johnston, Jr., E. R., Vector Mechanics for Engineers (Statics and Dynamics), McGraw Hill, .
* Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, .
* Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, .
* Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley and Sons, .

Laboratory: *Mechanics Lab*

01 Center of gravity
02 Determination of the moment of inertia using the oscillation method
03 Determination of the angular velocity and the angular acceleration
04 Centrifugal force as a function of mass, angular velocity and radius
05 Determination of the angular momentum, conservation of angular momentum
06 Physical Pendulum

PHM 132 Mechanics (2)

1st Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Mass properties: Centroids, Center of mass, Mass moment of inertia. Kinematics of rigid bodies: Translational motion, Rotational motion, General motion, Instantaneous center of zero velocity, Rolling motion. Kinetics of rigid bodies (force, acceleration method): Pure translational motion, Pure rotational motion, General motion. Kinetics of rigid bodies (work, energy methods): Work done by a force, Kinetic energy, Work, Energy principle, field forces, The potential energy, Energy conservation principles. Kinetics of rigid bodies (impulse, momentum methods): Linear impulse momentum relations, Angular impulse momentum relations, Impulsive forces.

References:

* Beer, F. P. and Johnston, Jr., E. R., Vector Mechanics for Engineers (Statics and Dynamics), McGraw Hill, .
* Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, .
* Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, .
* Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley and Sons, .

Laboratory: *Mechanics Lab*

Laboratory: *Mechanics Lab*

01 Center of gravity
02 Determination of the moment of inertia using the oscillation method
03 Determination of the angular velocity and the angular acceleration
04 Centrifugal force as a function of mass, angular velocity and radius
05 Determination of the angular momentum, conservation of angular momentum
06 Physical Pendulum

PHM 211 Mathematics (3)

2nd Year: Electrical Engineering - . (Cont.) Hrs/Week: [(3+2) + (3+2)]
Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Functions of a complex variable including Cauchy-Riemann conditions, Conformal mappings. Complex series, Complex integral. Integration by residues and its application to real integrals. Series solution of differential equations. Special functions including gamma, Beta, Bessel and legendre functions, Bessel and legendre series. Linear programming including geometric and simplex methods with some applications. Probability and statistics including discrete and random variables, Probability functions and distributions, Statistical inference and testing of statistical hypotheses, Numerical analysis including the solution of nonlinear algebraic equations, Systems of linear and nonlinear equations, Ordinary and partial differential equations.

References:

* Cheney, W. and Kincaid, D., Numerical Mathematics and Computing, Brooks, Cole Pub. Co., 1996.
* Kreysig, E., Advanced Engineering Mathematics, John Wiley Pub. Co., 1998.

Structure Engineering

CES 111 Structural Analysis (1)

1st Year: Civil Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(110+40+0) + (110+40+0)] = 300

Course Contents

Types of loads, Types of supports, Reactions, Stability of statically determinate structures, Internal forces in statically determinate plane beams, Frames and arches, Two and three dimensional analyses of statically determinate trusses, Influence lines for statically determinate beams, Frames, Arches and trusses, Properties of plane areas, Straining actions, Distribution of normal stresses in homogeneous sections, Distribution of normal stresses in heterogeneous and composite sections, Core of cross sections.

References:

* Chu-Kia Wang and Salmon, Charles G., Introductory Structural Analysis, Prentice Hall, Inc., 1984.
* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 112 Theory of Structures

1st Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

General principles of the theory of structures, Loads, Forces and moments, Reactions, Stable and unstable structures, Internal forces in statically determinate structures (beams, frames and trusses), Internal stresses (normal stresses and shear stresses).

References:

* Chu-Kia Wang and Salmon, Charles G., Introductory Structural Analysis, Prentice Hall, Inc., 1984.
* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 113 Theory of Structures

1st Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

General introduction to theory of structures, Loads, Moments, Forces, Reactions, Shearing and normal forces. Statically determinate structures. (frames, trusses). Stable and unstable structures. Internal stresses. Bending, Shear, Normal stresses. Deformation of statically delaminate beams. Examples and applications.

References:

* Chu-Kia Wang and Salmon, Charles G., Introductory Structural Analysis, Prentice Hall, Inc., 1984.

* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 114 Civil Engineering

1st Year: Electrical Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Distance measurements by tapes and electronic devices. Theodolites and applications in angle measurements. Calculation of levels and transversal and longitudinal cross sections. Traverse calculations and setting out of buildings. Adjusting verticality of buildings. Elements of structure analysis of statically determinate structures. Foundations of concrete and steel structures. Effects of heavy machines vibrations on building structures.

References:

* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.
* Irvine, William F., Surveying for Construction, McGraw Hill Publishing Co., England, 1995.

Laboratory: *Surveying Lab*

01 Practicing the linear measurements procedures and the process of producing line maps. (instruments, tapes, pegs, arrows,…etc)
02 Surveying with theodolites and setting out (making sketches, choosing stations.
03 Introduction to ordinary survey level and staff reading.
04 Temporary adjustment of the survey level.
05 Determination of the difference height between two points using ordinary levelling.

CES 141 Properties & Testing of Materials (1)

1st Year: Civil Engineering - . (Cont.) Hrs/Week: [(3+2) + (3+2)]

Marks:[(75+25+0) + (75+25+50)] = 250

Course Contents

Specifications and standard specifications of engineering materials and products, Testing machines and its calibration, Strain gages. Main properties of engineering materials (physical chemical, mechanical, .. etc). Non-metallic building materials and units types. Properties and testing of building stones, Lime, Gypsum, Timber, Bricks, Tiles. Isolation materials for moisture, Heat and sound. Advanced composite materials, Glass, Plastics. Metallic building materials and units: Structural and reinforcing steel, Welding and welded splice, Aluminium. Behaviour of metals under static loads: Tension, compression, Flexure, Shear, Surface hardness of metals. Behaviour of metals under dynamic loads (Impact) and repeated loads (fatigue), Creep.

References:

* الكود المصري لتصميم وتنفيذ المنشآت الخرسانية، ، وزارة الإسكان والمرافق والمجتمعات العمرانية، ٢٠٠١.
* Lecture Notes, Staff of Properties, Testing of Materials and Quality Control Laboratory, 2003.

* Egyptian Standard Specifications, ESS, المواصفات القياسية المصرية للمواد، وزارة الصناعة، أخر إصدار.

Laboratory: ***Properties & Testing of Materials & Quality Control***

01 Testing machines and its calibration, strain gages

02 Testing of non-metallic building materials and units: physical tests (density, unit weight, absorption, permeability, shrinkage, etc). Mechanical tests (tension, compression, flexure, shear, etc). Chemical tests (chemical analysis, salts content, . etc)

03 Testing of metallic building materials and units: mechanical tests (tension, compression, flexure, shear, hardness, impact, fatigue, short term creep)

CES 142 Foundations & Testing of Materials

1st Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Soil mechanics and foundations: Soil characteristics and testing, Types of foundations, Design criteria, Suitability of foundation type to soil and loads. Material testing: Timber, Stones, Bricks, Testing of plain and reinforced concrete and components.

References:

* Murthy, V. N. S., Soil Mechanics and Foundation Engineering, UBS Publishers and Distributors Ltd., 1996.
* Das, B.M., Principles of Geotechnical Engineering, 4th Ed., PWS Publishing Co., 1998.
* Egyptian Code for Design and Construction of Reinforced Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Cairo, Egypt, 2001.
* Lecture Notes, Staff of Properties, Testing of Materials and Quality Control Laboratory, 2003.
* Egyptian Standad Specifications ESS, المواصفات القياسية المصرية للمواد، وزارة الصناعة، أخر إصدار.

CES 211 Structural Analysis (2)

2nd Year: Civil Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(110+40+0) + (110+40+0)] = 300

Course Contents

Shear stresses in homogeneous sections subjected to shearing forces and bending moments, Shear forces in bolts and welds, Shear stresses due to torsional moments, Analytical and graphical determination of combined stresses, Deformations of elastic bodies, Double integration method, Conjugate beam method, Virtual work method, Analysis of statically indeterminate structures, Method of consistent deformation, Virtual work method, Three moment equation method, Slope deflection method, Moment distribution method, Fixed points, Envelopes of internal forces, Euler theory for buckling of compressive members.

References:

* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 221 Design of Reinforced Concrete Structures (1)

2nd Year: Civil Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Study of physical and mechanical properties of concrete and steel reinforcement, Study of structural systems, Statical systems of floor elements and load distribution on different supporting elements, Experimental behaviour of reinforced concrete elements under flexure, Design of short columns under axial and eccentric loads, Design of reinforced concrete beams and statically determinate frames under bending moments and normal and shearing forces using the limit state design method, Study of bond between concrete and steel, The development length of reinforcement, Details of reinforcement of beams and statically determinate frames, Study of serviceability limit states (deflection and cracking) and design of reinforced concrete elements using the working stress design method.

References:

* Hilal, M., Fundamentals of Reinforced and Prestressed Concrete, Dar Rotaprint, Cairo, Egypt, 1987.
* Reynolds, C. and Steedman, J., Reinforced Concrete Designer's Handbook, E and FN Spon, Chapman and Hall, London, UK, 1988.
* Macgregor, J. G., Reinforced Concrete: Mechanics and Design, Prentice Hall, New Jersey, 1997.
* ECCS 203-2001 Egyptian Code for Design and Construction of Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Giza, Egypt, 2001.

CES 222 Concrete Structures

2nd Year: Architecture Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Structural systems of buildings (wall bearing, skeleton). Physical and mechanical properties of concrete and reinforcing steel. Loads on buildings, Load distribution on beams. Behaviour and design of reinforced concrete beams, (simple, continuous and cantilever beams). Behaviour and design of axially loaded short columns. Study structural systems of slabs (solid, hollow block, ribbed, flat slab and panelled beams). Behaviour and design of reinforced concrete solid slabs (one and two way). Structural systems of stairs. Structural systems of reinforced concrete halls (frames, domes, cones, surfaces of revolution, folded plates, shells, … etc.).

References:

* Hilal, M., Reinforced Concrete Halls, Dar Rotaprint, Cairo, Egypt, 1987.
* Hilal, M., Fundamentals of Reinforced and Prestressed Concrete, Dar Rotaprint, Cairo, Egypt, 1987.
* Reynolds, C. and Steedman, J., Reinforced Concrete Designer's Handbook, E and FN Spon, Chapman and Hall, London, UK, 1988.

* Macgregor, J. G., Reinforced Concrete: Mechanics and Design, Prentice Hall, New Jersey, 1997.
* ECCS 203-2001 Egyptian Code for Design and Construction of Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Giza, Egypt, 2001.

CES 241 Properties & Testing of Materials (2)

2nd Year: Civil Engineering - . (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(90+30+0) + (90+30+60)] = 300

Course Contents

Concrete materials: Cement, Aggregate, Mixing water, Admixtures. Concrete manufacturing: Storage, Mixing, Transportation, Pouring, Compacting, Curing, Construction Joints, Shrinkage and movement joints, Formwork, Ready mixed concrete. Properties of fresh concrete: Consistency, Workability, Cohesion, Segregation, Bleeding. Properties of hardened concrete: Strength, Volumetric changes, Elasticity and creep, Durability of concrete. Mix design: Engineered methods, Empirical methods. Non-destructive testing: Rebound hammer, Ultrasonic, Pulse velocity, Core, Steel detection, Radiation. Statistical analysis: To judge the concrete quality. Special concrete: Polymer, Fibber and lightweight concretes. Hot weather concreting: Definition, Problems, Precautions. Repair and strengthening of R.C. structures: Assessment methods, Repair materials, Overview for different techniques. Concrete floorings: Floor types, Materials properties, Joints construction, Surface finish and preparation.

References:

* Mehta, P.K., Properties of Concrete and Structures, Prentice Hall Inc., New Jersey, 1998.
* Neville, A., Properties of Concrete, Longman, 1998.
* الكود المصري لتصميم وتنفيذ المنشآت الخرسانية، ، وزارة الإسكان والمرافق والمجتمعات العمرانية، ٢٠٠١.
* Lecture Notes, Staff of Properties, Testing of Materials and Quality Control Laboratory, 2003.
* Egyptian Standard Specifications, ESS, المواصفات القياسية المصرية للمواد، وزارة الصناعة، أخر إصدار.

Laboratory: *Properties & Testing of Materials & Quality Control*

01 Cement tests: fineness, setting time, soundness, compression, volumetric weight
02 Aggregate: grading, bulking, soundness, crushing, shape, volumetric weight, specific weight, organic impurities, abrasion, impact
03 Fresh concrete: slump, compacting factor, V.B., flow table, bleeding, air content
04 Hardened concrete: compression, tension, flexure, shear, bond, shrinkage modulus of elasticity, permeability
05 Non-Destructive testing: core, loading test, rebound hammer, ultrasonic

CES 251 Geological & Geotechnical Engineering

2nd Year: Civil Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Geological engineering: Definition, The role of geological engineering in civil

engineering. Types of rock: igneous rocks, Sedimentary rocks, Metamorphic rocks. Soil formation: Soil origin and formation, Basic definitions. Physical properties of soil: Definitions, Laboratory tests, Basic relationships, Soil classification. Hydraulic soil properties: Soil water, Laboratory and field soil permeability. Stress distribution within the soil mass: Stresses under point and line loads, Stress distribution under distributed load. Compressibility and consolidation: Soil compression, Estimation of settlement, Consolidation, Theory of consolidation. Shear strength of soil: Definitions, Mohr's strength theory, Types of shear tests. Subsurface exploration and sampling: Methods of boring, Basic field tests.

References:

* Blyth, F. G. H. and deFreitas, M. H., A Geology for Engineers, Edward Arnold Publishing Co., 1984.
* Bowles, J. E., Physical and Geotechnical Properties of Soil, McGraw Hill Publishing Co., 1998.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics and Design and Construction of Foundations, Parts 1, 2 and 3, Housing and Building Research Center, Cairo, 2001.

Laboratory: ***Soil and Rock Lab***

01 Sieves and Hydrometer Analysis
02 Specific Gravity
03 Water Content
04 Atterberg Limits
05 Permeability Tests
06 Consolidation Test
07 Unconfined Compression Test
08 Triaxial Compression Test
09 Direct Shear Test

CES 311 Structural Analysis (3)

3rd Year: Civil Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Analysis of plane frames, Grillages and space trusses using the stiffness method, Degrees of freedom and sign convention, Element stiffness matrix in element local axes, Transformation matrix for forces and displacements in global axes, Equilibrium equations in global axes, Internal forces in members of the structure, Influence of temperature change and settlement of supports, Effect of axial force on the stiffness of structures [P-delta effect], Stability functions and equations of stability, Buckling of trusses and frames, Applications, Structural dynamicS, Definitions, Classification of structural systems, Free vibration of SDOF systems, Undamped vibration, Damped vibration, Forced vibration of SDOF systems, Response to constant and harmonic forces, Response to general type of forces (using duhamel integration).

References:

* Chu-Kia Wang and Salmon, Charles G., Introductory Structural Analysis, Prentice Hall,

Inc., 1984.

* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 321 Design of Reinforced Concrete Structures (2)

3rd Year: Civil Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Design of rectangular and square slabs under uniform loads and line loads, Design of hollow block slabs, One way and two slabs, Design of panelled beams, Design of beams under torsional moment and taking into consideration the effect of shear stresses, Design of stairs, Design of columns under biaxial moments, Design of short and long columns under centric and eccentric loads. Design of R.C. shallow foundations, Design of simple and continuous girders, Design of statically determinate and statically indeterminate frames and design of hinges. Design of trusses, Vierendeel girders, Arch slabs, Arch girders, Design of saw tooth slab and girder types, Details of joints in R.C. structures.

References:

* Park and Paulay, Design of Reinforced Concrete Elements, J. W. and Sons, 1985.
* ECCS 203-2001 Egyptian Code for Design and Construction of Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Giza, Egypt, 2001.

CES 322 Steel Structures

3rd Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Structural steel technology: Metallurgy of steel, Steel fracture, Steel grades, Fatigue. Design synthesis: Structural systems, Lateral resistance and bracing systems, Codes and specifications. Elements design: Structural behaviour of members, Introduction to design philosophies, Local buckling and cross section classification, Tension members, Struts and columns, Bending of beams, Torsion of beams, Beam-columns and frame structures, Light gauge steel members. Connection design: Bolts: types of bolts, Analysis and design of bolt groups, Welds: Types of welds, Analysis and design of welded connections. Composite structures: composite beams and composite columns. Construction: tolerances, fabrication, erection, fire Protection, Corrosion resistance.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 331 Steel Structures Design (1)

3rd Year: Civil Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Structural steel technology: Metallurgy of steel, Steel fracture, Steel grades, Fatigue. Design synthesis: Structural systems, Lateral resistance and bracing systems, Codes and specifications. Elements design: Structural behaviour of members, Introduction to design philosophies, Local buckling and cross section classification, Tension members, Struts and columns, Bending of beams, Torsion of beams, Beam-columns and frame structures, Light-gauge steel members. Connection design: Bolts: types of bolts, Analysis and design of group welds: Types of welds, Analysis and design of welded connections. Composite structures: Composite beams and composite columns. Construction: Tolerances, Fabrication, Erection, Fire protection and corrosion resistance.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 351 Geotechnical Engineering

3rd Year: Civil Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Soil compaction: Relative density, Laboratory compaction tests, Field compaction, Compaction equipment, Site control of compaction. Seepage: Flow net diagram, Uplift pressure, Critical hydraulic gradient. Slope stability: Infinite slope, Finite slope, Mass methods, Method of slices, Design charts. Lateral earth pressure: Active and passive earth pressure, Water pressure. Gravity retaining structures: Acting forces, Rotational siding, Block stability, Foundation contact stresses. Bearing capacity: Shear strength parameters, Bearing Capac loads equation, Eccentric loads, Inclined loads.

References:

* Das, B. M., Principles of Geotechnical Engineering, 4th Ed., PWS Publishing Co., 1995.
* Bowles, J. E., Foundation Analysis and Design, 7th Ed., McGraw Hill Book Co., 1996.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics, Design and Construction of Foundations, 6th Ed., Housing and Building Research Center, Cairo, 2001.

Laboratory: *Soil and Rock Lab*

01 Compaction tests
02 Sand cone replacement test
03 Water balloon test

CES 411 Structural Analysis (4)

4th Year: Civil Engineering - Structure (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Approximate methods for analysis of statically indeterminate structures, Reasons for performing approximate analysis, Assumptions, Approximate analysis for industrial buildings, Approximate analysis for double diagonals trusses, Continuous beams under gravity loads, Building frames subjected to lateral loads, Portal frame method, Cantilever method, Vierendeel trusses, Approximate methods of shell analysis, Choice of method and inaccuracies of approximate methods. Plastic analysis of beams and frames, Definitions, Material behaviour, Assumptions, Theories of plastic analysis, Applications on beams and frames, Effect of normal forces.

References:

* Home, M. R. and Morris, L. J., Plastic Design of Low-Rise Frames, Granada Publishing Limited, London, 1981.
* Tartaglione, Louis C., Structural Analysis, McGraw Hill, Inc., 1991.

CES 414 New Construction Materials

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction, Different types of new construction materials, Constituent materials of the new construction materials, Properties (physical, chemical, mechanical), Fabrication technology, Comparison with conventional construction materials, Structural applications, Testing, Economical point of view.

References:

* Gibson, Principles of Advanced Composite Materials, McGraw Hill, Inc., 1994.
* Green, A., Glass Fibber Reinforced Composites in Building Constructions, Journal of Composite for Construction, 1997.
* ACI, Manual, American Concrete Institute, 1998.
* Fonda, A. F., The Professional Use of Design Fundamentals for FRP Applications, Journal of Composite for Construction, 1999.
* Barbero, E. J., Introduction to Composite Materials Design, Journal of Composite for Construction, 1999.

Laboratory: *Properties & Testing of Materials & Quality Control*

01 Mechanical tests of constituent materials: tension, compression, shear, … etc

02 Mechanical tests of the new construction materials: tension, compression, shear, abrasion, bond, … etc

03 Physical tests of the new construction materials: unit weight, dimensions, … etc

04 Chemical tests of the new construction materials: chemical resistance, … etc

CES 415 The Concept of Using Models in Structural Analysis

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Direct and indirect aspects, Indirect models (displacement models) Influence line diagrams for deflection, Influence line diagrams for stress resultant, Scale factors, Practical applications of the indirect method, Experimental procedure in the indirect method, Direct method of model analysis, Applications, Influence surfaces for deformations and internal forces.

References:

* Marshall, W. T. and Nelson, H. M., Structures, Pitman, London, 1984.

CES 416 Earthquake Engineering

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction, Causes and effects of earthquakes, Quantification and magnitude of earthquakes, Factors affecting structural seismic response, Earthquake design philosophy and limit states, Determination of earthquake forces by code provisions, Free vibration analysis of multi-degrees of freedom systems, Response spectrum analysis of multi-degrees of freedom systems, Design response spectrum curves, Applications.

References:

* Nathan, M.; Newmark and Emilio Rosenblueth, Fundamentals of Earthquake Engineering, Prentice Hall, Englewood Cliffs, N.J., 1971.
* Clough, R. W. and Penzien, J., Dynamics of Structures, 2nd Ed., McGraw Hill, Inc., 1993.
* Chopra, A. K., Dynamics of Structures, Prentice Hall of India, New Delhi, 1998.

CES 417 The Finite Element Method

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Assemblage of discrete elements, Elastic continua, Triangular elements for plane stress, Rectangular elements for plane stress, Transformation matrix, Assembling the structure stiffness matrix, Rectangular elements in bending, Various elements for two and three dimensional analyses.

References:

* Bathe, K. J., Numerical Methods in Finite Element Analysis, Prentice Hall, Englewood Cliffs, 1976.

* Cheung, Y. K. and Yeo, M. F., A Practical Introduction to Finite Element Analysis, Pitman, London, 1979.
* Coates, R. C.; Coutie, M. G. and Kong, F. K., Structural Analysis, Pitman, London, 1987.

CES 421 Design of Reinforced Concrete Structures (3)

4th Year: Civil Engineering - Structure (Cont.) Hrs/Week: [(2+2) + (2+2)]
Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Flab slab: Code limitations, Structural analysis, Punching of flat slab. Design of slabs, Columns, Openings in slabs, Reinforcement details. Surfaces of revolution (SOR): Different types of SOR (domes, cones). Internal stresses, Design of sections reinforcement details. Seismic design of concrete structures: Introduction, Forces induced from earthquakes, Classification of seismic zones, Structural analysis and design of concrete structures subjected to earthquakes and distribution of horizontal forces at different levels. Prestressed concrete: Introduction, Types of prestressing steel, Material properties, Analysis of statically determinate prestressed beams, Calculation of prestressing forces, Eccentricity of cables, Calculation of losses design of endblock. Water tanks: Design of sections, Elevated, Ground and underground tanks, Circular and rectangular tanks, Calculation of internal forces, Design of deep beam, Details of reinforcement.

References:

* Park, R. and Paulay, T., Reinforced Concrete Structures, John Wiley and Sons, 1975.
* Lin,T. and Burns, N., Design of Prestressed Concrete Structures, John Wiley and Sons, 1982.
* Egyptian Code for Design and Construction of Reinforced Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Cairo, Egypt, 2001.

CES 425 Special Concrete Types

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

The course of special types of concrete is a comprehensive review of all special concrete types: High strength concrete, Light weight concrete, Heavy weight concrete, Fibber reinforced concrete, High performance concrete, Polymers concrete, Mass concrete, etc. It includes fundamental principles, Glossary of terms and description of types and manufacturing methods, Practices, Physical properties, Durability, Design considerations, Application and research needs. Each special type course includes: Introduction and historical background, Definition and composition, Discussion of special components, Comparison with conventional concrete, Production aspects and fabrication technologies, Testing, Standard specifications and codes, Properties, Practical applications, Research need and related references.

References:

* Aitcin, P.C., High Performance Concrete, Properties and Applications, McGraw Hill, Inc., 1994.
* Neville, A. M., Properties of Concrete, LONGMAN, England, 1998.
* ACI, Manual, American Concrete Institute, 1998.

Laboratory: *Properties & Testing of Materials & Quality Control*

01 Fresh concrete: slump, compacting factor, V.B., flow table, bleeding, air content

02 Hardened concrete: compression, tension, flexure, shear, bond, shrinkage, modulus of elasticity

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CES 426 Masonry Structures

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction: History of masonry, Masonry elements, Types of masonry construction, Analysis and design methods. Masonry materials: Masonry units, Mortar, Grout, Reinforcement. Masonry assemblages: Compression, Flexural, Shear in plane tensile strength. Reinforced beams and lintels: Flexural behaviour and design, Shear behaviour and design, Load distribution on lintel beams. Flexural walls: Load resisting mechanisms, Flexural behaviour, Analysis and design of reinforced flexural walls. Load bearing walls under axial load and out of plane bending: Overview, Effects of bending on the capacity of walls, Effect of wall height, Interaction between axial load an bending, Linear elastic analysis of unreinforced and reinforced sections, Effects of slenderness, Moment magnification, Special provisions for slender reinforced walls.

References:

* Drysdale, R.; Hamid, A., and Baker, L., Masonry Structures Behaviour and Design, The Masonry Society, 1999.

CES 427 Advanced Design of Reinforced Concrete Bridges

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

The course includes the conceptual design of concrete bridges and hybrid material bridges, for which various concrete sections are adopted. Different structural systems will be introduced, e.g. girder type bridges, Box girder bridges, Arch bridges and extra dosed bridges. Analysis and design of different structural elements, Decks, Bearings, Piers and footing are involved. The influence of the construction techniques and construction details on the design are included in design.

References:

* Alan Holgate, The Structural Art: The Work of Jorg Schlaich and His Team, Co. Ltd

Sungam, Corea, 1995.
* Egyptian Code of Practice for Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Cairo, Egypt, 2001.
* Fathy Saad, Lecture Notes: Bridge Construction, Ain Shams University, 2001.

CES 428 Concrete Durability

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

The objective of the "Concrete Durability" course is to study the conditions surrounding the concrete structures, The causes of the deterioration mechanisms, The factors that affect the deterioration mechanisms and transport coefficients. The course contents include: Introduction and problem statement, Microstructure of conventional and high performance concrete, Transport mechanisms through concrete, Relation between transport characteristics and durability, Parameters influencing transport characteristics and durability, Laboratory tests for transport coefficient, Deterioration mechanisms (chloride attack, sulphate attack, freezing and thawing, alkali aggregate reaction, sea water attack, fire).

References:

* Kropp, J. and Hisdorf, H. K., Performance Criteria for Concrete Durability, E and FN SPON, London, 1995.
* Neville, A. M., Properties of Concrete, LONGMAN, England, 1998.
* International European Committee of Concrete, Durable Concrete Structures, Design Guide, Thomas Telford, 1999.

CES 431 Steel Structures Design (2)

4th Year: Civil Engineering - Structure (Cont.) Hrs/Week: [(2+2) + (2+2)]
Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Structural system of bridges types of bridges: Structural systems in longitudinal and transverse directions, Material of construction, Design philosophy. Design loads: Road way loading, Railway loading, Other loads on bridges. Design of floor beams systems: Stringer, Cross girders, Floor connections. Design of plate girder bridges: General design considerations, Fatigue considerations, Buckling of plates, Actual strength of plate girder elements, Flange to web weld, Stiffeners, Splices, Curtailment of flange plates, Details. Design of truss bridges: General design considerations, Fatigue considerations, Actual strength of truss members. Design of joints, Details. Design details: Bracings, Bearings. Topics relevant to bridge design: Beam grids, Curved and skew bridges, Composite bridges, Deflection and camber, Temperature effect in bridges, Erection of bridges.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.

* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 432 Design of Civil Structures

4th Year: Civil Engineering - Public Works (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Structural system of bridges: Types of bridges, Structural systems in longitudinal and transverse directions, Material of construction, Design philosophy. Design loads: Road way loading, Railway loading, Other loads on bridges. Design of floor beam systems: Stringer, Cross girders, Floor connections. Design of plate girder bridges: General design considerations, Fatigue considerations, Buckling of plates, Actual strength of plate girder elements, Flange to web welds, Stiffeners, splices, Curtailment of flange plates, Details. Design details: Bracings, Bearings. Topics relevant to bridge design. truss bridges, Beam grids, Curved and skew bridges. Flat slab: Code limitations, Structural analysis, Design of slabs, Reinforcement details. Surfaces of revolution (SOR): Different types of SOR (domes, cones) internal stresses, Design of sections, Reinforcement details. Seismic design of concrete structures: Introduction, Forces induced from earthquakes, Classification of seismic zones, Structural analysis and design of concrete structures subjected to earthquakes Prestressed concrete: Introduction, Types of prestressing steel, Material properties, Analysis of statically determinate prestressed beams, Calculation of prestressing forces, Eccentricrty of cables, Calculation of losses. Water tanks: Design of sections, Calculation of internal forces, Design of deep beams, Details of reinforcement.

References:

* Park, R. and Paulay, T., Reinforced Concrete Structures, John Wiley and Sons, 1975.
* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Lin,T. and Burns, N., Design of Prestressed Concrete Structures, John Wiley and Sons, 1982.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.
* Egyptian Code for Design and Construction of Reinforced Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Cairo, Egypt, 2001.

CES 435 Steel Plated Structures

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Orthotropic structures: Orthotropic systems, Orthotropic floors and decks, Behaviour and design, Construction details. Steel box girders: Different

applications, Theory and behaviour, Members design, Connections design, Details of connections. Steel hollow section structures: Different applications in trusses, Arches and vierendeels, Connection design, Details of connections. Cold formed structures: Introduction and applications, Theory and behaviour, Compression members, Beams, Frame elements, Walls and diaphragms, Composite decks. Storage structures: Tanks: Types of tanks, Analysis and design, Construction details. Silos: Types of silos, Analysis and design, Construction details.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 436 Space Steel Structures

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Space roof trusses (double layer grids): Review of the development of various types of steel double layer grids, Analysis of double layer grids, Construction of space roof and deck systems. Tall buildings (high rise buildings): Building function, Structural system to resist gravity loads, Structural system to resist lateral loads, Energy dissipation system, Method of analysis, Construction details. High voltage steel towers and antenna towers: Function and classification, Analysis and design, Construction details, Safety and serviceability. Cable supported structures: Development and classification, Material and equipment, Analysis and design, Construction details, Safety and serviceability. Off shore structures: Review of the development of various types of steel off shore structures, Loads affecting the structure, Structural system to resist gravity loads, Structural system to resist lateral loads, Method of analysis, Construction details.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 437 Behaviour & Construction of Steel Structures

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Fabrication procedures of steel structures: Flame cutting, Shearing and sawing, Punching, Drilling, Welding techniques and inspection, Painting procedure and

inspection, Maintenance of steel structures. Pre-stressed steel structures: Different applications, Theory and design, details. Ductile behaviour of steel joints: Behaviour of structural steel joints, Pretensioned bolts, Nonpretensioned bolts, Washers, Nuts, Welding, Rigid and semi rigid joints. Fire resistance in steel structures: Fire resistance of protected and unprotected steel beams and columns, Analysis and design of steel members at elevated temperatures. Fatigue behaviour of steel structures: Factors affecting fatigue behaviour of steel structures, Recommended details, Crack initiation and propagation, Stress range, Load cycles.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 438 Steel Structures Design (3)

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Structural system of bridges: Types of bridges, Structural systems in longitudinal and transverse direction, Material of construction. Design loads: Roadway loading, Railway loading, Other loads. Design of floor beam system: Stringer, Cross girders. Design of plate girder and truss bridges: General design consideration, Strength of main structural elements, Bracing, Bearings and details. Movable bridges: Design consideration, Details.Topics relevant to water structures: Types of gates, Design consideration, Construction and expansion joints, Details. Structural steel technology: Painting and corrosion resistance and maintenance.

References:

* Merritt, Frederick S., Structural Steel Designers, McGraw Hill, 1980.
* Merritt, Frederick S., Building Design Handbook, McGraw Hill, 1983.
* White, R. and Salmon, C., Building Structural Design Handbook, Harper and Row, Publishers, 1998.

CES 441 Repair & Strengthening of Structures

4th Year: Civil Engineering - Structure (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Causes of deterioration of concrete structures, Evaluation of concrete structures. Repair and strengthening materials (types, selection, handling). Bond between repair and strengthening materials and substrate concrete. Different repair and strengthening techniques. Protection and maintenance of concrete structures. Repair and strengthening of some concrete elements (footing, column, beam, slab… etc). Structural analysis of repair and strengthening, Design of repair and

strengthening, Case studies.

References:

* Allen, R. T. L.; Edwards, S. C. and Shaw, J. D. N., The Repair of Concrete Structures, Blackie Academic and Professional, 1993.
* Emmons, Peter H., Concrete Repair and Maintenance, R. S. Means Co., Inc., 1993.
* ACI Committee 440, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures, American Concrete Institute, 2000.

Laboratory: *Properties & Testing of Materials & Quality Control*

01 Non-Destructive testing of concrete structures: inspection, rebound hammer, ultrasonic, core, loading test

02 Tests of repair and strengthening materials: physical, mechanical, chemical

03 Bond between repair and strengthening materials and substrate concrete: shear tests, tension tests

04 tests of repaired and strengthened concrete elements: coumuns, beams, slabs

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CES 451 Foundation Engineering

4th Year: Civil Engineering - Structure (1st Term) Hrs/Week: [(4+4) + (0+0)]

Marks:[(140+60+0) + (0+0+0)] = 200

Course Contents

Analysis and design of shallow foundations: Isolated and combined footings, Strip foundation, Strap beams, Raft foundation. Deep foundations: Types, Classification of piles, Bearing capacity of a single pile, Pile groups, Settlement of piles, Pile load tests, Design of pile caps, Laterally loaded piles. Supported deep excavation: Types of in-situ walls, Analysis and design of in-situ walls, Struts and tiebacks, Waling beams, Braced supported excavation. Interaction of shallow foundations with elastic soil: Subgrade reaction model, Half-space model, Contact pressure distribution, Settlement. Soft ground tunnelling: Construction of tunnels, Analysis of lining, Calculation of settlement. Eearthdams and earth embankments: Classification, Empirical dimensioning, Analysis and design.

References:

* Winterkorn, H.F.and Fang, H.Y., Foundation Engineering Handbook, Van Nostrand Reinhold Co., 1975.
* Das, B. M., Principles of Foundation Engineering, 3rd Ed., PWS Publishing Co., 1995.
* Bowles, J. E., Foundation Analysis and Design, 7th Ed., McGraw Hill Book Co., 1996.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics, Design and Construction of Foundations, 6th Ed., Housing and Building Research Center, Cairo, 2001.

CES 452 Foundation Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Analysis and design of shallow foundations: Isolated and combined footings, Strip

foundation, Strap beams, Raft foundation. Deep foundations: Types, Classification of piles, Bearing capacity of a single pile, Pile groups, Settlement of piles, Pile load tests, Design of pile caps, Laterally loaded piles. Supported deep excavation: Types of in-situ walls, Analysis and design of in-situ walls, Struts and tiebacks, Waling beams, Braced supported excavation. Earthdams: Classification, Empirical dimensioning, Analysis and design.

References:

* Winterkorn, H.F.and Fang, H.Y., Foundation Engineering Handbook, Van Nostrand Reinhold Co., 1975.
* Das, B. M., Principles of Foundation Engineering, 3rd Ed., PWS Publishing Co., 1995.
* Bowles, J. E., Foundation Analysis and Design, 7th Ed., McGraw Hill Book Co., 1996.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics, Design and Construction of Foundations, 6th Ed., Housing and Building Research Center, Cairo, 2001.

CES 453 Foundation Engineering

4th Year: Civil Engineering - Public Works (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Analysis and design of shallow foundations: Isolated and combined footings, Strip foundation, Strap beams, Raft foundation. Deep foundations: Types, Classification of piles, Bearing capacity of a single pile, Pile groups, Settlement of piles, Pile load tests, Design of pile caps, Laterally loaded piles. Supported deep excavation: Types of in-situ walls, Analysis and design of in-situ walls, Struts and tiebacks, Waling beams, Braced supported excavation. Earth embankments: Classification, Empirical dimensioning, Analysis and design.

References:

* Winterkorn, H.F.and Fang, H.Y., Foundation Engineering Handbook, Van Nostrand Reinhold Co., 1975.
* Das, B. M., Principles of Foundation Engineering, 3rd Ed., PWS Publishing Co., 1995.
* Bowles, J. E., Foundation Analysis and Design, 7th Ed., McGraw Hill Book Co., 1996.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics, Design and Construction of Foundations, 6th Ed., Housing and Building Research Center, Cairo, 2001.

CES 455 Soils & Rocks in Dry Regions

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Expansive soils: Origin and occurrence, Mineralogy, Identification and classification, Laboratory testing, Swelling pressure, Swelling potential, Foundations on swelling soils. Collapsible soils: Origin and occurrence, Soil

structure, Classification and identification, Laboratory testing, Collapsibility potential, Foundations on collapsible soils. Rock mechanics: Classification of rocks, Intact rock, Geological structures, Rock mass, Laboratory testing, Engineering classification of rocks, Engineering applications on rock mechanics.

References:

* Chen, F.H., Foundations on Expansive Soils, Elsevier Scientific Publishing Co., 1975.
* Goodman, R. E., Introduction to Rock Mechanics, John Wiley and Sons, 1980.
* Nelson, I. D. and Miller, D. J., Expansive Soils: Problem and Practice in Foundation and Pavement Engineering, John Wiley and Sons Inc., 1992.
* Fredlund, D.G. and Rahardjo, H., Soil Mechanics for Unsaturated Soils, John Wiley and Sons, 1993.
* Permanent Committee For Preparation of Egyptian Code, Egyptian Code of Practice for Soil Mechanics, Design and Construction of Foundations, 6th Ed., Housing and Building Research Center, Cairo, 2001.

Laboratory: *Soil and Rock Lab*

01 Swelling tests
02 Collapse test
03 Unconfined compression test on rocks

CES 456 Soil Improvement

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Engineering needs for soil improvement: Geotechnical problems with soft and loose soils, Soil improvement techniques. Mechanical stabilization densification: Deep and shallow compaction, Techniques, Compaction equipment, Soil parameters after densification. Preloading: Consolidation analysis, Preloading with and without drains. Design and construction of soil reinforcement: History of soil reinforcement, Reinforcing materials, Physical and mechanical properties, Utilization methods, Advantages and limitations, Reinforcement techniques, Analysis and design of reinforced embankments constructed on soft soils, Analysis and design of reinforced earth walls. Grouting: grout properties, Grouting techniques. Criterion for choosing suitable technique for soil improvement.

References:

* Winterkorn, H.F.and Fang, H.Y., Foundation Engineering Handbook, Van Nostrand Reinhold Co., 1975.
* Hausmann, M.R., Engineering Principles of Ground Modification, McGraw Hill Book Co., 1990.
* Das, B. M., Principles of Foundation Engineering, 3rd Ed., PWS Publishing Co., 1995.

CES 457 Geotechnical Analysis Using Computer

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selection of geotechnical parameters for computer analysis. Software applications: Slope stability, Seepage analysis, Settlement of shallow foundations, Beams on elastic foundations, Piles under lateral loads. Geotechnical applications using Excel program: Bearing capacity of shallow foundations, Capacity of axially loaded piles.

References:

* Atkinson, J., An Introduction to the Mechanics of Soils and Foundations, McGraw Hill Book Co., 1993.
* Das, B. M., Principles of Foundation Engineering, 3rd Ed., PWS Publishing Co., 1995.

CES 461 Management of Project Resources

4th Year: Civil Engineering - Structure Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Planning in the different project stages, Planning using bar (Gantt) charts. Network planning: Activity on arrow, Activity on node, Progress monitoring, Progress curves, Resource allocation and levelling.

References:

* Gray, R. and Larson, K., Project Management: The Managerial Process, McGraw Hill, Irwin, New York, NY, 2002.
* Harris, R. and McCaffer, D., Modern Construction Management, Black Well Science, London, U.K., 2002.

CES 462 Construction Technique For Concrete Structures

4th Year: Civil Engineering - Structure Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

The course includes the presentation of the dinerent construction methods used in construction of concrete structures. Different shuttering system are introduced, e.g. Wooden shuttering, Metallic shuttering, (scaffolding system) tunnel forms, Climbing forms and slipforms for construction of concrete structures, e.g. Buildings and Bridges. Practical examples for these construction methods will be presented.

References:

* Alan Holgate, The Structural Art: The Work of Jorg Schlaich and His Team, Co. Ltd., Sungam, Corea, 1995.
* Egyptian Code of Practice for Concrete Structures, Ministry of Housing, Utilities and Urban Communities, Cairo, Egypt, 2001.
* Fathy Saad, Lecture Notes: Bridge Construction, Ain Shams University, 2001.

CES 499 Project

4th Year: Civil Engineering - Structure (Cont.) Hrs/Week: [(1+1) + (2+4)]

Marks:[(0+25+0) + (0+75+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, in addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Irrigation & Hydraulics

CEI 111 Civil Drawing

1st Year: Civil Engineering - . (1st Term) Hrs/Week: [(1+4) + (0+0)]

Marks:[(75+50+0) + (0+0+0)] = 125

Course Contents

Metallic sheds: Column base, Riveted joints, Connections between girders and beams, Columns and beams. Steel bridges: Truss connections, Main girders (upper and lower chords, verticals and diagonals), Cross girders and stringers. Reinforced concrete structures: Footings, Column slabs and beams. Irrigation structures: Earth works, Retaining walls, Bridges, Culverts, Syphons, Regulators, Weirs, Symmetrical and unsymmetrical locks.

References:

* Faculty of Engineering, Civil Drawing, Cairo University, 2003.
* Faculty of Engineering, Civil Drawing, Ain Shams University, 2003.

CEI 121 Fluid Mechanics

1st Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Review of fluid properties and hydrostatics: Manometry, Forces on plane and curved surfaces, Buoyancy, Fluid masses subject to acceleration (forced vortex). Kinematics of fluid motion: Fluid flow, Types of flow, Classification of flow, Continuity equation. Flow of Incompressible fluid: One-dimensional flow, Euler's Equation in three dimensions, Bernoulli's, Energy equation, T.E.L. and H.G.L., Applications of bernoulli's equation (flow through free and submerged orifices, flow over notches and weirs flow measuring devices, time of filling and emptying tanks under variable and constant heads, free vortex). Pipe flow: Laminar and turbulent flow, Reynolds number, Shear stress distribution, Velocity distribution, Main losses, Secondary losses, Single pipe, Pipe connections (parallel and series), Pipe branching, Three tank problems. The Impulse-Momentum principle: Development of the principle, Pipe bends, Enlargements and contractions, Hydraulic structures in open channels.

References:

* Vennard, J. K., Elementary Fluid Mechanics, John Wiley and Sons Inc., 1965.
* Olson, R. M., Engineering Fluid Mechanics, , 1967.

Laboratory: *Hydraulics Lab*

01 Density
02 Capillarity
03 Viscosity
04 Flow through orifice
05 Flow over rectangular Notches
06 Flow over V-Notches
07 Venturimeter

08 Coefficient of Impact

CEI 211 Irrigation & Drainage Engineering

2nd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction for the water cycle and water resources and use in different sectors. Elements of the hydrologic cycle: Measurements of rainfall, Evaporation, Surface runoff. Methods of measuring levels, Discharges and groundwater flows. Introduction to groundwater, Sources, Characteristics and movement. An overview for well design and pumps' selection. Soil-Plant-Water relationships. Irrigation water requirements, Irrigation efficiency and calculating periods between irrigations, Low rates and irrigation time. Different types of field water application : Surface irrigation methods, Sprinkler and drip irrigation, Subsurface irrigation. Planning, Design, Management, Operation and maintenance for different methods. Canal lining. An overview for the irrigation structures for control and distribution of water on the canals and field levels, Crossing works, Navigation works and water lifting devices. Planning and design of fish ponds. Introduction to the drainage, Types, Factors influencing selection and design. Design of open, Subsurface and vertical drains. Disposal of drainage water and drainage water reuse and precautions. Summary of river nile hydrology, Annual and long-term storage in reservoirs and the high aswan dam. Development of the irrigation system in Egypt. The environmental impacts of irrigation and drainage projects in general.

References:

* Zimmerman, J. D., Irrigation, John Wiley and Sons, 1977.
* Withers, B. and Vipond, S., Irrigation: Design and Practice, Bastfor Academic and Educational Ltd., 1983.
* شبكات الري والصرف - التخطيط والتصميم الهندسي، كلية الهندسة، جامعة الإسكندرية، ٢٠٠٠.
* هندسة الري والصرف، كلية الهندسة، جامعة عين شمس، ٢٠٠١.

CEI 231 Hydraulics

2nd Year: Civil Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Pipe networks: Analysis, Design and Optimal design. Open channel flow: Introduction, Types of open channel flow, States of open channel flow, Properties of open channels flow, Velocity distribution, Equations for uniform steady flow, Energy equation, Gradually varied flow, Rapidly varied flow, Roughness coefficient, Design of open channels cross sections, Applications. Water hammer in pipes: Unsteady flow equations, Rigid water hammer theory, Elastic water hammer theory, Wave celerity, Water hammer effects and control. Hydraulic machines: Introduction, Turbines, Types of turbines, Types of pumps, Pump characteristics and performance, Operation of pumps, Cavitation phenomena.

References:

* Chow, V. T., Open Channel Hydraulics, McGraw Hill Book Co. New York, 1953.
* Hwang, N. H. C and Hita, C. E., Fundamentals of Hydraulic Engineering, Prentice Hall, Inc., 1987.

Laboratory: *Hydraulics Lab*

01 Laminar Flow
02 Turbulent Flow
03 Minor Losses
04 Manning Coefficient (Smooth bed, Rough bed)
05 Chezy Coefficient (Smooth bed, Rough bed)
06 Hydraulic Jump
07 Specific Energy Curve
08 Specific Energy Applications
09 Water Hammer
10 Surge Tank

CEI 311 Design of Irrigation Works (1)

3rd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Planning and design of Irrigation projects: Alignment of canals and drains, Synoptic diagrams for canals and drains, Design of cross sections for earth channels, Seepage through earth channels, Calculation of expropriation widths, Longitudinal sections and typical cross sections for canals and drains, Canal lining. Irrigation structures: Classification of irrigation structures. Retaining walls: Types, Cases of loading, Hydraulic and structural design. Crossing structures: Hydraulic design, Calculation of loads for different cases of loading and structural design for the following crossing structures: Small R.C. bridges, Culverts, Syphons, Aqueducts. Escapes: Types, Functions, Design. Introduction to heading up works and navigation works.

References:

* Leliavisky, S., Canals and Barrages, , 1985.
* Leliavisky, S., Short Span Bridges, , 1985.
* French, R., Open Channel Hydraulics, McGraw Hill, 1994.
* Novak, P.; Moffat, A.; Nalluri, C. and Narayanan, R., Hydraulic Structures, , 1996.

CEI 411 Modern Irrigation Systems

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Pressurized on farm Irrigation systems: Pipe irrigation, Sprinkler irrigation, Trickle irrigation. New trends in on farm irrigation: Surge surface irrigation, Subsurface trickle irrigation. Network control systems: Injection, Mixing and filtration, Discharge

measurements, Pressure measurements, Valves (close, air, wash, pressure relief). Economics of irrigation systems: Initial costs, Permanent costs, Feasibility study, Optimum productivity. Mesqas: Earth mesqa, Lined mesqa, Pipe mesqa, High level mesqa (single lift point, multi lift point). Operation and maintenance of on farm irrigation systems: Operation management, Maintenance systems, Monitoring, Training and institutional aspects.

References:

* Hansen, V. E.; Israelsen, O. W. and Stringham, G. E., Irrigation Principles and Practices, , 1975.
* James, Larry G., Principles of Farm Irrigation System Design, , 1985.
* Karmeli, D.; Peri, G., and Todes, M., Irrigation Systems Design and Operation, , 1985.
* Richard Cuenca, Irrigation System Design, An Engineering Approach, , 1989.

CEI 431 Networks Hydraulics

4th Year: Civil Engineering - Water & Hydraulic Structures (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Distribution networks: Graph theory, Branched network, System reliability, Governing equations, Analysis techniques, Unsteady flow boundaries, Extended period simulation, Commercial software, Optimal design of reservoirs, Pump stations, Practical consideration (control valves, water hammer protection devices, field testing, leakage control), Case study (complete design of water distribution system). Collection networks; Design flow (domestic, storm, drainage), Open channel networks (hydraulics of partial flow in pipes, unsteady flow), Collection network design (layout, pipes), Optimal design, Practical considerations (system flushing, leakage control), Water quality, Commercial software, Case study (complete design of water collection system).

References:

* Jepson, R. W., Analysis of Flow in Pipe Networks, Ann Arbor, 1976.
* Thomas, W., Advanced Water Distribution Modelling and Management, , 2000.
* Thomas, W., Computer Applications in Hydraulic Engineering, , 2002.
* El-Bahrawy, A. N., Spreadsheet Applications in Water Resources, Lecture Notes, 2003.

CEI 432 Environmental Hydrology

4th Year: Civil Engineering - Water & Hydraulic Structures (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction: Hydrologic cycle, Environment and hydrology, Importance of hydrology. Hydrometeorology: Solar energy, Temperature, Vapor pressure, Humidity, Wind, Evaporation, Evapotranspiration. Precipitation: Conditions and types, Rainfall measurements and estimates, Rainfall statistical analysis, Design storm. Infiltration: Effective factors, Measurements, Estimates. Hydromorphology:

Watershed characteristics, Morphological parameters, Time parameters. Surface runoff: Peak flow estimate, Storm hydrograph, Unit hydrograph, Mass curves, Flow and water level measurements. Soil erosion and sedimentation: Effective factors, Soil loss, Sediment yield. Protection works against flash floods: Storage and detention works, Roads crossing works, Direction change works, Sediment traps, Storm water drainage systems. Subsurface hydrology: Soil-water relations, Characteristics and types of aquifers, Flow through porous media, Well hydraulics, Sea water intrusion in coastal aquifers. Water quality and pollution control: Pollution sources, Pollutant transfer mechanisms in surface and subsurface systems, Protection of water resources against pollution. Introduction to application of remote sensing and GIS in hydrological studies.

References:

* Linsley, Ray K., Hydrology for Engineers, McGraw Hill Int., Hamburg, 1982.
* Wand, A. D. and Ellio, W. J., Environmental Hydrology, Lewis Publishers, New York, 1995.
* Mecuen, R. H., Hydrologic Analysis and Design, Prentice Hall, New Jersey, 1998.

CEI 433 Pump Stations Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Performance curves: Speed effect, Impeller changes effect, Type of pump effect, Viscosity effect, Cavitations effect, Net positive suction head effect, Available suction head effect, Required suction head effect. Pump definition: General-service pump, Booster pump, Non-clogging pump, Sump pump, Total head, Total dynamic head, System friction-head curve, Approximated operating head, Pumps operating in series, Pumps operating in parallel. Pump application: Pumping arrangement, Economic consideration. Pump selection: Dredge pumps, Slurry pumps, Deep-well pumps, Water-works irrigation and drainage pumps, Circulating pumps. Pump Installation: Location of pump units, Suction line inlet, Size of suction line, Long-radius elbows, Suction header, Eccentric reducers, Screens, Check valves, Expansion joints, Vent valves, Realigned in field, Pump levelling. Operation: gate valve, Priming, Foot valve, Priming chamber, Ejectors, Dry-vacuum pump, Wet-vacuum pump, Automatically priming pump, Time of priming, Sump-pump design.

References:

* Taylor, H. B. and Moody, L. F., The Hydraulic Turbine in Evolution, Vol. 39, No. 7, Engineers and Engineering, 1968.
* Thomas, D., Experimental Research in the Field of Water Power, World Power Conference, London, 1972.
* Marks Handbook, Experimental Research in the Field of Water Power, McGraw Hill, 1986.

Irrigation & Hydraulics

CEI 434 Hydraulic Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction to hydraulic structures: Types, Purpose, Components, Hydraulic design (dimensions and losses). Control and crossing works, Drainage and pumping stations, Navigation works. Hydraulic design of intakes, Entrances, Exits, Spillways, Energy dissipators. Loss through trach racks, Filters and screens. Flow and water measurements in water streams and pipes using advanced technology. Principles of automatic control in flow through water streams and pipes. Use of computer programs and spreadsheets in hydraulic engineering, Pump calculations, Similarity, Operating point, Pump testing, Specific speed, Variable speed pump. Principles of hydraulic similarity, Classification of hydraulic models, Dimensional analysis, Distorted and undistorted models.

References:

* Allan Smith; Ernest Hinton and Roland Lewis, Civil Engineering Systems. Analysis and Design, , 1984.
* El-Bahrawy, Use of Spread Sheets in the Design of Dendritic Distribution Systems, , 1993.
* El-Bahrawy, Use of Spread Sheets Rainfall-Runoff Calculations, , 1996.

Laboratory: *Hydraulics Lab*

01 Modeling of Flow through Pipes

02 Modeling of Open Channel Flow Uniform Open Channel Flow (weirs, spillways, hydraulic jump, movable bed models)

03 Pump Modeling

CEI 435 Environmental Hydraulics

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction: Hydraulics and the environment, Water quality and pollution sources, Pollutant transport mechanism and hydrodynamic equations and boundary conditions in different water bodies. Water streams, Rivers, Lakes, Groundwater, Coasts, Estuaries and wetlands. Sediment transport and scour in water streams. Thermal pollution in water bodies. Hydraulic simulation of environmental problems, Engineering solutions and environment protection.

References:

* Thomann and Muller, Surface Water Quality Modelling, Prentice Hall, 1994.
* Chin, David A., Water-Resources Engineering, , 2000.

Irrigation & Hydraulics

CEI 441 Design of Irrigation Works (2)

4th Year: Civil Engineering - Water & Hydraulic Structures (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Heading up structures: Weirs: Weirs function, Types of weirs, Stability of gravity weirs, Hydraulic of weirs, Static design of the floor for percolation, Uplift and scour. Regulators and barrages: Types of regulators and component parts of the regulator, Hydraulic design of the waterway, Hydraulic and static design of piers under different cases of loading, Static design of floor for percolation and scour, Static design of gates and winch structure. Navigation structures: Symmetrical and unsymmetrical locks: Main elements of locks, Dimensioning of lock chamber, Methods of emptying and filling the lock chamber, Hydraulic design of side culverts, Hydraulic and static design of landing wall, Guide pier, Thrust wall, Floor. Storage works: Introduction to dams and reservoirs.

References:

* Leliavisky, S., Dams, , 1985.
* Leliavisky, S., Regulators and Barrages, , 1985.
* Leliavisky, S., Syphons, Weirs and Locks, , 1985.
* Novak, P.; Moffat, A.; Nalluri, C. and Narayanan, R., Hydraulic Structures, , 1996.

CEI 442 Water Structures Design

4th Year: Civil Engineering - Water & Hydraulic Structures (2nd Term) Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (125+50+0)] = 175

Course Contents

Structural design of irrigation and storage structures using conventional and modern materials: Underground tanks, Balancing (compensating) elevated tanks, Arch dams, Buttressed dams, Spillways, Stilling basins, Regulators, Gates vertical and radial, Winch structure used for lifting regulators gates, Steel bridges on water structures.

References:

* Leliavisky, S., Regulators and Barrages, , 1985.
* USBR, Design of Small Dams, Handbook, 1987.
* Novak, P.; Moffat, A.; Nalluri, C. and Narayanan, R., Hydraulic Structures, , 1996.

CEI 451 Harbour, Navigation & Shore Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Natural phenomenon (winds, waves, tide, sea currents), Choosing of suitable site

on shore for a harbour, Harbour planning, Harbour master plan, Design of different elements of harbour (break waters, quay walls, dry and floating docks, slipways, shore protection structures, stability of shore line, sediment transport, mathematical models, physical models).

References:

* Per Brunn, Port Engineering, Gulf Publishing Co., 1989.
* Herbich, John B., Handbook of Coastal and Ocean Engineering, Gulf Publishing Co., 1990.

CEI 453 Coastal Environment Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Shoreline morphodynamics, Tides in lakes, Long tidal development of shores, Effect of sea level changes on shoreline, Environmental systems of shores, Shore swamps, Shore lagoons, Coastal inlets, Human activities on shore, Dredging, Coast water management, Coast sediment management, On shore casualties.

References:

* Per Brunn, Port Engineering, Gulf Publishing Co., 1989.
* Herbich, John B., Handbook of Coastal and Ocean Engineering, Gulf Publishing Co., 1990.

CEI 454 Inland Navigation

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Types of navigation channels, Inland (river) harbours, Specifications of vessels, Ship movements, Hydraulic phenomenon, Effect of ship movement on water motion, Design of water cross section, Slope protection, Channel bathemetry, Curves design, Rivers treatments, Navigation Aids, Berthing facilities, Dredging, Bathemetric survey, Navigation importance, Bridges.

References:

* Per Brunn, Port Engineering, Gulf Publishing Co., 1989.
* Herbich, John B., Handbook of Coastal and Ocean Engineering, Gulf Publishing Co., 1990.

CEI 461 Ground Water Hydrology

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction: Groundwater and hydrologic cycle, Importance of groundwater, Groundwater and geology, Types and physical properties of aquifers, Aquifer systems in Egypt. Groundwater hydraulics: Infiltration, Seepage, Percolation, Darcy' s law, Hydraulic conductivity measurements, Flow governing equations. Well hydraulics: Flow towards wells, Safe yield, Well construction, Test and development, Well fields, Injection wells. Surface and subsurface water relations and conjunctive Use. Groundwater exploration methods. Groundwater quality and pollution: Pollution sources, Mechanisms of pollutant transfer in porous media, Saltwater intrusion in coastal aquifers, Pollution control and remedy measures. Groundwater modelling: Mathematical, Physical and numerical models, Modelling of flow in porous media, Modelling of pollutant transfer in porous media. Management of groundwater systems. Introduction to application of remote sensing and GIS in groundwater studies.

References:

* Bear, J, Hydraulics of Groundwater, McGraw Hill, New York, 1979.
* Todd, D. K., Groundwater Hydrology, Wiley, New York, 1980.
* Bear, J. and Verruijt, A., Modelling Groundwater Flow and Pollution, Reidel Publishing Co. Boston, 1987.

CEI 471 Water Resources Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction: Hydrologic cycle, Evaluation of available water resources, Water quality, Rate of different water uses. Theory of probability and its role in water resources planning. Technical engineering, Economic, Social, environmental, Legal, Political and administration consideration related to water resources, Development project. Principles of water resources assessment, Design and planning principles of dams, Reservoirs, Water streams, Pipelines, Irrigation systems, Control systems, Power plants, Water supply systems, River navigation, Drainage and sewage disposal systems. Economic and financial analysis and assessment principles of water projects.

References:

* Goodman, A. S., Principles of Water Resources Planning, Prentice Hall, Englewood Cliffs, 1984.
* Linsely, R. K, Water Resources Engineering, McGraw Hill, Civil Engineering Series, 1992.

CEI 472 Management & Maintenance of Irrigation Projects

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction to basics of project management, Main objectives and life time, Planning in various project stages (using bar charts and networks, progress monitoring, progress curves, resource allocation and levelling), Role of quality in the project stages (technical investigation, confirming assurance steps, applications using computer), Applications on execution of irrigation and drainage projects. Repair and strengthening of water structures: Properties and constituents of recent construction materials including the physical, Chemical and mechanical ones, Causes of water structures deterioration, Evaluation of water structures, Materials needed for repairing and strengthening concrete and steel structures (including painting and coating materials, additives, treatment materials, bonding materials, filling materials and painting tests), Maintenance methods and design of maintenance strengthening works for concrete and steel structures. Maintenance of roads: Defects of asphalt and concrete pavement, Maintenance of asphalt and concrete pavement, Maintenance of platforms and linings, Maintenance of unpaved roads.

References:

* Glantz, M. H. and Thompson, J. D., Resource Management and Environmental Uncertainty, , 1981.
* Allen, R. T. L.; Edwards, S. C. and Shaw, J. D. N., The Repair of Concrete Structures, Blackie Academic and Professional, 1993.
* Emmons, Peter H., Concrete Repair and Maintenance, R. S. Means Co., Inc., 1993.
* Gibson, Principles of Advanced Composite Materials, , 1994.
* Green, A., Glass Fibber Reinforced Composites in Building Constructions, , 1997.
* Barbero, E. J., Introduction to Composite Material Design, , 1999.
* Fonda, A. F., The Professional Use of Design Fundamentals for FPR Applications, , 1999.
* ACI Committee 440, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures, , 2000.

CEI 473 Environmental Impact Assessment for Water Projects

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction: Availability of natural resources, Natural cycles for some basic elements (carbon, oxygen, nitrogen, sulfur, phosphorous…). Conflicts between developments, Economics and environments. Defining emissions sources, Impacts, Standards and precautions. Water, Air and soil pollution and measurements.

Historical development for recognizing the need for environmental impact assessment. Assessing the impacts on health, Social, Cultural and economical activities. Procedures of the environmental impact assessment: Screening, Scoping, Defining impacts, Comparing alternatives, Plans for mitigation and alleviation, Environmental auditing. Public participation. Environmental impact statement and reporting, Contents and forms. Examples for assessing the impacts of water resources projects on the environment and impacts of different activities on the water environment.

References:

* Wathern, P., Environmental Impact Assessment: Theory and Practice, Unwin Hyman Publishers, London, 1988.
* Kiely, G., Environmental Engineering, McGraw Hill, Boston, 1997.

CEI 474 Water Management

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Defining global water resources and uses in general and water balance in Egypt and the arab countries and the mediterranean. Management of water supplies and demands. National water management policies. Water management at different levels : The national level, On hydrologic basins' level, Metropolitan level, Canal command level and farm level. Estimating future water supplies and demands and its uncertainty. Integrated water management and meeting increasing demand on water. Prerequisites for water management, Operation and maintenance. Management by objectives and/or results. Meeting increasing demand on water. Seasonal, Annual and strategic planning for water resources. Water quality management and environmental laws governing water resources protection. Technical, Economical, Social, Legal, Political and institutional aspects in water management policies. Monitoring, Evaluation and Performance indicators : Effectiveness, Efficiency, Legitimacy and sustainability.

References:

* Loucks, D. P.; Stedinger, J. R. and Haith, D. A., Water Resource Systems Planning and Analysis, Prentice Hall, 1981.
* Mays, L. W. and Tung,Y. K., Hydrosystems Engineering and Management, McGraw Hill, 1992.

CEI 481 Dams Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Reservoir planning: Investigation for reservoir planning, Selection of dam site, Zones of storage in reservoirs, Storage capacity and yield, Sedimentation and

sediment flow, Multipurpose reservoirs. Dams: Different types of dams, Advantages and disadvantages of dams, Physical factors governing the selection of dams, Selection of site of a dam and its foundation. Earth and rockfill dams: Factors governing the selection of earth dams, Classification of earth dams, Design criteria, Seepage in earth dams, Downstream drainage system, Stability of upstream and downstream faces, Slope protection, Causes of failure of earth dams. Gravity dams: Forces acting on gravity dams, Stability requirements, Elementary and practical profile of gravity dam, Height of gravity dam and its limitation, Methods of design, Galleries and joints, Control of cracks in dams. Arch and buttress dams: Types of arch dams, Forces acting on dam, Methods of design. Spillways and stilling basins: Type of spillways and stilling basins, Design considerations, Methods of design.

References:

* Leliavisky, S., Dams, , 1985.
* USBR, Design of Small Dams, Handbook, 1987.
* US Army Corops of Engineers, Earth and Rockfill Dams, Engineer Manual, 1994.

CEI 499 Project

4th Year: Civil Engineering - Water & Hydraulic Structures (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, in addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

CEP 111 Plane Surveying

1st Year: Civil Engineering - . (Cont.) Hrs/Week: [(4+2) + (2+2)]

Marks:[(75+25+0) + (75+25+50)] = 250

Course Contents

Introduction to mapping and surveying science: Historical background, Definitions and branches of surveying science. The surveying maps, Scales and measurements units. Field sketches, Electronic methods of linear measurements, Electronic measurements and their corrections kinds of directions, Azimuth, Methods of observing angles and their associated errors. Methods of calculating coordinates. Setting out of angles. EDM and theodolite instruments. Traverse observations and calculations. Two dimensional coordinates transformation, Setting out of points by intersection and resection. Area calculation, Land division, Introduction to theory of errors in plane surveying.

References:

* Wolf, P.R. and Brinker, R.C., Elementary Surveying, Harper Collins Publishers, New York, 1994.
* Irvine, William F., Surveying for Construction, McGraw Hill Publishing Co., England, 1995.

Laboratory: *Surveying Lab*

01 Practicing the linear measurements procedures and the process of producing line maps. (Instruments, tapes, pegs, arrows,…etc.)

02 Electronic distance measurements (EDM), and its calibration (instruments, EDM separate and as a part of a total station).

03 Measuring horizontal directions and vertical angles using theodolites. (Instruments optical theodolites and digital theodolites).

04 Traverses and theodolite applications (Measuring angles and distances) (making skectches choosing stations).

05 Surveying with theodolites and setting out.

06 Linear observations and angular observations field, book, etc.

CEP 112 Survey

1st Year: Architecture Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Introduction to survey and mapping science. Measurements units, Scales and maps. Direct and indirect methods of distance measurements by classical and electronic methods. Direction and angles measurements using theodolites and its relation to traverse. Traverse observation calculations and adjustment. Methods of area calculation and land divisions. Coordinate transformation. Vertical control using levels or theodolites. Calculating elevations or difference in elevation. Sources and kinds of errors in levelling, Methods of setting out of buildings.

References:

* Wolf, P.R. and Brinker, R.C., Elementary Surveying, Harper Collins Publishers, New

York, 1994.

* Irvine, William F., Surveying for Construction, McGraw Hill Publishing Co., England, 1995.

Laboratory: *Surveying Lab*

01 Practicing the linear measurements procedures and the process of producing line maps. (Instruments, tapes, pegs, arrows,…etc.)
02 Surveying with theodolites and setting out (making sketches, choosing stations).
03 Introduction to ordinary survey level and staff reading.
04 Temporary adjustment of the survey level.
05 Determination of the height difference between two points using ordinary levelling.

CEP 211 Topographical Surveying

2nd Year: Civil Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(60+20+0) + (60+20+40)] = 200

Course Contents

Introduction to vertical control, Different methods for height difference determination, Ordinary levelling survey level and survey staff, Calculation of ordinary levelling, Precise level and precise staff, Calculations of precise levelling, Indirect methods for height difference determination, Tachometry, Trigonometric levelling, Earth curvature and refraction and their effects on height differences, Applications of levelling, Longitudinal levelling, Cross section levelling, Grid levelling, Contour lines and work, Topographic maps, Volume computations and earth, Introduction to photogrammetry, Coordinates computations in photogrammetry, Flight mission applications of photogrammetry in engineering projects, Introduction to remote sensing.

References:

* Wolf, P.R. and Brinker, R.C., Elementary Surveying, Harper Collins Publishers, New York, 1994.
* Moffitt, F.E. and Mikhail, Photogrammetry, Happer and Row Publishers, New York, 1995.

Laboratory: *Surveying Lab*

01 Introduction to ordinary survey level and staff reading.
02 Temporary adjustment of the survey level.
03 Permanent adjustment of the survey level.
04 Determination of the height difference between two points using ordinary levelling.
05 Open ordinary levelling.
06 Closed loop levelling, connected levelling.
07 Precise survey level and precise staff reading.
08 Determination of the height difference between two points using precise levelling.
09 Closed and connected precise levelling.
10 Longitudinal levelling.
11 Grid levelling and contour lines drawing.
12 How to compile and draw a topographic map.

CEP 311 Engineering Surveying

3rd Year: Civil Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Role of surveying in engineering surveying projects, Total station instrument and its applications in setting out coordinates, Methods of setting out highways, Roads, Airports and runways and their correlated different types of curves, Tunnel survey, Setting out of water, Sewer and infrastructure networks, Setting out of construction 3D deformation mentoring. Introduction to geometric geodesy, Introduction to map projection, Introduction to grid coordinates and their transformation, Introduction to GPS basics of GPS, Methods of observing techniques of GPS.

References:

* Vanicek, P. and Krakiwisky, E., Geodesy - The Concept, North Holland Publishing Co., Amsterdam, 1982.
* Kavanagh, B.F., Surveying for Construction Applications, Englewood Cliffs, NJ, Prentice Hall, 1989.
* Irvine, William F., Surveying for Construction, McGraw Hill Publishing Co., England, 1995.

Laboratory: *Surveying Lab*

01 Total station instrument operations.
02 Surveying and setting and using total station (curves, buildings, and civil Engineering applications etc..
03 Data down load and digital map processing.
04 GPS instruments (navigators and survey GPS instruments)

CEP 331 Traffic Engineering

3rd Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Traffic engineering: What is traffic engineering, Traffic studies (volume, speed, density, and travel time , delay), Traffic flow characteristics. Traffic control devices: Definition, Types, Purpose of devices. Intersection control: Conflict points at intersections, Types of intersection control, Traffic signals design, Green weaves, Parking survey, Design principles of parking spaces, Accidents and road safety.

References:

* Salter, R. J., Highway Traffic Analysis and Design, The Macmillan Press, Ltd., 1992.
* Institute of Transportation Engineers, Manual Traffic Engineering Studies, , 1994.
* Institute of Transportation Engineers, Traffic Engineering Handbook, , 1996.
* Transportation Research Board, Highway Capacity Manual, , 2000.

CEP 341 Sanitary Engineering (1)

3rd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction to water supply works: Sources of water, Rain water, Ground water, Surface water, Impurities, Water quality of each source, Drinking water standards. Rate of water consumption: Required studies to estimate water demands for different water uses. Collection works: Types of intake structures, Surface water intakes, Criteria for intake location, Design of intake conduit and low lift pumps. Water purification works: Flash mixing, Coagulation, Sedimentation, Slow and rapid filtration, Chlorine disinfection. Storage works: Elevated and ground storage. Water distribution works: High lift pumps, Design of distribution networks using method of sections. Introduction to wastewater systems: Surface and ground water pollution due to the absence of wastewater systems, Historical development of wastewater systems. Characteristics and sources of wastewater: Pollutants, Domestic flow, Industrial flow, Storm water flow, Infiltration flow. Collection works: Design of gravity networks, Wastewater pump stations, Force mains. Treatment works: Design of primary treatment units, Design of biological treatment systems using trickling filter.

References:

* Escritt, L. B., Water Supply and Building Sanitation, 4th Ed., Mac Donald and Evans Limited, 1972.
* Hammer, Mark J., Water and Wastewater Technology, 2nd Ed., John Willey and Sons Inc., 1986.

CEP 361 Transportation Planning & Traffic Engineering

3rd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Transportation planning: Introduction to transportation planning. Objectives and gaols and transportation planning stages. Traffic engineering: What is traffic engineering, Traffic studies (volume, speed, density and travel time delay), Traffic flow characteristics. Traffic control devices: Definition, Types and purpose of devices. Intersection control: Conflict points at intersections, Types of intersection control, Traffic signals design, Green weaves. Parking survey and design principles of parking spaces. Weaving for intersection, Freeways and expressways.

References:

* Institute of Transportation Engineers, Manual Traffic Engineering Studies, , 1994.
* Institute of Transportation Engineers, Traffic Engineering Handbook, , 1996.
* Bruton, M. J., Introduction to Transportation Planning, Hutchinson of London, 1996.

CEP 364 Transport Economics

3rd Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]
Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Introduction: Modes of transportation: Road, Railway, Air and water transport, Comparison between the modes, Criteria of choice between them. Buses: Types, Comparison between their specifications and the reflection on their prices. Factors affecting economy of transport: Rolling resistance, Air resistance, Etc and the methods used to improve the economy of road transport. Economic evaluation of transportation plans: Cost and benefit to traffic. Elements of cost: Break even point concept, Vehicle operating cost, Factors affecting vehicle operating cost, Fuel consumption and spare parts consumption, Replacement policy of transportation fleet, Traffic and the environment.

References:

* Morlock, E.K., Introduction to Transportation Engineering and Planning, McGraw Hill, New York, 1978.
* Mitchell, Robert L., Engineering Economics, John Wiley, New York, 1980.

CEP 371 Highways & Airports Engineering

3rd Year: Civil Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Classification of roads, Planning and route selection, Geometric design criteria, Sight distances, Horizontal alignment, Vertical alignment, Elements of cross section, Planning and design of intersections, Planning and geometric design of airports. Pavement construction materials: Design and characteristics of asphalt mixes, Characterization of pavement materials, Testing and specifications, Stresses in flexible pavements, Stresses in rigid pavements, Load and truck considerations and pavement design (flexible and rigid).

References:

* Annual Book of ASTM Standards, ASTM, 100 Barr Harbor Drive, West Conshohocken, PA19428, 1996.
* جمهورية مصر العربية - وزارة الاسكان والمرافق والمجتمعات العمرانية، الكود المصري لأعمال الطرق الحضرية والخلوية، مركز بحوث الاسكان والبناء، ١٩٩٨.
* AASHTO Standards, A Policy an Geometric Design, Pavement Design, etc., 2001.

CEP 372 Highway & Traffic Engineering

3rd Year: Architecture Engineering - Urban Planning & Design (2nd Term) Hrs/Week: [(0+0) + (3+1)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction: Motor traffic circulations system planning of highways network, Traffic

studies, Rural and urban highways hierarchy. Characteristics of highway alignment: Sight distance, Horizontal and vertical design. Road cross section elements. Design criteria of car parking. Planning of pedestrians and bicycles routs.

References:

* جمهورية مصر العربية - وزارة الاسكان والمرافق والمجتمعات العمرانية، الكود المصري لأعمال الطرق الحضرية والخلوية، مركز بحوث الاسكان والبناء، ١٩٩٨.
* AASHTO Standards, A Policy an Geometric Design, Pavement Design, etc., 2001.

CEP 411 Geodetic Survey

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Astronomic coordinates and their relation to geographic coordinates, Astronomic latitude and azimuth determination from astronomic triangle, Least squares principles and its applications, Different reference ellipsoids and geodetic datums, Reduction of observation, 3D coordinates computations and transformation coordinates determinations using different GPS techniques, GPS operation planning, Applications of GPS in engineering surveying projects.

References:

* Vanicek, P. and Krakiwisky, E., Geodesy - The Concept, North Holland Publishing Co., Amsterdam, 1982.
* Hoffmann, Wellnhof, B.H. Lichtenegger and Collins, J., GPS - Theory and Practice, Springer Verlag, Publisher, New York, 1994.

CEP 414 Hydrographic Survey & Harbour Engineering

4th Year: Civil Engineering - Public Works (1st Term) Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Introduction to natural phenomena and their effect on coasts and harbours. Planning factors which affect the design of harbours and their protection. Design of dry basins and navigation channels: Open and determined. Surveying procedure of marine survey and the associated instruments. Methods of horizontal and vertical control in marine survey. Methods of depth determinations and contour mapping. Position determination and setting out of off sure engineering projects.

References:

* Knavanagh, B. and Glenn, Brid S.J., Surveying Principle and Applications, Prentice Hall, Inc. Columbus, Ohio, USA, 2000.

CEP 421 Geographic Information System GIS

4th Year: Civil Engineering - Public Works (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to geographic information system (GIS), Kinds of used information, Transforming the analog drawings to digital maps and study of the errors resulting from the process of transforming and merging, Building attribute date base and linking it with the analog data. Methods of data input, Store and output. Applications of GIS in the field of roads, Transportations and sanatry engineering. Applications of GIS in water resources harbors, Marine contraction and hydraulic contraction like regulators, Dams and other projects. Decision making support by GIS in non engineering fields.

References:

* Star, J.L. and Estes, J.E., Geographic Information System: An Introduction, Englewood Gliffs, NJ, Prentice Hall, 1995.

CEP 422 Remote Sensing

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to remote sensing basics and principal. Elements of photographing process. Introduction to aerial photos and satellite images interpretations. Thermal and spectral scanning. Remote sensing by microwave and radar. Introduction to satellites: Ocean monitoring, Metrological monitoring, Terrestrial monitoring, Like: Land sat, Spot, Indian satellite and what is new in this field. Digital image processing. Application of remote sensing . Land use, Mapping, Wet land, Geological maps soil maps and environmental assessment.

References:

* Lillesand and Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 1979.
* Curran, P. J., Principles of Remote Sensing, Longman Group Limited, 1985.

CEP 423 Photogrammetric Surveying

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to different kinds of photos: Terrestrial aerial, Satellite. The instruments used in processing photos characteristics. Analytical photogrammetry : Theories and applications. Digital photogrammetry: Theories, Applications. Method of digital aerial photos and satellite images processing :Radiometical, Geometrical. Methods of processing ortho photos. Use of advanced photogrammetry : Highways, Urban

planning, Management of water resources, City planning, Production of digital mapping and digital terrain models.

References:

* Moffitt and Mikhaoil, Edward M., Photogrammetry, Harper and Row, Inc., 1980.
* Toni Schenk, Digital Photogrammetry, Terra Science, 1999.

CEP 424 Geographic Information System GIS

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to geographic information system (GIS), Kinds of used information, Transforming the analog drawings to digital maps and study of the errors resulting from the process of transforming and merging, Building attribute date base and linking it with the analog data. Methods of data input, Store and output. Applications of GIS in the field of roads, Transportations and sanatry engineering. Applications of GIS in water resources harbours, Marine construction and hydraulic construction like regulators, Dams and other projects. Decision making support by GIS in non engineering fields.

References:

* Understanding GIS Environmental System Research Institute, Inc., USA, 1992.
* Peter, A.; Burrough and Rachael, A., Mcdonnell, Principles of geographical in formation system, Oxford University Press Inc. New York, 2000.

CEP 431 Traffic Management Systems

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction: Definition, Objectives of traffic management, Planning process for TSM traffic management measures for traffic operations improvements, One way street, Coordinating signal timing, Restricting turning movements, Tidal and reversible flow, Monitoring of traffic, Metering ramps. Management measures for public transport, Pedestrians and bicycles, Management of heavy goods vehicles and parking control.

References:

* Salter, R. J., Highway Traffic Analysis and Design, The Macmillan Press, Ltd., 1992.
* Hobbs, F. D., Traffic Planning and Engineering, Pergamon Press Ltd., London, 1996.
* Transportation Research Board, Highway Capacity Manual, , 2000.

CEP 441 Infrastructure & Utilities

4th Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(1+2) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Infrastructure's aims and objectives. Description of all essential services and utilities including: Electricity, Gas, Water supply, Sewerage system, Storm network, Solid wastes disposal and telecommunication. Design basis of infrastructure planning. The impact of infrastructure utilities on environment, Public health and safety. Environmental laws and regulations governing infrastructure utilities. Modern infrastructure tools (GIS).

References:

* Escritt, L. B., Water Supply and Building Sanitation, 4th Ed., Mac Donald and Evans Limited, 1972.
* Hammer, Mark J., Water and Wastewater Technology, 2nd Ed., John Willey and Sons Inc., 1986.

CEP 442 Water Purification

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Importance of water purification for the protection of public health and the environment. Uses of water :Domestic, Commercial, Industrial, Fire fighting, Public purposes. Per capita water consumption: Influencing factors, Fluctuations. Water demand for fire fighting. Sources of water in nature. Water quality: physical, Chemical and microbiological. Conventional surface water purification: Theory of sedimentation, Plain sedimentation tanks, Theory of coagulation, Types of coagulants, Coagulant dose, Sedimentation using chemical coagulants, Design of flash mixing, Flocculation tanks and clari-flocculators, Theory of filtration, Design of slow and rapid sand filters. Water disinfection: Purpose, Influencing factors, Methods used for disinfection. Water chlorination: Advantages, Disadvantages.

References:

* Escritt, L. B., Water Supply and Building Sanitation, 4th Ed., Mac Donald and Evans Limited, 1972.
* Hammer, Mark J., Water and Wastewater Technology, 2nd Ed., John Willey and Sons Inc., 1986.

CEP 443 Sanitary Engineering (2)

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Modern systems for water purification: Accelator, Pulsator, Pressure and rapid sand

filters, Direct tiltration. Design of under drainage system of filters: Systems of back wash, Measuring and control equipment, Arrangement of filter building. Methods of water disinfection: Chlorine, Breakpoint chlorination, Getting rid of excessive chlorine, Chloramines, Ozone, Ultra violet rays. Design of water distribution system using method of circle. Design of wastewater pump stations: H-Q curve, Efficiency curve, System curve, Types of pumps and motors, Flow measuring and control equipment. Design of biological treatment works using activated sludge system: Aerobic and anaerobic stabilization processes, Types and growth kinetics of micro-organisms, Fundamentals of microbiology, Design criteria, Determination of aeration volume and air flow, Control methods, Process technologies of activated sludge. Design of waste stabilization ponds. Design of sludge treatment and disposal systems: Determination of sludge volume, Sludge thickeners, Sludge digestion, Different methods of sludge dewatering.

References:

* Viessman, Warren, Jr. and Hammer Mark, J., Water Supply and Pollution Control, Harper and Row, 4th Ed., 1985.
* Metcalf and Eddy, Wastewater Engineering,Treatment/Disposal/Reuse, 3rd Ed., McGraw Hill, 1991.

CEP 444 Characteristics of Wastewater & Industrial Wastes

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Industrial wastewater characteristics, Effects of Industrial wastes on streams and municipal wastewater treatment plants, Pre-treatment regulations, Management strategies for pollution and waste minimization. Pre-treatment technologies physical pre-treatment, Chemical pre-treatment, Biological pre-treatment. Major industrial wastes :Characteristics and treatment, Food processing industries, Energy industries (fuel, oil and coal), Textile industries, Rubber and plastic wastes, Pulp and paper mill industries, Tannery wastes, Chemical industries, Metal industries.

References:

* Nemerow, N. L., Liquid Waste of Industry-Theories, Practices and Treatment, Addison Wesley Inc. Massach, 1971.
* Manual of Practice, Pretreatment of Industiral Wastes, USA, No FD-3, 1994.

CEP 445 Treatment of Water for Industrial Purposes

4th Year: Civil Engineering - Public Works Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

The course aims at defining: The water used for industrial purposes, The

engineering know - how to produce the required water quality for every industrial use, Introduction to the various types of industry, The corresponding water quality needs. The different technologies applied for industrial water treatment : Water desalination, Iron and manganese removal, Water softening, Scaling and demineralization, Sedimentation, Chemical precipitation, Water flotation, Water filtration and water aeration, Water recycling and reuse in industry.

References:

* Hammer, Mark J., Water and Waste Water Technology, John Willey and Sons Inc. USA, 1977.
* Degremont, Water Treatment Hand Book, 6th Ed., Lavoisieet Publisher, France, 1991.

CEP 451 Environmental Engineering

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

The course aims at introducing the principles of environmental engineering: Water resources, Water supply, Wastewater systems, Solid waste management. Introduction to environmental sciences: Water resources and supply works, Preliminary studies for water supply works, Collection works, Water purification, Storage works, Water distribution and networks. Wastewater systems: Wastewater sources, Sewerage systems, Wastewater and sludge treatment, Disposal and reuse. Solid waste management: Collection, Handling, Separation and treatment, Disposal, Recycling and reuse.

References:

* Esack, J.P.; Angel, P.E. and Ramy, N.E., Environmental Engineering Handbook, John Willey and Sons Inc., 1989.

CEP 452 Environmental Engineering

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

The course aims at introducing the principles of environmental engineering: Water resources, Water supply for industries, Wastewater systems for industrial effluents, Hazardous solid waste, Management. Introduction to environmental sciences: Water resources and supply works, Preliminary studies for water supply works, Collection works, Water purification for industrial purposes, Water softening, Ion-exchange process, RO process. Treatment of industrial effluents, Wastewater characteristics and sources, Sludge treatment and disposal. Hazardous solid waste management: Collection, Handling, Separation and treatment, Disposal and recycling. Introduction, Environmental impact of traffic, Traffic noise, Sound intensity, Calculations of sound levels, Contour maps for noise levels, Protection methods form traffic noise, Air pollution, Environmental elements affected by traffic

flow, Air pollutants, Components of traffic emissions, Fuel consumptions, Emissions rates and fuel consumption rates, Methods of traffic emissions reductions.

References:

* Clark, John W.; Warren Viessman; Mark, Jr. and Hammer, J., Water Supply and Pollution Control, Copy right by Thomas Y. Crowell Co. Inc., 1977.
* Hammer, Mark J., Water and Waste Water Technology, John Willey and Sons Inc. USA, 1977.
* Case, D.J., Emissions from Vehicles, TE and C, 1982.
* Institute of Transportation Engineers, Manual Traffic Engineering Studies, , 1994.

CEP 461 Transportation Planning

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Stages of the urban and regional transportation plans, Data collection process required for the transportation plans, Stages of the travel demand forecasting process using the traditional sequential approach, Trip generation - trip distribution, Mode split and trip assignment, Evaluation or transportation projects.

References:

* Adib Kanafani, Transportation Demand Analysis, McGraw Hill, 1983.
* Juan de Dios Ortuzar and Willumsen, Luis G., Modelling Transport, , 1990.
* Robertson, H. D.; Hummer, J. E. and Nelson, D. C., Institute of Transportation Engineers, Manual of Transportation Studies, 1994.

CEP 471 Highways Construction Technology

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Technology of embankment construction, Technology of pavement construction. Lay down of asphalt mixes: Compaction of asphalt mixes. Operation and supervision of asphalt mixing plants, Equipment, Inspection, Quality control, Surface treated pavements, Methods of soil stabilization. Rigid pavements: Technology of construction, Quality control. Construction requirements for modified binders: Polymers, Sulphur, Mineral filler and other additives. Use of asphalt in hydraulic structures: Reservoirs, Tanks design, Dams, Canal linning, Embankment protection, Coastal structures.

References:

* Annual Book of ASTM Standards, ASTM, 100 Barr Harbor Drive, West Conshohocken, PA19428, 1996.
* جمهورية مصر العربية - وزارة الاسكان والمرافق والمجتمعات العمرانية، الكود المصري لأعمال الطرق الحضرية والخلوية، مركز بحوث الاسكان والبناء، ١٩٩٨.
* AASHTO Standards, A Policy an Geometric Design, Pavement Design, etc., 2001.

CEP 472 Airport Engineering

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Airport planning, Elements of airport, Runway orientation and defining landing and takeoff positions, Aircraft characteristics, Aircrafts apron layout. Design of runway including length, Width, Longitudinal and pavement slope. Design of: Helicopters landing strip, Structural design of pavement, (flexible and rigid), Drainage system, Sign and pavement marking.

References:

* Annual Book of ASTM Standards, ASTM, 100 Barr Harbor Drive, West Conshohocken, PA19428, 1996.
* ICAO Standards, International Civil Aviation Organization, , 2000.
* AASHTO Standards, A Policy an Geometric Design, Pavement Design, etc., 2001.

CEP 473 Maintenance of Roads & Airports

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Assessment of pavement distresses: Assessment of flexible pavement distresses and assessment of rigid pavement distresses, Tests of pavement evaluation, Methods of pavement evaluation, Road maintenance, Maintenance of flexible pavement. Maintenance of rigid pavement, Maintenance of pedestrian crossing routes, Road curbs and pitching, Maintenance of unpaved roads, Maintenance of drainage system, Maintenance of opened and covered ditches, Maintenance of surface water drainage system, Recycling of road pavement materials, Reconstruction works, Pavement management systems.

References:

* Annual Book of ASTM Standards, ASTM, 100 Barr Harbor Drive, West Conshohocken, PA19428, 1996.
* جمهورية مصر العربية - وزارة الاسكان والمرافق والمجتمعات العمرانية، الكود المصري لأعمال الطرق الحضرية والخلوية، مركز بحوث الاسكان والبناء، ١٩٩٨.
* AASHTO Standards, A Policy an Geometric Design, Pavement Design, etc., 2001.

CEP 481 Railway Engineering (1)

4th Year: Civil Engineering - Public Works (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Railway dynamics: Tractive effort and resistance, Acceleration and braking, Line capacity. Railway alignment: Longitudinal and cross sections, Railway path, Vertical

and horizontal curve design, Gaparite, Cumulative curve. Structural design of track: Wheel - rail interaction, Forces acting on the rail, Joined and welded rail design, Sleeper and ballast design, Unballasted track and magnetic levitation train, Turnouts, Stations and signals, Renewal and maintenance.

References:

* Radwan and Riad, Railway Engineering, Ain Shams University, 1998.
* Hemeda and Salem, Railway Engineering Text book, Alexandria University, 2002.
* El Hawary, El Bary and Salama, Railway Engineering, Cairo University, 2002.

CEP 482 Railway Engineering

4th Year: Civil Engineering - Water & Hydraulic Structures Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Study of external forces affecting the wheel and rails due to move or brake. Design of vertical and horizontal curves. Study of vibrations, Thermal change, Dynamic effect of track on embankments, Bridges and tunnels with application for rail, Sleeper and ballast design for both rural and underground lines. Unballasted track technology, Turnouts, Stations and signals technology.

References:

* Radwan and Riad, Railway Engineering, Ain Shams University, 1998.
* Hemeda and Salem, Railway Engineering Text book, Alexandria University, 2002.
* El Hawary, El Bary and Salama, Railway Engineering, Cairo University, 2002.

CEP 483 Railway Engineering (2)

4th Year: Civil Engineering - Public Works Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Turnouts and switches: Switch, Diamond crossing, Crossover, Scissor crossover, Slip, Double junction. Stations and yards: Passenger and freight stations, Locomotive and stabling yards, Sorting and marshalling yard. Railway cost: Price and subsidy. Signals: Classification and types, Mechanical devices of interlocking, Train traffic control, Automatic block system (ABS), Centralized traffic control system (C.T.C), Automatic train control (ATC) system.

References:

* Radwan and Riad, Railway Engineering, Ain Shams University, 1998.
* Hemeda and Salem, Railway Engineering Text book, Alexandria University, 2002.
* El Hawary, El Bary and Salama, Railway Engineering, Cairo University, 2002.

CEP 499 Project

4th Year: Civil Engineering - Public Works (Cont.) Hrs/Week: [(2+2) + (0+4)]

Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Architecture Engineering

ARC 111 Visual Design & Design Fundamentals

1st Year: Architecture Engineering - . (1st Term) Hrs/Week: [(2+5) + (0+0)]

Marks:[(100+75+0) + (0+0+0)] = 175

Course Contents

This course is an introduction to the basic equipment, Media, Techniques and principles of graphic communication. Fundamental skills are established in both free hand and drafting techniques. The course includes, Studying the different design elements: Point, Line, Direction, Shape, Size, Texture, Color and form. The course investigates and explores processes involved in perception, Nature of light, Movement, Color, Depth and distance cues. Design fundamentals are reinforced where students can experiment and explore several ideas related to Two and Three dimensional forms. The course involves case studies and applications of design principles in architectural design.

References:

* Ching, Francis D. K., Architecture: Form, Space and Order, Van Nostrand Reinhold Co. NY. USA, 1979.
* VanDyke Scott, From Line to Design, American Planning Association, USA, 1985.

ARC 112 Architectural Drawing & Representation Techniques

1st Year: Architecture Engineering - . (1st Term) Hrs/Week: [(2+5) + (0+0)]

Marks:[(100+75+0) + (0+0+0)] = 175

Course Contents

This course aims at educating students the principles of architectural drawing. Emphasis is placed upon developing the skills of imagination by using pen and pencil. The course includes developing students' free hand skills as well as mastering other drawing techniques using different drawing tools and equipment, With emphasis on the importance of light and shadow in architectural representation. The course includes developing students' abilities of deducting elevations and sections from 3 dimensional drawings and vice versa. The course aims also at educating students to draw efficiently and accurately, By developing their representation and rendering skills, Through the study of the principles of casting shades and shadows in architectural plans and elevation, In addition to developing skills in interior and exterior perspective representation.

References:

* VanDyke Scott, From Line to Design, American Planning Association, USA, 1985.

ARC 113 Architectural Design (1)

1st Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (0+7)]

Marks:[(0+0+0) + (90+60+25)] = 175

Course Contents

The design studio introduces students to the perception of architectural spaces and develops abilities to design simple spaces and compositions, By considering the functional activities and circulation on simple requirements. Exercises with simple spatial requirements studying design considerations of spaces. Each exercise focuses on certain design objectives, As part of the set of objectives while addressing the basic design concerns of circulation, Orientation, Privacy, Spatial compositions … etc. Examples of selected projects Would be: Private residences, Vacation houses, Buildings for the children: Kinder-gartens, Activity centers and libraries for children, Kiosks, Pavilions and simple service buildings in public places, Simple structural buildings like parking sheds-bus terminals and others.

References:

* VanDyke Scott, From Line to Design, American Planning Association, USA, 1985.
* White, Edward T., Space Adjacency Analysis, Architectural Media Limited, Florida, USA, 1986.

ARC 121 Theory of Architecture (1)

1st Year: Architecture Engineering - . (1st Term) Hrs/Week: [(4+0) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction to architecture: Definitions, Needs, Design goals, Design standards and criteria potentials and constraints. Building objectives: Firmness, Commodity and delight. Function: Anthropometric data, Analyzing buildings to accommodation, Service and circulation spaces. Horizontal circulation: Corridors, Lobbies and entrances. Vertical circulation: Ramps, Staircases, Lifts and escalators. Primary elements: Point, Line, Plane, Volume. Properties of form: Primary forms, Regular and irregular forms form transformation: Dimensional, Additive, Subtractive by modifiers. Elements of space: Horizontal and vertical.. Space treatment: Light, Texture, Color. Space organization: Spatial relationships, Spatial continuity. Principles of composition: Unity, Axis, Dominance, Symmetry, Harmony, Rhythm and repetition, Hierarchy, Datum. Variety within unity material, Color, Texture, Shape. Proportions: Golden section, The orders, The modular. Scale: Types

References:

* Neufert, Architect's Data, Grosby Lockwood Staples, London, 1970.
* Ching, Francis D. K., Architecture: Form, Space and Order, Van Nostrand Reinhold Co. NY. USA, 1979.
* Laseau Paul, Graphic Thinking for Architects and Designers, Reinhold Co. NY. USA, 1980.

ARC 131 History of Architecture (1)

1st Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+0)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

The course aims to clear the relation between the architectural concept and the philosophy of design in different ages and the effects of physical, Cultural, Natural and constructional possibilities on the different architectural elements, Through a comparative analytical study of art and architecture for different old cultures: Ancient Egyptian, West asiatic and mesopotamia, Babylonian, Assyrian and persian and the classical ages: Greek and roman and the early christian and byzantine periods.

References:

* Banister Fletcher, A History of Architecture on the Comparative Method, , Latest Ed.

ARC 151 Building Construction

1st Year: Architecture Engineering - . (Cont.) Hrs/Week: [(2+3) + (2+3)]

Marks:[(0+50+0) + (125+50+25)] = 250

Course Contents

The course aims to clear the main elements of the building, Building materials and building systems (bearing walls, skeleton, shell construction and other new structural systems) and to train the student to draw the constructional details through the study of: Bearing wall buildings (bricks and stones), Architectural symbols, Building methods, Bonds, Tools, Wall thickness, Openings. Lintels and arches, Vaults and domes, Foundations, Damp proofing, Heat and sound insulation, Expansion and settlement joints, Retaining walls, Erection requirements, Concrete components, Structural elements, Stairs, Internal sanitary installations, Internal and external finishes.

References:

* Ramsey, Sleeper Architectural Graphic Standards, Wiley, Latest Ed.
* Mitchell, Building Construction, Batsford, Latest Ed.
* McKay's, Building Construction, Volume One, Longmans, Latest Ed.

ARC 161 Environmental Design & Control

1st Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (1+2)]

Marks:[(0+0+0) + (40+35+0)] = 75

Course Contents

An Introduction on the conception and importance of environmental control and its influence on the design of buildings through studying: Thermal environment: Solar radiation, Sun path diagram, Design of shading devices, Thermal exchange between the building and the environment, Ventilation. Light environment daylighting. The importance of daylighting, Sky conditions, Components of daylighting, Factors affecting illuminance due to Daylighting inside buildings, The influence of window design on the condition of indoor illumination, Methods of analyzing daylighting, Quality of lighting and glare avoidance.

References:

* Robins, C., Daylighting Design and Analysis, Van Nostrand Reinhold Co., 1986.
* Guzowski, M., Daylighting Sustainable Design, McGraw Hill, Co., 2000.
* Brown, G. Z., Sun, Wind and Light, Architectural Design Strategies, John Wiley and Sons Inc., 2000.

ARC 211 Architectural Engineering

2nd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

The course introduces students to basic components of buildings, Building materials and types of finishes. Exercise areto train students to comprehend architectural drawings and the notions used. The course includes load-bearing constructions lintels vaults, Domes, thermal insulation, Water proofing, Staircases in buildings (types - materials and design considerations, joints in buildings and architectural treatments).

References:

* Ramsey, Sleeper Architectural Graphic Standards, Wiley, Latest Ed.
* Mitchell, Building Construction, Batsford, Latest Ed.
* McKay's, Building Construction, Volume One, Longmans, Latest Ed.

ARC 212 Architectural Design (2)

2nd Year: Architecture Engineering - . (Cont.) Hrs/Week: [(0+8) + (0+8)]

Marks:[(0+80+0) + (200+80+40)] = 400

Course Contents

The course aims to develop architectural design capacities related to the design of buildings, (featuring repetitive elements and other spatial ones) (school, commercial center, tourist village, etc). While satisfying functional and structural requirements. Developing architectural design capacities related to the design of multi-function buildings (retail-commercial-residential complex) featuring multiple circulation networks while satisfying functional and structural requirements.

References:

* Selected References, Manuals, Catalogues, Data Books, Latest Ed.

ARC 221 Theory of Architecture (2)

2nd Year: Architecture Engineering - . (1st Term) Hrs/Week: [(4+0) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

The course introduces different types of design methods. It covers a wide range of issues related to the formulation and analysis of architectural program and brief.

Synthesis of the design concept and methods of evaluating and developing the concept. The course aims at enhancing the student's analytical abilities while developing design concepts and selecting a suitable approach in solving architectural problems. Finally, The course presents different techniques in generating creative ideas in architectural design.

References:

* John Chris Hones, Design Methods, New York, 1992.
* Duerk, Donna P., Architectural Programming: Information Management in Design, VNR, NY, 1993.

ARC 231 History of Architecture (2)

2nd Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+0)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

An analytical study of the art and architecture of the early Islamic, Ayyubid and abbasid periods with an emphasis on selected monuments of Egypt from the tulunid, Fatimid, Mamluk and ottoman periods to illustrate the unity of architectural expression in each period with its culture and environment -Examples from religious and secular architecture are studied in lectures and field trips -The course also surveys the architecture of west Europe: The romanesque. Gothic and renaissance architecture.

References:

* توفيق أحمد عبد الجواد، تاريخ العمارة والفنون الاسلامية، مكتبة الانجلو المصرية. القاهرة، ١٩٨٢.
* Hillenbrand Robert, Islamic Architecture, Edinburgh University Press, 1994.

ARC 241 Computer Applications (1)

2nd Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (50+25+25)] = 100

Course Contents

Introduction to computers as a tool for architects and its applications in 2D and 3D drawing. Topics for 2D include: The CAD interface, Command syntax, Drafting theory, Selecting objects, Inserting objects, Correcting errors, Object snap, Zooming. Measuring objects, Panning, Text, Layers, Editing objects, Linetypes, Lineweights, Manipulating objects, Grips, Construction lines, Crosshatching, Blocks, dimensioning, reference files, special objects and plotting. Topics for3D include: Extrusions, viewing the model, world and user Coordinate systems, Wireframe models, Modifying and editing wireframes, Model space, Paper space, Scaling views, Perspective views, 3D surface modeling, 3D faces, 3D Polygon meshes, Solid shapes, 3D solid models, Sectioning, Slicing, Shading and rendering solid models.

References:

* Lloyd, Jshort, Using Special Edition Auto CAD, 1992.

* Selected Software, Drafting Packages, CAD Tools, Latest Ed.

ARC 251 Building Construction & Principles of Working Drawings

2nd Year: Architecture Engineering - . (Cont.) Hrs/Week: [(2+4) + (2+4)]

Marks:[(0+60+0) + (150+60+30)] = 300

Course Contents

Study of details of: Construction, Finishes and maintenance. The course aims at developing the skills in detailed drawings: Execution of buildings. Setting out foundations, Excavation, Laying foundations. Super structure works. Joints, (settlement, expansions…), Carpentry of doors and windows. Curtain walls. Internal partitions, Timber construction of trusses, Lamella. Finishing materials (internal and external), Plaster and painting works, Maintenance of buildings, Repairs and improvement of performance. Approach to working drawings and data requirements.

References:

* Keith Styles, Working Drawing Handbook, Oxford: Butterworth, Heinemann, 1995.
* Ramsey, Sleeper Architectural Graphic Standards, Wiley, Latest Ed.
* Mitchell, Building Construction, Batsford, Latest Ed.
* McKay's, Building Construction, Volume One, Longmans, Latest Ed.

ARC 261 Acoustics & Artificial Lighting

2nd Year: Architecture Engineering - . (1st Term) Hrs/Week: [(2+0) + (0+0)]

Marks:[(35+15+0) + (0+0+0)] = 50

Course Contents

Artificial lighting: Visual perception and light, Basic artificial lighting sources, Light and visual effects, Light revealing architecture, Designing for artificial lighting quantity and quality, Integration with daylighting, Computer simulation programs that aid artificial lighting design. Architectural acoustics: Definition of architectural acoustics and its importance in buildings, Terminologies, Behaviour of sound waves in enclosures, Sound absorption, Sound reflections, Sound isolation, The concepts and objectives of acoustics design: The most important considerations that have to be considered for designing auditoriums.

References:

* Egan, David M., Architectural Acoustics, McGraw Hill Book Co., 1972.
* Hopkinson, R. G. and Kay, J. D., The Lighting of Buildings, Faber and Faber Press, London, 1972.
* Millet, Marietta S., Light Revealing Architecture, Van Nostrand Reinhold, New York, 1996.
* الخطيب أحمد، الصوتيات المعمارية - النظرية والتطبيق، مكتبة الأنجلو المصرية، ٢٠٠٣.

ARC 311 Architectural Design (3)

3rd Year: Architecture Engineering - Architecture (Cont.) Hrs/Week: [(0+8) + (0+8)]

Marks:[(0+80+0) + (200+80+40)] = 400

Course Contents

Design studio is concerned with the development of skills in solving composite problem to include different functions, Circulation and construction systems, While paying attention to limitations of site and environment, Identifying a principal objective in the design solution, Special emphasis on the study of internal spaces. Also housing projects are a must as they introduce concepts of outdoor and indoor spatial composition, Through the study of a basic dwelling unit. In a specified urban site and the impact of social as well as economic factors on design is introduced with emphasis on internal vehicle and pedestrian circulation.

References:

* Selected References, Manuals, Catalogues, Data Books, Latest Ed.

ARC 312 Architectural Design (4)

3rd Year: Architecture Engineering - Urban Planning & Design (Cont.) Hrs/Week: [(0+6) + (0+6)]

Marks:[(0+50+0) + (150+50+50)] = 300

Course Contents

The course aims at developing the students abilities in designing residential settlements with different levels and types, Urban or rural, In addition to their services. Emphasis is put on housing projects with specific site potentials and constraints. Design concepts should emphasize diversified free spatial forms through the design of the basic residential unit, Circulation studies, Landscape design.

References:

* Selected References, Manuals, Catalogues, Data Books, Latest Ed.

ARC 313 Spatial Composition & Aesthetics in Architecture

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(1+2) + (0+0)]

Marks: [(40+35+0) + (0+0+0)] = 75

Course Contents

The course highlights the impact of aesthetics on architectural form and compositions through the study of theories and principles of artistic composition and philosophical approaches. Creativity and visual perception of spatial formations are analyzed to give students the vocabulary and experience needed for creative design.

References:

* Venture Robert, Complexity and Contradiction in Architecture, The Architectural Press

Ltd., London, 1985.
* Baker, Geoffrey H., Design Strategies in Architecture, Van Nostrand Reinhold, 1989.
* Conway, H. and Roenisch, R., Understanding Architecture, Rowtledge, London, 1994.

ARC 314 Architectural Rendering

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(1+2) + (0+0)]
Marks: [(40+35+0) + (0+0+0)] = 75

Course Contents

The course aims to train the student how to do presentation for the architectural areas and spaces - internal and external. Study the new materials, Its properties and how to represent it in 2D and 3D color, Texture and proposition. Training in the class how to use color and materials with sketches. And how to make models to create ability for architectural imagination.

References:

* Marilyn Farrow, IBD Interior Spaceces Chicago, USA, 1999.

ARC 315 Interior Design

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (1+2)]
Marks: [(0+0+0) + (40+35+0)] = 75

Course Contents

A study of theories and principles of interior design, Internal and external spaces hierarchy and interaction, Study of horizontal and vertical planes treatments and finishes, The study of movement , Visual perception, Space time internally and externally, The study of surfaces: Textures, Forms and visual illusions, Theories of colors, Color schemes and its different effects, The effects of natural andartificial lighting In spaces for different uses internally and externally, International examples and concepts in interior design.

References:

* Pile, Hohn F., Interior Design, Abrams, 1989.
* Jonathan Poore, Interior Color by Design, Rock Falls Inc., 1994.

ARC 321 Theory of Architecture (3)

3rd Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(4+0) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

An introduction to theories and philosophy of the international styles of the 2Oth and the modern movement: The organic theories of sullivan and wright, The functional formalism of le corbusier. The functional technological theories of the bauhaus and gropius, The structuralism of mies van der robe and the expressionism of mendelson. Also an introduction to design principles, Concepts and considerations

in office building, Commercial buildings, Industrial plants, as well as transportation building.

References:

* Hanrich Klotz, Century Architecture, New York: Rizzol, 1990.
* Kropf, Karl, Theories and Manifestoes of Contemporary Architecture, London: Academy Ed., Pub., 1995.
* Chris Adel, Architecture and Identity, Response to Cultural and Technological Changes New York: Rizzol. Pub, 1999.

ARC 322 Theory of Architecture (4)

3rd Year: Architecture Engineering - Architecture (2nd Term) Hrs/Week: [(0+0) + (4+0)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

The course traces the development of architectural thought in the second half of the 20th century and beyond and its effects on local architecture, A study of architectural spaces in the local tradition and its influences on local contemporary architecture, An introduction to design principles, Concepts and considerations in cultural and civic centers etc …

References:

* Charles Jencks, Modern Movements in Architecture, London: Academy Ed., Pub., 1989.
* Charles Jencks, Architecture to day, London: Academy Ed., Pub., 1994.
* Dennis Doordan, Twentieth Century Architecture, Hong Kong: King Pub., 2001.

ARC 324 Architectural Criticism & Project Evaluation

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(1+2) + (0+0)]

Marks: [(40+35+0) + (0+0+0)] = 75

Course Contents

The course emphasizes the multiplicity of architectural thinking. It introduces the theoretical approaches of contemporary architectural thoughts. The course discusses concepts of integration and comprehensiveness in architectural solutions, Principles of architectural criticism and techniques of evaluating projects are discussed.

References:

* Robert Venturi, Complexity and Contradictions in Architecture, New York: Dover Publications, 1971.
* Siegfried Gideon, Space, Time and Architecture. The Growth of a New Tradition, Boston, Mass, MIT Press, 1974.
* Wiebenson Dora, The Architectural Theory from Alberti to Ledoux, New York: The Museum of Modern Arts Publications, 1978.
* Alan Greenhalgh, Imitation and Innovation, London: Academy Ed., Pub., 1988.
* Aldo Rosse, Architecture, Theory and Criticism, Boston, Mass, MIT Press, 1989.

ARC 341 Computer Applications (2)

3rd Year: Architecture Engineering - Architecture (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (50+25+25)] = 100

Course Contents

Introduction to computer as decision support tools through two main approaches: Mathematical modeling and CAD virtual building modeling. Mathematical modeling is achieved through using the spreadsheet programs .Topics include: Basic principles, Entering data/ranges/selecting, Editing and formatting, Data processing, Functions and formulae, Navigating worksheets and workbooks, Creating hyperlinks, Using analysis, Applying protection and adding comments and making data validation. While CAD virtual building modeling is achieved through the use of 3D programs. Topics include: Basic concepts and tools for creating an object oriented 3D virtual model and how to refine it. Also, A variety of ArchiCAD's output capabilities as: Printing and plotting architectural drawings, Quantity calculation, Shaded view creation, Photo-realistic rendering, Sun studies, Animation "fly throughs" virtual reality and panoramic scenes.

References:

* Microsoft Excel Manual: Arrays, Functions and Macro, Microsoft Corporation, 1990.
* Selected Software, Drafting Packages, CAD Tools, Latest Ed.

ARC 351 Working Drawings (1)

3rd Year: Architecture Engineering - Architecture (Cont.) Hrs/Week: [(0+6) + (0+6)]

Marks:[(0+60+0) + (150+60+30)] = 300

Course Contents

The course aims to introduce the basics of detailed execution drawings. Exercises on the preparation of detailed location and assembly drawings including detailed sections, Detailed space drawings and assembly drawings for the coordination between different professions, In addition to signs, Symbols and information systems.

References:

* Seely, I.H., Building Technology, Macmillan, London, 1993.
* Keith Styles, Working Drawing Handbook, Oxford: Butterworth, Heinemann, 1995.
* Rosen, H.J., Architectural Materials for Construction, McGraw Hill, New York, 1996.
* Engel, Heino, Structure Systems, Verlag Gerd Hatje, Ostfildern- Ruit, Germany, 1999.

ARC 352 Specifications & Quantity

3rd Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(2+3) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to the writing of specifications documents presented with working drawings as part of the contract documents, General and special conditions of the job, Defining the scope of work and detailed descriptions of items and materials, Quantity surveying (rules and methods), Check listing the finished work and detecting faulty items.

References:

* محمد زكى حواس، فن البناء المعاصر، مكتبة عالم الكتب، ١٩٧٩.
* عبد اللطيف أبو العطا، الموسوعة الهندسية، دار ماجد للطباعة، ١٩٨٤.

ARC 361 Environmental Design & Energy Conservation

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (1+2)]

Marks: [(0+0+0) + (40+35+0)] = 75

Course Contents

An introduction to the energy conservation in buildings, As one of the most important goals of the ecological trend in architecture, Through studying: The inefficient energy consumption in contemporary architecture, The principals of green architecture and its role in energy saving. Types of fossil and renewable energy resources, The application of solar energy in the passive design of buildings. Design techniques for passive cooling and passive heating, Analyzing applied examples. Optimizing the integrated application of each: Passive, Low-energy and active cooling methods in building design to achieve maximum efficiency in energy conservation.

References:

* Wright, D., Natural Solar Architectural, A Passive Primer, Litton Educational Publishing, 1978.
* Brawn, G. Z.; Sam, Wind and Light, Architectural Design Strategies, John Wiley and Sons Inc., 2000.
* Barid, G., The Architectural Expression of Environmental Control Systems, Spon Press, London, 2001.

ARC 411 Architectural Design (4)

4th Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(0+10) + (0+0)]

Marks:[(125+75+50) + (0+0+0)] = 250

Course Contents

The objective of forth year architectural design subject is how to deal with large projects which cover urban studies, Buildings relations in layout and to design each building individually. This course process goes through, Similar projects analysis, Preparation of preliminary program, Picking out the design and planing criteria, Circulation … etc. Point of stress in design projects will be on urban design, Landscape, Zoning. Hierarchy of space according to its size and Importance.

Entrances pedestrian and car circulation design concept, Structural concept and environmental effect of the building. All should be submitted in plans, Elevations, Sections, Perspectives and models. This demonstrating the student ability in presenting his final design and concept.

References:

* Selected References, Manuals, Catalogues, Data Books, Latest Ed.

ARC 412 Architectural Design (5)

4th Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(0+6) + (0+0)]

Marks:[(75+55+20) + (0+0+0)] = 150

Course Contents

The course aims at developing the students abilities in designing multifunctional buildings on sites with certain potentials and limitations. Emphasize urban integrations with surrounding environment. Projects with special complex environments and problems: Urban and rural, Neighbourhood, Centers with emphasis on circulation networks integrated with open urban spaces.

References:

* Selected References, Manuals, Catalogues, Data Books, Latest Ed.

ARC 413 Housing in Developing Countries

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]

Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

Introduction to the housing issues in developing countries which is characterized by rapid growth of towns and cities, Restructuring of traditional modes or dwelling and inhabitation, Different ways of planning and organizing the built environment and introducing different processes and production in the building sector. Course Objectives: To introduce major housing issues and problems at all scale levels (from the global to the very local i.e. dwelling level). To discuss new and emerging concepts, Methods and tools to face new challenges in the housing sector in developing countries, The course is an introduction to housing in developing countries: Concepts and issues. The schools of thought in housing issues. Housing system typologies, Housing system and housing policy evolution in Egypt, Housing and economic aspects, Case studies in selected context.

References:

* Rapoport, A., Human Aspects in Urban Form, Pergamon Press, Oxford, 1977.
* Turner, J. F. C, Housing by People, Towards Autonomy in Building Environments, Marian Boyars, London, 1979.
* Aboesh, Ibrahim M., Housing Policies in Developing Countries Between Theory and Practice, Ain Shams University, 1991.
* Ettouney, S. and Abdelkade, N., Notes on Housing and Physical Planning, Al Araby Press, 1992.

ARC 421 Humanities in Architecture

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]

Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

The course aims at introducing the role of human factors in the design process - highlighting the behavioural and psychological dimensions in architecture through the study of visual, Social, Psychological and perceptual influences of people and place. Incorporating the behavioural sciences as a set of design priorities in designs generated from a better understanding of human perceptions and preferences

References:

* Moore, G., Environment Behaviour Studies, McGraw Hill, 1979.
* Abel Chrio, Architecture and Identity, Architectural Press, 1986.
* Bird Alexander, Philosophy of Science, John Shand, UCL Press, 1988.

ARC 422 Contemporary Vernacular Architecture

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]

Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

This course emphasis at the prevailing issues of the contemporary vernacular architecture, Using the induction analytical method: Defining contemporary architecture, Its features ideologies and its relationship with international architectural schools, The main features and points of references in this course, The depate between intellectual and cultural variables affecting the local, Political and social issues are to be argued, Within variable examples and case studies.

References:

* Jenks, C, What is Post Modernism, Academy Edition, London, 1986.
* Jenks, C, Architecture Today, Academy Group Ltd., London, 1993.
* روز، مارجريت، ما بعد الحداثة، الهيئة المصرية العامة للكتاب، القاهرة، ١٩٩٤.

ARC 451 Working Drawings (2)

4th Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(0+8) + (0+0)]

Marks:[(100+80+20) + (0+0+0)] = 200

Course Contents

The studio work aims at prepaing the student to complete a drawing documents set of a preliminary design project and to apply previous courses knowledge gained from with an emphasis on methods of constructions and high technology working details and materials to produce a whole set of drawings including electrical and plumbing drawings.

References:

*
* Keith Styles, Working Drawing Handbook, Oxford: Butterworth, Heinemann, 1995.
* Rosen, H.J., Architectural Materials for Construction, McGraw Hill, New York, 1996.
* Engel, Heino, Structure Systems, Verlag Gerd Hatje, Ostfildern- Ruit, Germany, 1999.

ARC 452 Advanced Technical Installations

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]
Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

The course aims at gaining familiarity with new techniques used in advanced technological systems in buildings (alarm systems, fire fighting systems, communication systems, air conditioning systems, electronic control systems), Basic concepts are illustrated. Materials and technical installations are addressed with its influence on contemporary architecture and applications.

References:

* Seely, I. H., Building Technology, Macmillan, London, 1993.

ARC 461 Housing

4th Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(2+4) + (0+0)]
Marks:[(75+50+25) + (0+0+0)] = 150

Course Contents

Definition of housing and its different level, The environmental impact on different housing types. Managing and financing housing projects people participation in housing projects. Definition, Needs and selection criteria for different target groups, Development phasing for housing clusters, Design criteria and constrains for grouping the residential units and services.

References:

* Payne, G., Low Income Housing in the Developing World, Liverpool University Press, 1986.
* Forbes Davisdson and Geoff Payne, Urban Projects Manual, Liverpool University Press, 1996.

ARC 471 Feasibility Studies & Project Management

4th Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(1+2) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

The course emphasizes the importance of feasibility studies in making design decisions, Land economics, Initial costs and running costs. Projects turnovers and marketing studies. Course also emphasizes the importance of project management, Planning and time scheduling of jobs, Evaluation of programs and critical path

method, Cost-time analysis.

References:

* Spark, Lipsey H. G. and Steiner, P., Economics, Harper and Row Pub., NY., 1983.
* Walter Ingo, Studies in International Environmental Economics, John Wiley, London, 1988.

ARC 472 Professional Practice & Legislation

4th Year: Architecture Engineering - Architecture (1st Term) Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

The course explains the roles of the architect, The contractor and the owner during the building and construction process. It is a study of the professional practice codes and legislations in terms of rights, Commitments, Ethics and scope of services. Types of contracts, Fees, Bidding and construction supervision are the main issues of this course. Also, Types of contracting agreements and guarantee against construction flaws are discussed and analyzed by applying case studies. Finally, The course discusses building codes and regulations in Egypt.

References:

* محمد زكى حواس، فن البناء المعاصر (قوانين وتشريعات وتنظيم المبانى)، مكتبة عالم الكتب، ١٩٧٩.
* عادل أمين، قانون المباني - قانون توجيه وتنظيم أعمال البناء في مصر، دار المعارف، ١٩٩٦.
* محمد ماجد خلوصى، جمال الدين نصار، قانون وتشريعات معمارية، ١٩٩٦.

ARC 481 Urban & Architectural Heritage

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]

Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

The course emphasizes the importance of architectural and urban heritage. The study introduces criteria for classifying and documenting the heritage, Study of environmental problems: Subsoil water, Air pollution, Visual pollution, Miseuse of buildings and spaces, Negligence and lack of maintenance, The principles of preservation and techniques of restoration for architectural heritage.

References:

* Feilden, Bernard M., Conservation of Historic Buildings, Butterworth Scientific, London, 1982.
* Pickard, Robert D., Conservation in the Built Environment, Longman Publisher. Essex, 1996.
* Warren John and El, Conkxt: New Building in Historic Settings, Architectural Press, Oxford, 1998.

ARC 491 Project Studies & Technical Report

4th Year: Architecture Engineering - Architecture (2nd Term)

Hrs/Week: [(0+0) + (1+1)]

Marks:[(0+0+0) + (35+15+0)] = 50

Course Contents

This course introduces the student with different techniques for preparing technical reports analysis of collected data and conclude the architectural program for different architectural components. Different studies for functional aspects, Ecological and different architectural styles for similar architectural projects are to be argued and compared with similar architectural projects. The student is to submit, By the end of the course, A final report concerning the site and ecological analysis of his project within a comparative study with different and similar project, That will finally lead to his final architectural program.

References:

* Joseph De Chiara, Time Saver Standards for Site Planning, McGraw Hill Book Co., USA, 1984.

ARC 499 Project

4th Year: Architecture Engineering - Architecture (2nd Term)

Hrs/Week: [(0+0) + (0+16)]

Marks:[(0+0+0) + (0+200+200)] = 400

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Urban Planing

UPL 241 Urban Landscaping

2nd Year: Architecture Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

This course is an introduction to urban design theory and practice. Examines the meaning and scope of urban design. Analyzes the elements of the urban landscape: Open spaces, Built form, Urban form, Greenery, Street furniture, Movement patterns. The course includes a studio which will focus on space design, Relation between buildings and open spaces, Grouping, Geometry of space, Landscape elements. Students will also learn how to survey the built environment on the scale of the street (monographic scale) Visual analysis. Includes case studies and site visits, Site design.

References:

* Lynch, K., The Image of the City, The Mit Press, 1960.
* Woods, G. W., Townscape, Oxford University Press, 1997.
* Bentley, I. et al. (eds), Responsive Environments, Oxford Books, 1997.

UPL 251 Theories & History of Planning

2nd Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+0)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

The purpose of the course is to introduce the origins of the city throughout history, How city has originated, Why. The forces that shaped its growth. The course will concentrate on the origins of modern city and theories about its emerging form including the transformations since the middle ages. Analysis of the current issues of city form in relation to city making, Social structure and physical design. The student will be able to analyze and differentiate between the different urban patterns: The grid, Radial, Spontaneous planning, Understand the effect of different attributes that shape city form and urban pattern (social, economic, cultural, and religious). Examples, Comparative analysis, Case studies.

References:

* Tanghe, J.; Vhaeminck, S. and Berghoef, J., Living Cities, Pergamon Press, 1984.
* هشام أبو سعدة، الكفاءة والتشكيل العمراني، مدخل لتخطيط وتصميم المواقع، المكتبة الأكاديمية، ١٩٩٤.
* Greed Clara, Introducing Town Planning, Longman Group, 1994.
* Greed Clara, Implementing Town Planning, Longman Group, 1996.

UPL 311 Urban Design (1)

3rd Year: Architecture Engineering - Urban Planning & Design (Cont.) Hrs/Week: [(2+5) + (2+5)]

Marks:[(0+50+0) + (175+75+50)] = 350

Urban Planing

Course Contents

Introduces the scope of urban design and the role of urban designer in shaping the urban environment and urban form. History and reasons and needs for the discipline. Misconceptions about the profession. Elements and components of the urban environment, Relation between built form and space and people and culture, Place theory, Place versus space, Critical reconstruction, Infill projects. Relation between urban design and planning, Space and objectives of urban design at different levels of planning, Qualities of urban design, Concepts (permeability, variety, robustness, legibility, visual appropriateness), Experiences and case studies will include comparative analysis of components and reasons of success or failure. Project in an existing area: Purpose of project is to link between planning dimensions that affect the project and the design concepts in an integrated project that will consider the impact of natural, Social, Economic and environmental attributes and urban design. Analyze the different variables. Synthesize and draw conclusions to develop a program for an original urban project that is based on objective criteria.

References:

* Lynch, K., The Image of the City, The Mit Press, 1960.
* Woods, G. W., Townscape, Oxford University Press, 1997.
* Bentley, I. et al. (eds), Responsive Environments, Oxford Books, 1997.

UPL 312 Urban Design

3rd Year: Architecture Engineering - Architecture

Hrs/Week: [(0+0) + (1+2)]

Marks: [(0+0+0) + (40+35+0)] = 75

Course Contents

Introduction to Imaginability and elements of the urban landscape (paths, nodes, landmarks, districts, edges). The role of urban design in shaping urban environments. Relation between urban design and architecture. Comparative analysis of various urban environments and the different attributes that helped to shape them (design factors, cultural attributes, social and environmental determinants). Observative analysis and tools for documentation of the urban environment. Field work and case studies: Analysis of local urban environments.

References:

* Lynch, K., The Image of the City, The Mit Press, 1960.
* Woods, G. W., Townscape, Oxford University Press, 1997.
* Bentley, I. et al. (eds), Responsive Environments, Oxford Books, 1997.

UPL 321 Urban Planning

3rd Year: Architecture Engineering - Architecture (2nd Term)

Hrs/Week: [(0+0) + (1+4)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Housing problems, Housing typology in urban areas stressing on deteriorated areas

and how to deal with them, New housing areas. Housing production systems, The role of different authorities in implementing housing projects. The studies shall be applied through the development of a project dealing with urban surveys for an area, Defining and analysing their problems.

References:

* Tanghe, J.; Vhaeminck, S. and Berghoef, J., Living Cities, Pergamon Press, 1984.
* هشام أبو سعدة، الكفاءة والتشكيل العمراني، مدخل لتخطيط وتصميم المواقع، المكتبة الأكاديمية، ١٩٩٤.
* Greed Clara, Introducing Town Planning, Longman Group, 1994.
* Greed Clara, Implementing Town Planning, Longman Group, 1996.

UPL 322 Town Planning & Housing

3rd Year: Architecture Engineering - Urban Planning & Design (Cont.) Hrs/Week: [(2+3) + (2+4)]

Marks:[(0+50+0) + (140+50+35)] = 275

Course Contents

Levels and axis of planning, Planning methodology, Functional and administrative divisions of the city, City boundaries, Elements of the city. System for the analysis of planning information, City center, Roads, Traffic and parking areas (problems and solutions), Demographic studies (population pyramid ,growth rate). Economic studies (economic activities, labour, unemployment), Social studies (education, health, gender). Deteriorated areas of the city (formal and informal housing) diagnosis and solutions. Housing levels (densities, congestion rate), Distribution of housing levels, Neighbourhood unit, Services, Grouping system, Core house, Impact of economical changes on housing policies. Remote sensing systems for monitoring the development in housing and services. Application of the theoretical studies in a project dealing with Urban, Social and economic surveys for an existing area, Analysis and Diagnosis, Alternative solutions to upgrade the area. In addition separate exercises on the theoretical studies of housing.

References:

* Tanghe, J.; Vhaeminck, S. and Berghoef, J., Living Cities, Pergamon Press, 1984.
* هشام أبو سعدة، الكفاءة والتشكيل العمراني، مدخل لتخطيط وتصميم المواقع، المكتبة الأكاديمية، ١٩٩٤.
* Greed Clara, Introducing Town Planning, Longman Group, 1994.
* Greed Clara, Implementing Town Planning, Longman Group, 1996.

UPL 331 Design & Development of Rural Communities

3rd Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (1+2)]

Marks: [(0+0+0) + (40+35+0)] = 75

Course Contents

The course aims to study the nature of the rural settlements and how to deal with them through: Evaluation of rural development projects in the third world, Evaluation of the Egyptian experience in the development of the rural house since the fifties. Experience in nubaria, Salhia, Twin villages, Sers ellayan, Evaluation of the studies

carried by the building research center concerning the design of the rural house. Urbanization trend inral areas.

References:

* النهوض بالقرية المصرية، ، وزارة الإدارة المحلية، ١٩٧٠.
* عبد الباقي إبراهيم، استراتيجية التنمية الريفية، ، ١٩٨٢.
* دولت أحمد صادق، محاضرات في التخطيط العمراني، مكتبة عين شمس، ٢٠٠٠.

UPL 332 Computer Applications in Planning

3rd Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(50+50+0) + (0+0+0)] = 100

Course Contents

The course aims to recognize the renewable potentials of computers enabling special applications for different specialization by using computer programs individually or combined: Special computer components and networks in different applications with less-time and more safety. Two and three dimensional programs with special libraries helping the design process, Programs and languages of the two and three dimensional design programs, Geographic information system technology and its relation with information banks, Local and international surveying systems and how to use it in urban planning, Urban design and project management, Systems of remote sensing for urban planning and design, Programs dealing with environment and climate on the urban design level.

References:

* Burrough, Peter A.; McDonnell, Rachael A., Principles of Geographical Information Systems, Oxford University Press, 2000.
* Turban, Efraim, Aronson and Jay, E., Decision Support System and Intelligent Systems, Prentice Hall, 2001.
* De Mers, Michael N., GIS Modelling in Raster, John Wiley and Sons Inc., 2002.

UPL 333 Regional Urbanization

3rd Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Definition of the regional urban network (settlement network), Classification of human settlements in different regions (urban, rural, touristic, industrial). Directions and trends of regional urban growth. International examples for urban network. Design of the regional urban network (relationship between existing and proposed network regarding the site, the size and the function). Regional roads and their relationship to the settlements and the transportation systems. Applied research.

References:

* Chadwick George, Models of Urban and Regional Systems in Developing Countries, Pergamo, 1987.
* Greed Clara, Implementing Town Planning, Longman Group, 1996.

UPL 341 Landscape Architecture

3rd Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(1+3) + (0+0)]
Marks:[(50+50+0) + (0+0+0)] = 100

Course Contents

Definition of the natural elements of the site (landform, water, vegetation cover) and artificial elements (paving, colors, lighting and treatment, street furniture), Local and international examples, Functional use of the elements and their emotional impact, The design process, Presentation techniques of different landscape elements, Application of the studies on a project with three dimensional treatment using study models, Avant project for a site landscape, Working drawings and details.

References:

* Booth, Norman K., Basic Elements of Landscape Architectural Design, Ohio State University, 1984.
* Thompson, J., William, Sorvig and Kim, Sustainable Landscape Construction, Island Press, 2000.

UPL 351 Environmental Studies

3rd Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(2+2) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

The environmental problem (pollution, environmental degradation, desertation, erosion), Introducing the environment as an important factor in the planning process, Conflicts leading to ignoring the environmental factor in planning (political and economical factors), Development alternatives, Resources, Input, output, The concept and aims of sustainable development, Types, Strong sustainability, weak sustainability, The concept of sustainable development (aims and types), Natural reserves (definition, planning process of the surrounding areas).

References:

* Hough, Michael, Cities and Natural Process, Routledge, London, 1995.
* Salama, Ashraf, Human Factors in Environmental Design, Egyptian Bookshop, 1998.
* Allen, Adriana, Davila, Julio et al., Sustainable Urbanization: Bridging the Green and Brown Agendas, DPU - UCL, 2002.

UPL 361 Urban Sociology

3rd Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

A multi-disciplinary approach that draws from concepts of sociology, Environment and behaviour studies and cross cultural studies. Introduces a theoretical approach and research methods for examining various urban environments and settings in

relation to users, Behavioural patterns, Cultural and traditional attributes, Ethnicity, Social and urban changes. Examines traditional urban settings faced with modernization and contemporary challenges, Spatial location and urban growth in relation to environmental, Social, Cultural and historic shaping factors, Roup interaction and behaviour. Course will include field work and research analysis and cross cultural comparisons.

References:

* Giddens Anthony, Sociology, Polity Press, Cambridge, 1993.

UPL 371 Economic Geography

3rd Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Definition of economic geography. The concept of economic regions, Resources (natural, man made). Distribution of resources among the economic regions. Impact of natural phenomena and social habits on the economic activities, Relationship between roads and transportation systems and economical development, Relationship between the Urban network and economic resources, Impact of resources on the population mobility inside the economical regions. National five years plans for economical development on the regional level.

References:

* Bourne, L., Internal Structure of the City, Oxford University Press, N. Y., 1982.
* Hartshorn,T., Interpreting the City, John Wiley and Sons Inc., Canada, 1992.

UPL 412 Urban Design (2)

4th Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(2+8) + (0+0)]
Marks:[(125+100+25) + (0+0+0)] = 250

Course Contents

A more advanced focus on urban design issues, Focuses on relations and attributes affecting urban design, Examines modern theories, Urban design paradigms and 20th. Century pioneers. Detailed study and analysis of the work of Kevin Lynch, Bill hilliar, Gordon, Rob and leon krier and others, Mobility and urban design. Critical theory: Reasons for twentieth century urban design failures, What is lost space, Case studies and examples both national and International. Projects in new cities, New settlements, Satellite cities, Touristic complexes and development zones in highways. Project will analyze: Urban design complex in a new area. Analysis of the impact of economic, Social, Political, Cultural attributes on the project, Location analysis, Site analysis. Analyze the different complex variables and activities that affect urban design. Synthesis and conclusions to develop and design the urban design program in order to reach a unique original urban design project.

References:

* Lynch, K., The Image of the City, The Mit Press, 1960.

* Woods, G. W., Townscape, Oxford University Press, 1997.
* Bentley, I. et al. (eds), Responsive Environments, Oxford Books, 1997.

UPL 413 Urban Renewal

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]
Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

Focusing on the reasons of deterioration of the urban environment specifically in the third world. Studying types of slums and squatters, Understanding the historical context for urban deterioration, Identifying the urban upgrading and development policies, Reviewing case studies on comparative analysis basis for local and international examples.

References:

* Tanghe, J.; Vhaeminck, S. and Berghoef, J., Living Cities, Pergamon Press, 1984.

UPL 421 City Management

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

The governmental administrative organization structure for distribution of cities and villages. The concept of centralization and decentralization of city management. The role of private sector. The role of public participation in city management, Reviewing the executive management approach and the objective management approach. Departmental and sectoral divisions of governmental administrative structure in existing units for city development, Understanding the job description and mutual relations among various administrations in municipalities. Highlighting the difference between the role of municipalities in existing cities and that of new cities and the importance of their integration. Focusing on the importance of development municipalities according to urban development needs.

References:

* Mackenzie Dorothy, Green Design: Design for Environment, Laurence. King L+d, 1991.
* Yeang, K., Designing with Nature, Thompson, G. and Fredrick S., 1996.

UPL 431 Urban Planning

4th Year: Architecture Engineering - Urban Planning & Design (1st Term) Hrs/Week: [(2+5) + (0+0)]
Marks:[(90+65+20) + (0+0+0)] = 175

Course Contents

Regional planning and planning regions, Successive plans for G.C.R, Successive plans for metropolitan regions on the international level. Regional studies: Natural and environmental studies (earth, sea, air), Economic studies (agriculture, industry,

mining, tourism…etc), Legislation studies. Regional urban network: (urban hierarchies, the city, the countryside). Theories of new towns, the new towns in Egypt, Urban growth, Services, Planning of the urban development, Sustainable urban development. Application in a project including necessary studies for the planning and development of an existing region, Planning of a new town (program for housing and services, site selection, town planning, phases of implementation).

References:

* Chadwick George, Models of Urban and Regional Systems in Developing Countries, Pergamo, 1987.
* Greed Clara, Implementing Town Planning, Longman Group, 1996.
* أحمد كمال الدين عفيفي، نظريات في تخطيط المدن، هاجر للطباعة والتوزيع، ٢٠٠٠.

UPL 432 Sustainable Urban Development

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to sustainable urban development: Definitions of development, Urban development and sustainability. Sustainable urban development (SUD) as a paradigm: The mutual synergic relationship between the natural environment and development, The social, Cultural and natural environment, principles of SUD. Approaches of SUD, Examples of development projects that are not sustainable. Development sectors (Agricultural, industrial, touristic etc.) and their revaluation in the light of sustainability principles. Objectives of SUD, Constraints of implementing sustainability. Impacts of development projects on the environment. Different dimensions related to SUD: Political dimensions, Social dimensions, Environmental dimensions and economic dimensions.

References:

* عبد الباقي إبراهيم، الارتقاء بالبيئة العمرانية للمدن، مركز الدراسات التخطيطية والمعمارية، ١٩٨٦.
* Elliot, Sustainable Development, London Press, 1998.

UPL 433 Rural Development

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Definition of the concept of rural development. Differentiation between rural and urban settlements, Rural development programs at the national level, Functional interferences in the rural development in Egypt, General tendencies to develop the Egyptian countryside from the fifties to the nineties. Relationship between the development of rural, Urban and new settlements, Current policies for the development of the Egyptian countryside. Evaluation of El Shorouk project for rural development and its impact on the rural settlement, Development of a pilot project for an Egyptian village including the urban surveys.

References:

* النهوض بالقرية المصرية، ، وزارة الإدارة المحلية، ١٩٧٠.
* عبد الباقي إبراهيم، استراتيجية التنمية الريفية، ، ١٩٨٢.
* دولت أحمد صادق، محاضرات في التخطيط العمراني، مكتبة عين شمس، ٢٠٠٠.

UPL 434 Site Analysis Studies

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (50+50+0)] = 100

Course Contents

Impact of climate and topography on the site selection for different projects. Study of surrounding road system concerning condition and traffic density and the accessibility to the site. Land uses around the project and their impact on the site, Volume and capacities of the infra-structures next to the site (water supply, sewage, electricity, gas, communications). Kind and size of the existing services in the urban surrounding of the site and their impact on it, Impact of housing and urban planning bylaws on the site planning and design, Integrating land uses in the site with the elements of the direct and wider urban surrounding, Impact of the size of the surrounding building on the site specially from the climatic and visual point of view. Study of the capacity of the site to carry the elements of the suggested architectural program.

References:

* Rapopart, A., The Meaning of the Built Environment, Sage Publications, 1982.
* Kim, W., Site Space and Structure, Van Nastrand Reinhold, 1985.

UPL 435 Report Preparation for The Graduation Project

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (50+50+0)] = 100

Course Contents

The course aims to prepare the necessary introductive studies for the graduation project and deducing the basis that could be used for the design of the project. It includes: Methods of data collection (using references, Internet, field visits), Development of the Project program, Site selection, Analytical studies to decide its objectives and concept, Definition of constraints and potentials, Preparation of a comprehensive report (writing techniques, classification, referencing).

References:

* University of York, Decision Making in Architecture Practice, Institute of Advanced Architectural Studies, 1982.
* Kumar, R., Research Methodology: A Step by Step Guide for Beginners, Sage Publications, 1999.

Urban Planing

UPL 436 Presentation Techniques of Urban Projects

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (50+50+0)] = 100

Course Contents

The course aims to teach the student how to express his ideas by using the functions. Necessary techniques to introduce projects of different scales, Nature and function: The philosophy of the project, The purpose for presentation, Main strong points of the project, Relationship diagrams for form and function, Methods of presenting the final project components (plans, elevations, perspectives, schematic plans, study models etc.).

References:

* Burden Ernest, Architectural Delineation; A Photographic Approach to Presentation, McGraw Hill, 1982.
* Burden Ernest, Design Presentation: Techniques for Marketing and Project Proposals, McGraw Hill Book Co., 1984.

UPL 453 Environmental Planning & Design

4th Year: Architecture Engineering - Urban Planning & Design (2nd Term) Hrs/Week: [(0+0) + (2+4)]

Marks:[(0+0+0) + (75+75+0)] = 150

Course Contents

Design decisions to reach an environment friendly and energy saving design on the planning, Urban design and architectural levels, Properties of green architecture (energy saving, planning with climate, site properties, holistic treatment), Comparison between different ways of measuring in environmental planning, Environmental Impact assessment (EIA) for urban projects. Application project to design a group of environment friendly buildings studying their EIA.

References:

* Brewer, G. D., Systems Analysis in the Urban Complex: Potential and Limitations in Improving Urban Management, Sage Publications, 1976.
* Barnett, C. C., Municipal Role in Economic Development, Center for International Development, 1995.

UPL 461 Urban Sociology

4th Year: Architecture Engineering - Architecture Hrs/Week: [(0+0) + (3+3)]

Marks: [(0+0+0) + (75+75+0)] = 150

Course Contents

Theoretical approaches and research methods for examining the architecture of various environments (home, work place, kindergarten, school) in relation to inhabitants and users with various characteristics (age, gender, ethnicity). Introduces concepts of environmental psychology and man environment studies.

Course will include field research and case studies, Which will combine theoretical, Knowledge with empirical investigation in generating design criteria.

References:

* Giddens Anthony, Sociology, Polity Press, Cambridge, 1993.

UPL 462 Human Settlements

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(2+2) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Concept and types of rural and urban settlements. Impact of climate and topography on the form of human settlements. Impact of activities and econome on the form of human settlements. Impact of income and culture on the form of human settlements, Integrating population settlements with the settlement of services and industry to develop new urban communities, Upgrading and development systems to be applied in informal human settlements, Pull factors in new human settlements, Push factors from the existing over populated settlements. National strategy for the urban development of human settlements.

References:

* Rapoport, A., Human Aspects of Urban Form, Pergamon Press, 1977.
* Sanoff, H., Designing with Community Participation, Hutchinson and Ross, 1978.

UPL 471 Urban Economy

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(2+2) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Definition of economy, General economy, Private economy. The economic problem and its elements. The axis and tools of economic analysis, Urban economy, Definition of regional economy, Urban economy at city level, City structure, The carrying capacity of the city. Urban productive capacity of the city, External economic factors of a project, Internal economic factors of a project, The economic constraints in a city, Economics of public services infrastructure, Economics of road network, Housing economics, Relationship between housing sector and economic complementary sectors, Housing Supply and demand, The General dimensions of the housing problem.

References:

* الخطط الخمسية للتنمية الاقتصادية والاجتماعية، ، وزارة التخطيط، ١٩٨٢.
* الاستراتيجية القومية للتنمية الاقتصادية والاجتماعية في مستهل سنوات القرن الحادي والعشرين، ، وزارة التخطيط، ١٩٩٧.
* على صبرى يس، محاضرات في الاقتصاد العمراني، ، ١٩٩٧.

Urban Planing

UPL 472 Feasibility Studies

4th Year: Architecture Engineering - Urban Planning & Design Hrs/Week: [(2+2) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Definition of the concept of feasibility study, Main targets, General aspects of urban projects, Preliminary and final feasibility study for urban projects, Environmental feasibility, Marketing feasibility engineering feasibility, Fiscal feasibility, Commercial feasibility, Social feasibility, Factors affecting land evaluation, Definition of structure of projects, Scope of influence of projects, Investment costs, Functioning and administrative costs, Environmental costs. Analysis of the housing market, Financial structure of projects, Cash flow tables, Balance between the execution time table and the financial structure of the projects.

References:

* أويس عطوة الزلط، أسس تقييم المشروعات ودراسات جدوى الاستثمار: الجزء الأول، المكتبة الأكاديمية، ١٩٩٢.
* نبيل عبد السلام شاكر، دراسات الجدوى الاقتصادية وتقييم المشروعات الجديدة، مكتبة عين شمس، ١٩٩٦.
* على صبرى يس، محاضرات في دراسات الجدوى، ، ١٩٩٧.

UPL 499 Project

4th Year: Architecture Engineering - Urban Planning & Design (2nd Term) Hrs/Week: [(0+0) + (0+16)]
Marks:[(0+0+0) + (0+200+200)] = 400

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Power & Electrical Machines

EPM 111 Electrical & Mechanical Engineering

1st Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Fundamentals of electric circuit theory, Ohm's law, Kirchhoff's laws, Ac circuits, Polyphase systems. Electric motors: Dc motors, Induction motors, Fractional horsepower motors. Industrial and commercial applications: Construction engineering, Petroleum industry, Steel mills, Agriculture, Electric hoists, Electric elevators, Air conditioning, Refrigeration.

References:

* Hancock, N.N., Electrical Power Utilization, Pitman Publishers, 1970.
* Hughes, E., Electrical Technology, Longmans Publishers, 1977.
* FLOYD, T.L., Principles of Electrical Circuits, Charles Merrill Publishers, 1990.

EPM 112 Electrical & Electronic Engineering

1st Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Electrical engineering: Constants and variables of electrical circuits, Elements of electrical circuits, dc circuits, Network theorems, Sinusoidal alternating current circuits at steady state, Phasor diagram representation of sinusoidal quantities, Application of network theorems to alternating current circuits, Electric power in alternating current circuits, Power factor, Inductance. Electronic Engineering: Review on types of solids: Bohr's model and its limitation, Energy bands (conduction, valence, energy gap), Fermi-Dirac distribution function, Intrinsic and extrinsic semiconductors (n-type, p-type), Electrons and holes, Concentration, Types of currents (drift, diffusion). PN-junction: I-V characteristics, Diffusion potential, Depletion layer capacitance. Diode circuits: Half and full-wave rectifiers, Smoothing, Clipping and clamping-circuits, Battery charger, Peak rectifier, Voltage doublers.

References:

* Nilsson, J.W., Electric Circuits, Addison Wesley Publishers, 1995.
* Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, Latest Ed.
* Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winstron (HRW), Latest Ed.

EPM 113 Electrical Circuits

1st Year: Electrical Engineering - . (Cont.) Hrs/Week: [(3+2) + (3+2)]

Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Electrical circuit variables and elements, Simple resistive circuits, Analysis of

electrical circuits, Source transformation, Network theorems, Star-delta transformation, Sinusoidal steady state analysis, Phasor diagram representation, Application of network theorems on alternating current circuits, Electric power in alternating current circuits, Complex power calculations, Power factor, Circuits with nonlinear resistance. Transients in electrical circuits, Polyphase circuits, Magnetically coupled circuits, Mutual inductance, Resonance in electrical circuits, Electric filters, Two-port networks, Locus of phasor diagrams at variable frequency, Analysis of electrical circuits with non-sinusoidal alternating currents, Higher harmonics, Fourier series.

References:

* Smith, R.J. and Dorf, R. C., Circuits, Devices and Systems, John Wiley and Sons, 1992.
* Nilsson, J.W., Electric Circuits, Addison Wesley Publishers, 1995.

Laboratory: *Electrical Engineering Fundamental Lab*

01 Electrical circuits experiments
02 Measurement of resistance
03 Fourier analysis and voltage signal
04 Wave filters
05 Three-phase circuits
06 Instruments and C.R.O.
07 Fundamentals of PLC's

EPM 171 Electrical Measurements & Measuring Instruments

1st Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Electrical measurements, Measurement errors, Accuracy, Statistical analysis. Static calibration, Resolution and precision, Dynamic response. Units, Systems, Dimensions and standards. Moving-coil instruments, Moving iron instruments, Electro-dynamic instruments, Induction-type instruments, Current and voltage measurements, Measurement of power, Measurement of energy and charge, Measurement of frequency and power factor, Measurement of non-electrical parameters. Cathode ray-oscilloscopes application. Dc bridges, Ac bridges, Resistance and capacitance measurement, Allocation of cable faults. Strain gauges, Temperature transducers, Displacement, Velocity and acceleration transducers, Force and pressure transducers, Light transducers, Data converters, Voltage-to-frequency converters. Digital devices : Digital voltmeters, Digital frequency meters.

References:

* Sawhny, J., An Introduction to Electrical and Electronic Measurements, McGraw Hill, 1975.
* Berlin, H.M. and Gillz, Merill F.C., Principles of Electronic Instrumentation and measurements, Publishers, 1988.

* Frank, An Introduction to Electrical Instrumentation and Measuring Systems, McGraw Hill, 1992.

EPM 211 Electromagnetic Fields

2nd Year: Electrical Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Vector analysis, Coulomb's law, Electric field intensity, Electric flux, Gauss's law, Divergence, Electric energy and potential, Electric conductors, Electrical resistance, Dielectric materials, Electrical capacitance, Electric field plotting, Poisson's equation, Laplace's equation. Steady magnetic fields, Ampere's law, Magnetic forces, Magnetic materials, Magnetic circuits, Inductance. Time varying magnetic fields, Maxwell's equations, Plane electromagnetic waves in free space, Propagation of electromagnetic waves in matter, Reflection and refraction.

References:

* Carson, D.R. and Lorrain, P. L., Introduction to Electromagnetic Fields and Waves, Taraporevala Sons and Co., 1970.
* Hayt, William H., Engineering Electromagnetics, McGraw Hill Publishers, 1989.

EPM 212 Electrical Engineering

2nd Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Fundamentals of electrical measuring instruments, Oscilloscopes and their applications, Three-phase systems, Transformers, Electric generators and motors, Dc machines, Synchronous machines, Induction motors, Fractional horsepower motors, Electric traction, Electric transportation, Transmission lines.

References:

* Gregory, B.A., An Introduction to Electric Instrumentation and Measurement Systems, McMillan Publishers, 1981.
* Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
* Balton, W., Measurements and Instrumentation Systems, Newnes Publishers, 1996.

EPM 221 Energy Conversion

2nd Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Conventional methods of energy conversion : Introduction, Sources of energy, Electrical power systems. Electromechanical energy conversion, Electric motors and generators, Faraday's law, Lorenz forces, The basic electric generator, The

basic electric motor, Magnetically single excited systems, Magnetically multi-excited systems, Dynamic energy conversion equations, Conservative fields, Coupled magnetic fields, Torque and stored energy in magnetic fields, Co-energy and torque calculations, The reluctance machine, Multi-fed rotating systems, Electrostatic systems. Renewable methods of energy conversion : Solar energy, Solar cells, Batteries, Wind-energy generators.

References:

* Brown, D. and Hamilton, E.P., Electromechanical Energy Conversion, McMillan, 1984.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.

Laboratory: *Energy Conversion Lab*

01 DC separately excited generator
02 DC shunt and compound excited generator
03 Retardation test of d.c. machine

EPM 271 Electrical Testing (1)

2nd Year: Electrical Engineering - . (Cont.) Hrs/Week: [(0+3) + (0+3)]
Marks:[(0+25+0) + (75+25+25)] = 150

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the first and second year: Electrical circuits: Applications of network theorems, Magnetically coupled circuits, Electric filters, Transients in electrical circuits, Operation with variable frequency. Electrical measurements and measuring instruments: Definition of various types of electrical measuring instruments and their applications, Calibration of ammeters, Voltmeters and watt-meters, Oscilloscopes and their applications. Energy conversion: Appreciation of the construction of electrical machines, A set of experiments on dc machines, Elementary tests on transformers. Electronic and logic circuits: Tests on some integrated electronic circuits and chips.

References:

* Laboratory Instructions, Manuals, Catalogues, Data books.

EPM 321 Electrical Machines (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

D.C. machines : Theory and design: The generation of e.m.f., Work, Power, Force torque, The magnetic circuit of the dc machine, Armature windings, Armature reaction, Inductance, Energy in magnetic field, Commutation, Methods of excitation, Load characteristics of dc generators and motors, Efficiency, Testing of dc machines, Special dc machines, Construction of dc machines, Mechanical details, Design, Main dimensions, The armature, Design of poles and inter-poles, Design of

commutator, Calculation of efficiency, Examples on the design of dc motors and generators.

References:

* Clayton, A. E. and Hancock, N. N., The Performance and Design of dc Machines, Pitman Publ., 1963.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
* Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: ***Electrical Machines Lab***

01 DC separately excited, shunt and compound motors
02 DC traction motor
03 Back-to-back test on dc machines

EPM 322 Electrical Machines (2)

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Transformers : Theory and design : Fundamental concepts, Mutual inductance, Electric and magnetic circuits, Power transformers, Phasor diagrams, Magnetizing current and core loss, Equivalent circuits, Transformers at load, Efficiency, Voltage regulation, Three phase transformers, Three phase transformer connections, Three phase to two phase connections, Auto transformer, Voltage regulation in auto transformers, Tap changers, On load tap changers, Harmonics, Transformers testing, Transformer design, Main dimensions, Magnetic cores, Transformer windings, Insulation, Cooling, Calculation of transformer characteristics, Examples on transformer design.

References:

* Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
* Say, M.G., Alternating Current Machines- Fifth edition, Pitman, 1990.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
* Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: ***Electrical Machines Lab***

01 Single-phase power transformer
02 Three-phase power transformer: 4 tests

EPM 331 Transmission & Distribution of Electrical Energy

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction, Representation of power systems, Parameters of transmission lines,

Models of transmission lines, Series impedance, Electrical capacitance, Representation of capacitance in parallel with transmission lines, Voltage and current relationships in transmission lines, Operation characteristics, Symmetrical components, Unsymmetrical faults on transmission lines, Introduction to underground cables, Design of transmission lines, Mechanical design, High-voltage dc overhead transmission lines, Insulated electrical cables, Determination of faults in underground cables, Design of electrical distribution systems, Substations, Introduction to power system planning.

References:

* Gross, C.A., Power System Analysis, John Wiley, 1980.
* Glover, J. and Sarma, M., Power System Analysis and Design, PWS Publishers, 1987.
* Stevenson, W. D., Elements of Power System Analysis- Third Edition, McGraw Hill, 1995.

Laboratory: ***Electric Power Lab***

01 Transmission lines (1) & (2)

EPM 332 Power System Analysis (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Symmetrical components: Synthesis of unsymmetrical phasor diagrams from their symmetrical components, The symmetrical components of unsymmetrical systems, Power in terms of symmetrical components, Positive, negative and zero phase sequence networks, Unsymmetrical faults : Shunt faults, Series faults, Network matrices: Network topology, System admittance and system impedance matrices, Load flow solutions and control: Load flow equations, The Gauss-Seidel method, Newton-Raphson method and approximations, De-coupled methods, Regulating transformers.

References:

* Venikov, V.A., Transients in Electrical Power Systems, MIR Publisher, 1979.
* Gross, C.A., Power System Analysis, John Wiley, 1980.
* Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.

EPM 333 Economics of Generation & Operation

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Load curves, Variation in demand, Load diversity. Power plant layout: thermal power plants, Hydro electric plants, Diesel and gas turbine plants, Main equipment, Auxiliaries, Bus-bar arrangements. Power plant economics: Capital cost, Operating cost, Fixed charge rate, Selection of plant and size and unit size, Operation and economics of spinning reserve. Tariffs, Effect of low power factor, Power factor improvement, Most economic power factor. Optimal operation of power systems:

Modeling of fuel cost for thermal generation, Optimal operation of thermal system, Accounting for system losses, Optimal operation of hydro-thermal system. New energy sources: Solar energy, Wind energy, Other energy sources: Tidal, Geothermal.

References:

* Glover, J. and Sarma, M., Power System Analysis and Design, PWS Publishers, 1987.
* Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.
* Berrie, T. W., Power System Economics, Peregrinus Publishers, 1998.

EPM 334 Electrical Power Engineering

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Introduction to electric power systems, Applications of high voltages in electric power systems, Overhead transmission lines, Underground cables. Generation of high voltage for test purposes, Methods of high voltage measurement, Electric insulation, Types, Corona. Earthing of electrical equipment, Safety, Resistance of earthing electrodes. Protection of power stations, Protection of sub-stations, Protection of transmission lines power stations, Types of circuit breakers.

References:

* Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley, 1984.
* Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
* Stevenson, W.D., Elements of Power System Analysis - Third Edition, McGraw Hill, 1995.

EPM 335 Utilization of Electrical Energy

3rd Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Electrical traction systems, Mechanical and electrical characteristics, Speed curves, Operations during electrical traction, Electrical traction motors, Modern control of traction motors. Illumination: Artificial illumination requirements and characteristics, Standard specifications, Types of lamps and luminaries, Illumination curves, Installation of lamps, Luminaries and connections- gas filled lamp ignition. Electric heating: Resistance wires, Electric furnaces, Induction heating. Electric welding of metals: Welding transformers and generators, Arc welding, Spot welding. Electrolytic processes: Metal coating. Electric transportation: Cranes and hoists, Elevators and conveyor belts, Paper and textile mills, Mining.

References:

* Hancock, N.N., Electric Power Utilization, Pitman Publishers, 1967.

* Laithwaite, E.R. and Freris, L. L., Electric Energy: Its Generation Transmission and User, McGraw Hill Co., 1984.
* Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley, 1984.

Laboratory: ***Electrical Machines Lab***

01 Illumination test

EPM 341 High Voltage Engineering

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Advantages and limitations of using high voltages for transmission, Generation and measurement of high voltage for testing, Generation of impulse waves, The impulse generators, Specifications of high voltage laboratories, Lnsulators for transmission lines and substations, Insulator materials: Shapes and types, Factors affecting performance of insulators, Testing of insulators: Destructive and non-destructive insulation tests- electrical breakdown in gases, Ionization and attachment coefficients, Electro-negative gases, Electrical breakdown in liquids and solids. Corona discharge, Single and three-core cables, Electrical stresses in cables, High voltage equivalent circuits, High voltage cables, Thermal properties of cables, Earthing systems.

References:

* Naidu, M.S., High Voltage Engineering, Tata McGraw Hill Co., 1982.
* Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
* Abdel Salam, M.; Anis, H., El-Morshedy, A. and Radwan, R., High Voltage Engineering, Marcel Dekker Inc., 2000.

Laboratory: ***Electric Power Lab***

01 High voltage tests (1), (2) & (3)

EPM 351 Power Electronics (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to power electronics, Power diodes, Thyristors: Construction, Characteristics -application in rectifier circuits (converters), Firing circuits, Power transistors as switches, Phase shift controls, Phase controlled rectifiers-static switches.

References:

* Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
* Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
* Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory: *Power Electronics Lab*

01 Poly phase uncontrolled rectifier circuits
02 Single phase half-wave controlled rectifier
03 Thyristor firing circuits

EPM 352 Industrial Electronics & Applications

3rd Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Introduction to power electronics, Power diodes, Thyristors, Ac voltage controllers, Single phase converters, Three phase converters, Phase control of ac controllers, Integral cycle control, Thyristor commutation techniques, Natural commutation, Forced commutation, Circuits, dc choppers, The single thyristor chopper, Two thyristor choppers, Inverters, Single phase circuits, Bridge inverter circuits. Adjustable speed dc drives, Industrial examples, Electric traction examples, Operations during electrical traction, Criteria for selecting drive components, Equivalent circuit of dc motors, Permanent magnet dc motors, dc servomotors, Induction motor drives, Slip power recovery from an induction motor, Forced commutated, Variable frequency ac motor drives, Electric braking of induction motors, Synchronous motor drives, Stepper motor drives, Computer controlled drives.

References:

* Starr, A. T., Generation, Transmission and Utilization of Electrical Power, Pitman, 1937.
* Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
* Gupta, J.P., Utilization of Electrical Power and Electrical Traction, Kalson Publishers, 1989.
* Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
* Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
* Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

EPM 361 Power System Protection

3rd Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Protection engineering: Introduction, Effects of short-circuits on power systems, Basic elements of protective gear, Current and potential transformers, Protective relays, Electromechanical and static relays, Different types of electromechanical relays, Types of protection in electrical power systems, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders.

References:

* Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.

* Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.
* Horowitz, S.H. and Phadk, A. G., Power System Relaying, John Wiley, 1992.

EPM 371 Electrical Testing (2)

3rd Year: Electrical Engineering - Power & Electrical Machines (Cont.) Hrs/Week: [(0+3) + (0+3)]
Marks:[(0+25+0) + (75+25+25)] = 150

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the third year: Electrical machines (1&2): Detailed tests on dc machines and single-phase and three-phase transformers. Transmission and distribution of electrical energy: Tests on transmission line models. High voltage engineering: High voltage testing on electrical insulators of different shapes, Training the students on handling, Control and using of high voltage equipment, Electric cables. Electric traction motors. Power electronics (1): Experiments on converter circuit using diodes and thyristors.

References:

* Laboratory Instructions, Manuals, Catalogues, Data books.

EPM 381 Automatic Control Systems

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Introduction, Dynamics of electrical and mechanical systems, Mathematical models, Analogy between electrical and mechanical systems, System equations, Linear models, Derivation of mathematical models from experimental data, State variable approach, Control system components, Transform to frequency domain, Block diagram representation, Signal flow graphs, Stability criteria, Frequency response methods, Bode plots, Nyquist criterion, Root-locus method. Root locus compensation, Domain separation criterion, Cascaded and feedback compensation, Frequency response plots, Design of automatic excitation control and stabilization, Load frequency control, Liapunove's second method.

References:

* Ogata, K., Modern Control Engineering, Prentice Hall, 1980.
* El- Hawary, M., Control System Engineering, Prentice Hall, 1984.
* Franklin, G.F. and Ponell, D., Digital Control of Dynamic Systems, Addison Wesley, 1992.

EPM 421 Electrical Machines (3)

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Synchronous machines : Theory and design : Introduction, Cylindrical-rotor and salient-pole synchronous machines, Types of windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-phase synchronous machines, Synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus, The synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars, Testing of synchronous machines, Construction, Design, Main dimensions, Examples on the design of turbo-generators and low speed generators.

References:

* Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
* Say, M.G., Alternating Current Machines- Fifth edition, Pitman, 1990.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
* Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: ***Electrical Machines Lab***

01 Three-phase synchronous generator testing
02 Synchronization of a three phase machine to an infinite busbar
03 Synchronous motors
04 Power angle characteristic of synchronous generator

EPM 422 Electrical Machines (4)

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Induction machines: Theory and design: Introduction, Construction of three-phase induction motors, The magnetic circuit, Slip ring induction motors, Cage motors, Performance at constant flux, Electromotive force, Currents, Torque, Equivalent circuits, Torque speed curves, Phasor diagrams, The circle diagram, Starting methods, Classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, The induction generator, The induction regulator, Induction type phase shifter, Single phase induction motors, Construction, Theory of rotating fields, Methods of starting, Fractional horsepower motors, Design of three-phase motors, The output equation, Selection of the main dimensions, Standard frames, Windings, Power factor, Design examples.

References:

* Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
* Sen, P.C., Introduction to Electrical Machines and Power Electronics - First edition, Pitman, 1990.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.

* Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: ***Electrical Machines Lab***

01 Three-phase induction motor testing (1) & (2)
02 Three-phase induction regulator
03 The synchronous - induction motor

EPM 423 Generalized Theory of Electrical Machines

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

The basic two-pole machine, Kron's primitive machine. Linear transformations, Power invariance, Rotating axes of reference, Three phase frame of reference, Transformation between different frames of reference, Torque equations, Restrictions. Applications of the generalized theory: dc machines: Steady state and transient operation, Cross-field generators, Electrical braking. Polyphase synchronous machines: Parameters, Steady state and transient analysis, Dual-excited synchronous machines. Polyphase induction machines : Transformations, Steady state and transient analysis, Special modes of operation, Single phase motors, Revolving field theory, Starting. AC commutator machines. Transformers.

References:

* Adkins, B., The generalized Theory of Electrical Machines, Dover Publishers, 1980.
* Bimbhra, P., The general Theory of Electrical Machines- Second Edition, Tata McGraw Hill, 1992.

EPM 424 Special Electrical Machines

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Theory of single-phase rotating machines, Two phase motors, Single-phase induction motors, Windings and connections, Split phase induction motors : Operation and protection, Capacitor start motors, Two value capacitor motors, Shaded pole motors, Drag-cup motors, Linear motors, Synchronous motors, Reluctance motors, Hysteresis motors, Permanent magnet motors, Inductor type motors, Stepper motors, Dc motors, Universal motors, Dc special purpose motors, Variable speed drive systems, Dc servomotors, Selecting motors for required operations.

References:

* Vinott, A., Fractional Horsepower Motors, McGraw Hill, 1980.
* Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
* Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

EPM 431 Electric Power System Analysis (2)

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Transients in electrical systems: Types of transients, Equivalent circuits of power system elements, Multi-machine linear systems, Maximum power and loading limit, Modeling of basic elements of electrical systems: Vector diagram representation, Simplified systems, Excitation and speed control systems, Block diagram representation, Simplified criteria of transient stability : Concept of transient stability, Equal area criterion, Numerical solutions of rotor electromechanical equation, Dynamic stability: Analysis of uncontrolled systems, Controlled systems, Power system stabilizers, Voltage stability of loads and power systems: Criteria of voltage stability, Voltage collapse in electrical power networks.

References:

* Venikov, V.A., Transients in Electrical Power Systems, MIR Publisher, 1979.
* Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.
* El-Sadek, M.Z., Power System Voltage Stability and Power, Mukhtar Press, Assuit, 2002.

Laboratory: *Power Lab*

01 Load management
02 P.L.C. based load management
03 Power system stability investigation

EPM 432 Planning of Electrical Networks

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

The utility perspective, Utility financial accounting, Utility economic evaluation, Fixed charge rate, Total annual fixed charge rate, Revenue requirements, Financial and regulatory analysis, Corporate financial simulation, Regulatory incentive, Utility incentives, Power generation economics, Co-generation overview and regulations, Steam turbine co-generation cycles, Gas turbine cycles, Generation planning, Manual and automated generation planning, Dynamic programming, Approximate techniques, Capacity resource planning, Integrated demand-supply planning, Marginal costs, Small improvement projects, Planning under uncertainty, Bulk power transmission planning, Transmission planning methodology and examples.

References:

* Arrillage, J. and Arnold, C.P., Computer Modelling pf Electrical Power Systems, , 1983.
* Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley Publishers, 1984.
* Stoll, H.G., Least - Cost Electric Utility Planning, J. Wiley Publishers, 1989.
* Berrie, T. W., Power System Economics, Peregrinus Publishers, 1998.

EPM 441 Over-Voltages in Power Systems

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to types of over-voltages in power systems, Lightning over-voltages, Physical phenomenon of lightning, Interaction between lightning and power system, Factors contributing to line design, Switching over-voltages: Recovery transient initiated by the opening of circuit breaker, Double frequency transient, Current suppression, Capacitance switching, Travelling waves: Wave equation, Reflection and refraction of the wave, Lattice diagram, Attenuation and distribution of the wave.

References:

* Guile, A.E. and Paterson, W., Electrical Power Systems, Oliver and Boyd Publishers, .
* Allan Greenwood, Electrical Transients in Power Systems, J. Wiley and Sons Inc., 1971.
* Rudenberg, R., Transient Performance of Electric Power System, M.I.T. Press, 1980.

EPM 442 High Voltage Applications

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Phenomenon of over-voltages in power systems, Wave propagation over lines and equipment, Theory of travelling waves and standing waves, Electrostatic field of extra-high-voltage (EHV) lines, Lightning and lightning protection, Over-voltages in EHV systems caused by switching operations, Insulation characteristics of long air gaps, Power-frequency voltage control and over-voltages, EHV testing and laboratory equipment, Design of EHV lines, Design examples.

References:

* Jha, R.S., A Course in High Voltage Engineering, Rai and Sins Dihi, 1977.
* Naidu, M.S., High Voltage Engineering, Tata McGraw Hill Co., 1982.
* Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
* Abdel Salam, M.; Anis, H., El-Morshedy, A. and Radwan, R., High Voltage Engineering, Marcel Dekker Inc., 2000.

EPM 451 Power Electronics (2)

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Ac voltage controllers: The single phase ac thyristor controller, Three phase controller, Phase control of ac controllers, Integral cycle control, Thyristor commutation techniques: Natural commutation, Forced commutation, Main

principles, Circuits, Dc choppers: The single thyristor chopper, Two thyristor chopper, Inverters: Single phase circuits, Bridge inverter circuits, Dc drives, Ac drives.

References:

* Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
* Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
* Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory: ***Power Electronics Lab***

01 Full wave controlled rectifier circuits
02 Half controlled three-phase controlled rectifiers
03 Fully controlled three-phase controlled rectifiers
04 D.C. choppers

EPM 452 Power Electronics

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Ac voltage controllers: The single phase ac voltage controller, Three phase controller, Integral cycle control, Thyristor commutation techniques, Main principles, Circuits, Dc choppers: The single thyristor chopper, Two thyristor choppers, Inverters: Single phase circuits, Bridge inverter circuits, Dc drives, Ac drives, Basics of industrial motor control, Criteria for selecting drive components, Dc motor drives, Equivalent circuit of dc motors, Permanent magnet dc motors, Dc servomotors, Adjustable speed dc drives, Industrial examples, Electric traction examples, Induction motor drives, Slip power recovery from an induction motor, Forced commutated, Variable frequency ac motor drives, Injection braking of induction motors, Synchronous motor drives, Stepper motor drives, Computer controlled drives.

References:

* Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
* Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
* Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

EPM 461 Protection & Switchgear in Electrical Power Systems

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term) Hrs/Week: [(0+0) + (3+1)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Protection relaying philosophy and fundamental considerations, Transmission line protection, Short lines, Medium length lines, Long distance power transmission,

Compensating distance relaying. Rotating machinery protection: Relay protection for ac generators, Loss of field relay operation, Power transformer protection, Relay input sources, Switchgear engineering: Circuit breakers, Types, Construction, Performance and ratings, Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms, Circuit breakers synthetic and direct tests. Switching over-voltages, Resistance switching, Capacitance switching.

References:

* Flurscheim, C.H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 1982.
* Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.
* Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.
* Horowitz, S.H. and Phadk, A. G., Power System Relaying, John Wiley, 1992.

Laboratory: ***Power Lab***

01 High voltage testing: restriking voltage transients
02 Switchgear testing

EPM 462 Applications in Protection & Switchgear Systems

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Item protection : Protection of generators, Protection of transformers, Protection of bus-bars, Protection of transmission lines (carrier protection), Protection against over-voltages, Protection schemes, Substations, Power stations, Protection of low-voltage systems, Coordination of protective devices. Over-voltage transients and travelling waves, Surge velocity, Surge impedance, Surge power and energy stored. Terminations: Incident reflected and transmitted waves, Applications. Over-voltage protection, Surge divertors, Insulated neutral systems over-voltages protection, Earthing systems earthing electrodes, Safety and power earthing, Engineering and calculations of systems and equipment earthing resistance.

References:

* Chunikhin, A. and Zhaboronikov, M., High Voltage Switchgear, Analysis and Design, MIR Publisher, 1975.
* Flurscheim, C.H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 1982.
* Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.
* Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.

EPM 471 Electrical Testing (3)

4th Year: Electrical Engineering - Power & Electrical Machines (Cont.) Hrs/Week: [(0+3) + (0+3)]
Marks:[(0+25+0) + (75+25+25)] = 150

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the fourth year: Electrical machines (3) and (4): Detailed tests on single-phase and three-phase induction machines, Three-phase synchronous machines, Measurement of the power angle in synchronous machines, Measurement of synchronous machines parameters. Power system analysis (1) and (2): Experiments on analog and/or digital models of power systems. Power electronics (2): Inverters, Voltage regulators. Switchgear and protection engineering: Definition of different types of protection relays, Circuit breakers.

References:

* Laboratory Instructions, Manuals, Catalogues, Data books.

EPM 481 Electric Drives

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Basics of industrial motor control, Criteria for selecting drive components, Dc motor drives, Equivalent circuit of dc motors, Permanent magnet dc motors, Dc servomotors, Adjustable speed dc drives, Industrial examples, Electric traction examples, Induction motor drives, Slip power recovery from an induction motor, Forced commutated, Variable frequency ac motor drives, Injection braking of induction motors, Synchronous motor drives, Stepper motor drives, Computer controlled drives.

References:

* Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
* Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
* Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory:

01 Basic function of P.L.C.
02 Application of P.L.C. in motor control
03 PID controller: concepts and applications
04 Word Leonard system

EPM 482 Advanced Control of Power Systems

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Central operations: Operation of power systems, Organization and operator activities, Control center experience, Supervisory and control functions : Data acquisition, Monitoring and event processing, Control functions, Reports and calculations, Man-machine communications: Operators duties, Mimic diagram

functions, System structures: Subsystems, System classes, System interactions, Performance and reliability considerations: Performance criteria, Software considerations, Hardware considerations, Databases, Technical realization: Central system, Communication system, Maintenance, Real time network modeling, Security, Training, Control system examples.

References:

* Cigrell, C., Power System Control Technology, Prentice Hall, 1992.
* Mahalanalas, A. K.; Kothari, D.P. and Ahson, S.I., Computer Aided Power System Analysis and Control, Tata McGraw Hill, 1994.
* El-Sadek, M.Z., Power System Voltage Stability and Power, Mukhtar Press, Assuit, 2002.

Laboratory: *PL.C Lab*

01 Application of PLC (1) & (2)
02 Digital Control Systems (1) & (2)

EPM 483 Computer Applications in Electric Power Engineering

4th Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction: Power system matrices, Input and transfer matrices, Admittance matrices of the bus bars, Impedance matrices, Circuit representation, Programming, Large system simulation and programming, Power flow studies concepts and methods, Approximate and fast methods, Separation methods, Distribution factors, Transfer methods, Optimal performance, Generation control, Error analysis, Simulation of power system components, Application of some computer packages.

References:

* Stagg, G. W. and El-Abiad, A. H., Computer Methods in Power Systems, McGraw Hill, 1968.
* Gross, C. A., Power Systems Analysis, John Wiley, 1979.

EPM 499 Project

4th Year: Electrical Engineering - Power & Electrical Machines (Cont.) Hrs/Week: [(0+4) + (0+4)]
Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

ECE 131 Electronic Engineering

1st Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Review on semiconductors: Bohr's model, Schroedinger equation, Fermi-dirac distribution function, N-type and p-type semiconductors, Methods of current flow, Continuity equation. Pn-junction: I-V ccs., Reverse saturation current depletion layer capacitance, Diffusion capacitance. Diode applications half- and full-wave rectifier, Battery charger, Peak rectifier, Voltage doublers. Other two-terminal devices: Zener diodes, Schottky barrier diodes, Light emitting diodes (LED), Solar cells. Bipolar junction transistor (BJT): Ebermoll model, Static and dynamics characteristics, Field effect transistors. (linear and nonlinear and pinch off regions), JFETs symbol and model and biasing. Insulated gate FETs: Types, Regions of operation, MOSFETs symbol and model and biasing. FETs applications: MOSFET as a resistance, JFET as a constant current source, Selected applications examples. Integrated circuit technology.

References:

* Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, 1987.
* Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winston (HRW), 1998.

ECE 241 Electronic Circuits (1)

2nd Year: Electrical Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Review: Biasing techniques of BJT and FETs. Transistor biasing stability: Current feedback, Voltage feedback, Current and voltage feedback, Stability factor. Transistor small signal models: T models, z, y and h-parameters. Analysis of AF amplifiers: RC- and transformer-coupled AF power amplifiers: Power transistor considerations, Class-A amplifiers (direct, transformer coupled), Push-pull operation (class-A, class-B). Operational amplifiers (OP-AMPs): Difference amplifier, OP-AMP specifications, Frequency characteristics. OP-AMP applications: Adder, Subtracter, Integrator, Differentiator, Electronic analogue computation, I to V and V to I converter, Comparators, Schmitt trigger, OP-AMP oscillators (rectangular, sinusoidal, wien bridge and phase shift).

References:

* Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, 1987.
* Jacob Millman and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill, Latest Ed.

ECE 251 Signal Processing

2nd Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Signals and systems: Continuous time and discrete-time signals, Exponential and sinusoidal signals, The unit Impulse and unit step functions, Basic system properties. Linear time-invariant systems: Discrete-time LTI systems: The convolution sum. Continuous-time LTI systems, Properties of LTI systems, Causal LTI systems described by differential and difference equations. Fourier series representation of periodic signals: Fourier representation of continuous, Time periodic signals, Fourier series representation of discrete, Time periodic signals, Filters described by differential equations and filters described by difference equations. The continuous-time fourier transform: Representation of aperiodic signals, The fourier transform for periodic signals, The properties of continuous-time fourier transform, The discrete-time fourier transform: Representation of aperiodic signals, The discrete fourier transform for periodic signals, Properties of the discrete-time fourier transform. The Z-transform: Region of convergence,The Inverse Z-transform, Properties of the Z-transform, Analysis and characterization of LTI systems using Z-transform, System function algebra, The unilateral Z-transform.

References:

* Oppenheim, A. V. and Willsky, A. S., Signals and Systems, Prentice Hall, 1997.

ECE 331 Electronic Devices

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Reviewing charge transport in semiconductors, Generation recombination mechanisms, High field effects, High injection in pn junctions, Large and small signal models for BJTs, Metal semiconductor contacts, MOS capacitors, Large and small signal models for MOSFETs, Short and narrow channel effects, Power devices, Device simulators, Other semiconductor devices, Applications.

References:

* Yang, E. S., Microelectronic Devices, MH, 1988.

ECE 332 Microprocessors & Applications

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to microprocessors, Architecture, Microprocessor hardware, Assembly

language fundamentals, Programming, Microprocessor system connections, Timing in microprocessors, Interrupts and interrupt service procedures, Microprocessor timing specifications, Interfacing, Programmable chips , Data acquisition systems, Applications of closed loop control, I/O hardware alternatives, Developments tools, Troubleshooting case studies.

References:

* Tokheim, R., Microprocessor Fundamentals, Schaum's Series McGraw Hill, N.Y., 1986.
* Barry Brey, The Intel Microprocessors, Prentice Hall, 2000.

Laboratory: *Electronics Lab*

01 Peripheral Interface Adapter (PIA)
02 Microprocessor/DAC interfacing and applications

ECE 333 Optical Electronics

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Interaction of radiation and atomic systems, Theory of laser oscillation: Fabry-perot laser, Oscillation, Frequency, Power output, Some laser system, Electro-optic modulation of laser, OPTO-electronic semiconductor devices, DC and AC characteristics, PIN and avalanche photodiodes, Applications: OPTO isolator types, Parameters and characteristics, Circuit applications, Solar cells, LCD's.

References:

* Joseph Verdeyen, Laser Electronics, Prentice Hall, 1995.

ECE 334 Electronic Circuits

3rd Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Transistor small signal models: Z-, y- and h- parameters. Analysis of audio frequency (AF) amplifiers: RC-coupled, Frequency response. AF power amplifiers: Class-A, push-pull operation (Class-A, Class-B). Operational amplifiers (OPAMPs): Difference amplifier, OPAMP specifications and frequency characteristics. OPAMP applications: Inverting, non-inverting, Adder, Subtracter, Integrator, Differentiator. Oscillators: Concept of stability and oscillations, OPAMP oscillators (rectangular, sinusoidal, Wien bridge, phase shift, and tuned circuits). Analog-to-digital (A/D) and digital-to-analog (D/A) converters.

References:

* Mitchell, F. H., Introduction to Electronic Design, Prentice Hall, Englewood Cliffs, Jersy, Latest Ed.
* Joyce, Mourice V. and Clarke, Kenneth K., Transistor Circuit Analysis, Addison Wesley Publishing Co., Inc., Latest Ed.

ECE 335 Electronic Engineering

3rd Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Bipolar junction transistor (BJT): Construction and operation, Types, I-V characteristics, Biasing: Base- and emitter-bias, Collector feedback bias, Operating point. Field effect transistors (FETs): Junction FET (construction and operation: linear, non-linear and pinch off regions), I-V characteristics, Biasing techniques. Insulated gate FETs (IGFETs): Construction and operation (depletion and enhancement), I-V characteristics, Symbols, Biasing techniques. Complementary metal oxide semiconductor FET (CMOSFET): Construction, Logic gates using CMOS, FET applications: MOSFET as a resistance, JFET as a constant current source, Selected applications examples, Other semiconductor devices: Silicon-controlled rectifier (SCR) construction, Operation, Application, Silicon-controlled switch. (SCS), Diac, Triac, Etc..

References:

* Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, 1987.
* Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winston (HRW), 1998.

ECE 341 Electronic Circuits (2)

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Feedback (FB) amplifiers: FB concept, General characteristics of negative FB amplifiers, Input and output impedances with FB, Oscillators (sinusoidal, phase shift, resonant circuits and crystal). Multivibrators (MVs): Bistable MVs (fixed and self-bias), Triggering, Schmitt trigger (emitter coupled), Monostable and astable MVs (collector and emitter-coupled). Radio frequency (RF) voltage amplifiers. RF power amplifiers. Voltage regulators: Basic requirements, Regulator types (shunt, series and FB-regulators), Complete FB regulator.

References:

* Jacob Millman and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill, Latest Ed.
* Joyce, Mourice V. and Clarke, Kenneth K., Transistor Circuit Analysis, Addison Wesley Publishing Co., Inc., Latest Ed.

Laboratory: *Electronics Lab*

01 BJT amplifiers (gain, i/p and o/p resistances, cut-off frequencies, bootstrap and Darlington)
02 FET amplifiers (CD, CS, CG, gain Av, Rin, Rou, Ai)
03 Measurements of h-parameters
04 Regulated power supplies (regulators)

05 OPAMPs applications
06 Oscillators (crystal, v-controlled, RC)
07 Simulation of OPAMP
08 D/A converters
09 A/D converters
10 Introduction to VHDL

ECE 342 Digital Circuits

3rd Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

CMOS Inverter: Noise margin, Propagation delay, Power dissipation, CMOS combinational circuits: Static design, Pass transistors and transmission gates, Dynamic design, CMOS sequential circuits: Latches, Flip- flops, Counters, Finite-state, Machines, Pipelined structure, Non-bistable CMOS circuits: Monostable, Ring oscillator.

References:

* Rabaey, Jan M.; Anantha Chandrakasan and Vorivoje Nikollic, Digital Integrated Circuits, 2/E Prentice Hall, 2003.

ECE 351 Communication Systems (1)

3rd Year: Electrical Engineering - Electronics & Electrical Communication (Cont.) Hrs/Week: [(3+2) + (3+2)]
Marks:[(0+40+0) + (170+40+0)] = 250

Course Contents

Introduction to communication systems, Analysis of amplitude modulation, Frequency modulation, Phase modulation, Pulse modulation systems, Transmitters and receivers, Detectors, Mixers, Automatic gain control, Automatic frequency control, Phase-locked-loop, Applications of RF power amplifiers, Limiters,Harmonic generators and AM modulators, Stereo coder and decoder, FM stereo broadcast transmitters and receivers, Black and white television system: Scanning methods, Synchronization, Black and white camera and picture tubes, Black and white transmitters and receivers and their associated circuits, Color TV systems (PAL/ SECAM/NTSC), PAL coders and decoders, SECAM coders and decoders, NTSC coders and decoders, Color TV transmitters and receivers, Alignment of color TV receivers.

References:

* Hutson, Color TV Systems, McGraw Hill, 1991.
* Grey Miller, Communication Electronics, McGraw Hill, 1999.

Laboratory: *Communication Lab*

01 Linear and adaptive delta modulation
02 Pulse Code Modulating (PCM)
03 Color television receiver

04 Phase Locked Loop (PLL)
05 AM receiver

ECE 352 Digital Signal Processing

3rd Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Digital filter design: Finite impulse response, Infinite impulse response. Adaptive digital filters: Concepts, Algorithms, Applications. Speech coders: Speech signal analysis, Waveform coders, Vocoders, Hybrid coders. Image processing: Image coding, Image enhancement, Image compression.

References:

* Jayant, N. S. and Peter Noll, Digital Coding of Waveforms: Principles and Applications to Speech and Video, Prentice Hall, 1984.
* Mitra, Sanjit K., Digital Signal Processing, McGraw Hill, 1999.

ECE 353 Data Communication Systems

3rd Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Overview of data communication systems with introduction to network protocols. Characterization of random processes. Continuous wave modulation (amplitude, frequency and angle modulation, frequency division multiplexing, phase locked loops). Pulse modulation (sampling and quantization, pulse code modulation, time division multiplexing). Baseband pulse transmission (matched filter, noise error rate, inter symbol interference, digital subscriber lines). Passband digital transmission (coherent frequency and phase shift keying, hybrid amplitude/phase modulation, voice band modems). Spread spectrum modulation (direct sequence and frequency hopping). Fundamental limits of information theory (source and channel coding theorems, information capacity theorem, rate distortion theory and data compression). Error control coding (linear block codes, cyclic and convolutional codes, trellis coded modulation, turbo codes). Physical layer in network protocols.

References:

* Halsall, F., Data Communications, Computer Networks and Open Systems, 4th Ed., Addison Wesley, 1996.
* Haykin, S., Communication Systems, 4th Ed., Wiley, 2001.

ECE 361 Electromagnetic Waves

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Power flow on TL, Smith chart and impedance matching, Theory of small reflections, Power and energy relations, Guided waves: Waves between two conducting parallel plates, TE and TM waves and their characteristics, Velocities of propagation, Attenuation and quality factor, Wave impedance, Basic closed wave, Guides TE and TM waves and their characteristics in rectangular wave guides, Waves solution in cylindrical coordinates, TE and TM waves in circular wave-guides, Attenuation and quality factor of the wave- guide, Dielectric planar wave-guide, Surface waves, Modes of TE and TM waves in planar dielectric guide, Optical fibbers.

References:

* Bahl, I. and Bhartra, P., Microwave Circuit Design, John Wiley and Sons Inc., New York, 1988.
* Collin, R. E., Foundations for Microwave Engineering, McGraw Hill Book Co., New York, 2000.

Laboratory: *Microwave Lab*

01 SWR and impedance measurements
02 Reflection and refraction of MWs
03 Scattering matrix and wave guide attenuation measurements
04 Study of waveguide Hybrid-T and its application for impedance

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ECE 362 Applications of Electromagnetic Waves

3rd Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Equivalent circuit of waveguides: N-port circuit, Circuit description, Scattering parameters, Excitation of wave guides, Waveguides coupling by aperture Passive devices: Terminations, Attenuators, Phase shifters, Directional couplers, Hybrid junctions, Circuit theory of resonators, Fabry perot and optical resonators, Microwave and optical measurements: Detection of optical power, Detection and measurement of microwave power, Measurement of wavelength, Measurement of impedance, Fibber parameter measurements.

References:

* Collin, R. E., Field Theory of Guided Waves, IEEE Press Piscataway, N. S., 1991.
* Collin, R. E., Foundations for Microwave Engineering, McGraw Hill Book Co., New York, 2000.

ECE 371 Electronic Measurements & Testing (1)

3rd Year: Electrical Engineering - Electronics & Electrical Communication (Cont.) Hrs/Week: [(2+3) + (2+3)]

Marks:[(0+40+0) + (125+40+45)] = 250

Course Contents

Analog Instruments, Precautions, Data converters, Digital Instruments, Testing of

linear systems, Wave analyzers, Transducers, Noise effects, Optical fiber measurements, Electronic and communication experiments to support the theoretical aspects of the course material.

References:

* Helfrick, A. and Cooper, W., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, 1990.
* Laboratory Instructions, Manuals, Catalogues, Data books.

ECE 421 Electronics For Instrumentation

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Switched Capacitor power supply, Time base generators, Active filters, Analog multiplier, Logarithmic and exponential amplifiers, Sample and hold circuits, Sensors and transducers, Data transmission, Digital to analog converters DACs and analog to digital converters ADCs, Voltage to frequency and frequency to voltage conversion, Data acquisition systems, Pulling a signal from noise: Lock-in detection, Spectrum analyzer.

References:

* Jacob Millman and Arvin Grabel, Microelectronics, 2/D, McGraw Hill, 1987.
* Diefenderfer, James A. and Holton, Brian E., Principles of Electronic Instrumentation, Saunders College Publishing, 1994.

Laboratory: *Electronics Lab*

01 Sawtooth Generators
02 Active Filters
03 Sensors and Transducers
04 Build-up of a data acquisition system

ECE 431 Microwave Electronic Engineering

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Microwave tubes: Linear beam tubes (O-type): Two cavity klystron, Reflex klystron, Multi cavity klystron amplifiers, Travelling wave tube amplifiers, Backward wave oscillator, Extended interaction oscillator. Microwave crossed field tubes (M-type): Magnetron oscillators, Forward wave crossed field amplifier, Backward wave crossed field amplifier (Amplitron), Backward wave crossed field oscillator (Carcinotron), Gyratron. Microwave solid state devices: Schottky barrier mixer diodes, Tunnel diodes, Transferred electron devices, IMPATT, TRAPATT, BARITT, Varactors. Parametric devices: Manley- rowe relations, Parametric up converters,

Negative resistance parametric amplifiers. Microwave transistors.

References:

* Liao, S. Y., Microwave Devices and Circuits, Prentice Hall, 1990.
* Collin, R. E., Foundations for Microwave Engineering, McGraw Hill, 2000.

Laboratory: ***Microwave Lab***

01 Reflex klystron
02 Gun oscillator
03 Microwave cavities
04 Injection phase looking of a microwave oscillator

ECE 432 Selected Topics in Electronics

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to recent development in micro- and nano-electronics, Mems and mems technologies, Integrated circuit design, Computer aided design techniques and design automation.

References:

* Selected References, Manuals, Software, Packages.

ECE 451 Communication Systems (2)

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Sampling Process, Pulse amplitude Modulation. Quantization Process: Quantization noise, Conditions for optimality of scalar quantizers. Pulse Code modulation, time division Multiplexing. Digital multiplexers, Random Processes: Stationary process, Mean, covariance and correlation functions, Ergodic process, Transmission of Random Process through Linear time invariant filter: Power spectral Density. Noise: Gaussian process and central limit theorem, white noise, Narrow band noise. Noise effect on CW modulation Systems: DSB-SC, AM envelope, FM. Baseband Pulse. Transmission: Line Codes, Equalizers, Filter, probability of Errors in baseband, Intersymbol Interference, Nyquist criterion for distortionless baseband transmission, Raised Cosine spectrum. M-Ary Probability of error, Regenerative repeaters, Eye Pattern, Power spectrum of pulse amplitude modulation. Signal space analysis, correlation receiver. Passband data transmission, BPSK, QPSK, QPSK, Pe, Spectrum, generation. M-ary PSK, Hybrid Amplitude-phase modulation, Coherent Frequency shift keying, M-Ary FSK, Noncoherent binary FSK. Differential phase shift Keying. Comparison of digital modulation schemes using a single carrier. Application: Modems.

References:

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Laboratory: ***Communication Lab***

01 Line coding
02 Digital signal processing
03 Digital communication systems
04 Private Automatic Branch Exchange (PABX)
05 Computer simulation of MODEMS

ECE 452 Telecommunication Networks

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to telecommunications, Telegraph and telephone, Switching: Telegraph, Telephone, Telex, Data, Signalling, ISDN, Broad band, Private switching. Management network multiplexing: Analog, Digital, Wavelength division. Data transmission interface equipment: Modems, Digital data interface equipment. Codecs: Audio, Video. Copper lines: Open wire, Twisted pair cable, Coaxial cable. Optical fibber technology: Types of optical fibbers, Cables, Applications, Radio relay technology, Systems. Mobile radio: Service mode technology. Satellites: Services, Technology, Digital subscriber lines.

References:

* Halsall, F., Data Communications, Computer Networks and Open Systems, Addison Wesley, 1996.
* Elahi Ata, Network Communications Technology, Delmar, 2001.

ECE 453 Satellite Communications

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Communication satellite system, Orbiting satellites, The satellite channel, Llink calculation, Satellite electronics, Frequency division multiple access, Time division multiple access and code division multiple access, On board processing.

References:

* Gagliardi, Robert M., Satellite Communication, Van Nostrand Reinhold Co., 2000.
* Roddy, D., Satellite Communications, McGraw Hill, 2001.

ECE 454 Optical Communication Systems

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Overview of optical fibber communications, Optical fibber power launching and coupling, Optical receiver operation, Digital and analog detectors and preamplifiers, Digital transmission systems, Point to point links, Systems considerations, Power and rise time budgets, Analog systems, Carrier to noise ratio, Multichannel transmission techniques, Coherent optical fibber communication, WDM multiplexing, Optical amplifiers.

References:

* Gerd Keiser, Optical Fibber Communications, McGraw Hill, 2000.

Laboratory: *Laser Lab*

01 Fiber optics
02 M-lines
03 Simulation of optical communication system

ECE 455 Mobile Communications

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Basic concepts of mobile communications: Cell site planning: Traffic engineering, Principles of base station provisioning, Cell site configurations RF propagation characteristics: Fading phenomena, Path loss phenomena, Free space propagation, Two path model, RF coverage for mobile station inside buildings, RF propagation in highways and city streets, Shadowing effects, Practical measurements and prediction model, Noise in cellular systems. Frequency planning: Omni frequency plan, Cell sectorization, Tricellular plan, Directional frequency reuse, Microcells, Types of interference. GSM cellular system: Features, Multiple access techniques, GSM architecture, TDMA frame structure, Types of bursts, Mapping of logical channels on physical channels, Speech coding, Channel coding, Bit interleaving, Modulation, Frequency hopping, Power control, Carrier and burst synchronization, Hand over processing, Authentication encryption, CDMA spread spectrum systems, Direct sequence SSS, The performance of DS-SSS, CDMA air links: The forward pilot channel, Sync channel, Paging channel, Traffic channel, Access channel, Traffic channel. Types of codes used in CDMA, Power control in CDMA, Hand-off process in CDMA

References:

* Raymond Steele, Mobile Radio Communications, Penteh Press and IEEE Press, 1994.
* Lee, W. C. Y., Mobile Cellular Telecommunications, Analog and Digital Systems, McGraw Hill, 1995.
* Saleh Farouque, Cellular Mobile Systems Engineering, Artech House Publishers, 1996.

ECE 456 Selected Topics in Communication Systems

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to current development in communication systems. Radar systems data, Communications and signal processing

References:

* Selected References, Manuals, Software, Packages.

ECE 457 Information Theory

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction: Uncertainty, Information, Entropy and its properties. Source coding:Shannon codin Prefix coding, Kraft-Mcmillan inequality, First shannon theorem, Huffman coding, Lempel Ziv coding. Discrete memoryless channels: Transition probability, Binary symmetric channel, Mutual information and its properties. Channel capacity: Definition, Binary symmetric channel. Channel coding theorem: Second shannon theorem differential entropy and mutual information for continuous ensemples: Differential entropy, Mutual information. Channel capacity theorem: Implications on different communication systems. Rate distortion theory. Compression of information. Linear block codes: Syndrome decoding, Minimum distance considerations. Cyclic codes: Generator polynomial, Parity check polynomial, Encoder for cyclic, Hamming codes, Bose Chaudhuri- Hocquenghem (BCH) codes, Reed-Solomon codes. Convolutional codes: Code tree, Trellis and state diagram Maximum likelihood decoding of convolutional codes.

References:

* Simon Hykin, Communication Systems, John Wiley and Sons, 2001.

ECE 461 Antennas

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Fundamentals and definitions for transmitting and receiving antennas and antenna arrays. Dipoles array synthesis and antenna arrays, Line sources. Resonant antennas wires and patches: Folded dipole antennas, Yagi Uda antennas, Microstrip antennas. Broadband antennas: Travelling wave wire antennas, Helical antennas, Biconical antennas, Sleeve antennas. Aperture antennas: Rectangular and circular apertures, Reflector antennas. Feeding networks for wire antennas,

Arrays and reflectors. Antennas in communication systems: Friis transmission formula, Antenna noise temperature. Microwave propagation: Atmospheric effects, Ground effects and plasma effects.

References:

* Balanis, C. A., Antenna Theory and Analysis, Wiley, New York, 1997.
* Stutzman, W. L. and Thiele, G. A., Antenna Theory and Design, Wiley, New York, 1998.

Laboratory: ***Microwave Lab***

01 Slide screw tuner
02 Directional coupler and reflectometer measurements
03 Antenna
04 The simulation of microstrip antenna

ECE 462 Selected Topics in Microwave Engineering

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to current development in microwave electronics, Microwave communication systems and antennas.

References:

* Stutzman, W. L. and Thiele, G. A., Antenna Theory and Design, Wiley, New York, 1998.
* Pozar, D. M., Microwave Engineering, Wiley, 1998.
* Scoot, A. W., Understanding Microwaves, Wiley, 1998.

ECE 471 Electronic Measurements & Testing (2)

4th Year: Electrical Engineering - Electronics & Electrical Communication (Cont.) Hrs/Week: [(0+3) + (0+3)]

Marks:[(0+25+0) + (75+25+25)] = 150

Course Contents

The student performs testing measurements in two domains: Communication systems: Study of PLL characteristics, Study of digital communication techniques: PCM, Delta modulation, Optical communication systems, TV characterization, Satellite receiver systems, Telephone system, Electromagnetic waves: Propagation of radio waves, Microwave generators, Semiconductor devices, Characterization of microwave circuits.

References:

* Helfrick, A. and Cooper, W., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, 1990.
* Laboratory Instructions, Manuals, Catalogues, Data books.

ECE 481 Integrated Circuits

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

IC Processing, Post Processing, Processing economics, Design of basic digital IC building blocks, NMOS Inverter : Noise margin propagation delay, Power dissipation, NMOS and CMOS gate circuits, GaAs digital circuits, IIL, TTL, ECL gates, BiCMOS digital circuits, Memory cores: ROM, EPROM, EEPROM, Flash ROM, SRAM, DRAM, Memory peripheral Circuitry: Row and column decoders, Array structure: PLA, PAL, PLD.

References:

* Sherif Embabi; Abdellatif Bellaouar and Mohamed Elmasry, Digital BiCMOS Integrated Circuit Design, Kluwer Academic Publishers, 1993.
* Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winston (HRW), 1998.
* Rabaey, Jan M.; Anantha Chandrakasan and Vorivoje Nikollic, Digital Integrated Circuits, 2/E Prentice Hall, 2003.

ECE 482 Integrated Circuits Technology

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Defining terms, technology roadmap, Basic silicon processes, Fabrication of passive and active components, Process integration and standard technologies, Process simulation, Layout design rules, Layout parasitics, Typical examples, Layout techniques, Interconnect modelling, Substrate coupling issues, ESD protection techniques, Packaging

References:

* Campbell, The Science and Engineering of Microelectronics Fabrication, Oxford University, 1996.

ECE 483 Application Specific Integrated Circuits (ASICS)

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction to ASICs, ASIC library design, Programmable ASICs, Programmable ASIC logic cells, Programmable ASIC I/O Cells, Programmable ASIC interconnect,

Programmable ASIC design software, VHDL and verilog HDL, Logic synthesis, Simulation and verification, Floorplanning, Placement and routing.

References:

* Smith, Michael J. S., Application Specific Integrated Circuits, Addision Wesley, 1997.

ECE 484 Analog Integrated Circuit Design

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to analog VLSI, Device modelling – basic analog building blocks (current mirrors, common- source, common- drain, common- gate, cascode-differential pair) , Frequency response, Stability and frequency compensation, Operational amplifiers (basic, two-stage, miller, symmetrical, telescopic, folded, cascode), Noise, Voltage and current references.

References:

* Behzad Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, Inc, 2000.

ECE 485 Integrated Circuits Applications

4th Year: Electrical Engineering - Electronics & Electrical Communication Hrs/Week: [(3+1) + (0+0)]
Marks: [(70+30+0) + (0+0+0)] = 100

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Amplifiers : RF IF and video, Oscillators: Tuned and untuned oscillators stability, VCO, Phase locked loop, Modulators: AM ,SSB balanced FM, PM, Pulse modulators, Digital modulators, Demodulators: AM, FM and PM detectors, Transmitter and receiver circuits, Circuit simulators, Digital, Analog and mixed mode.

References:

* Paul Young, Electronic Communication Techniques, Macmillan, 1990.

ECE 499 Project

4th Year: Electrical Engineering - Electronics & Electrical Communication (Cont.) Hrs/Week: [(0+2) + (0+6)]
Marks:[(0+25+0) + (0+75+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical

engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Computer & Systems Engineering

CSE 011 Computer Technology

Preparatory Year: General Engineering - . (1st Term) Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Computer architecture, Computer systems, Operating systems, File systems, Computer networks, Internet network, Logical design of programs, Problem solving methods, Types of programming languages, Application on a structured or visual computer programming language for solving engineering problems, Database systems and information technology and decision support systems, Computer graphics and computer systems needed for graphics and image display, Multimedia systems.

References:

* Lawlor, C.V., Computer Information Systems, 8th Ed., The Dryden Press, 2002.
* Introduction to Computers, Class Notes, Ain Shams University, 2003.

CSE 121 Computers Programming

1st Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to problem analysis, Algorithm generation and programming concepts using a Pascal like programming language, Variables, Declarations and assignments of numeric data types, Internal representation of numerical data, Analysis of errors in numerical computations, Input and output. Selection control structures, Loops and iteration structures, Procedures and functions, Recursion, Modular program design, Array processing, Characters, Strings and other data types, Developing computer programs to implement numerical algorithms of commonly engineering problems.

References:

* Griffiths, D. V. and Smith, I. M., Numerical Methods for Engineering: A Programming Approach, CRC Press, 1991.
* Koffman, E. B., Pascal Problem Solving and Program Design, Addison Wesley, 1992.

CSE 211 Computer Organization (1)

2nd Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Structure and behaviour of digital computers at several levels of abstraction (high-level, assembly/machine code, microprogramming and logic circuit). Functional organization of computer hardware. Instruction sequencing and timing: Logic circuits, Microoperation, Microcommand, Microinstruction. Data transfer: Data bus implementation, Bus cycles, Bus timing. representation of numbers, Data coding,

Operation codes in computer. Instruction set: Word format, Instruction format, Instruction types, Instruction set design tradeoffs. Addressing modes. Storage elements: Flip/Flop, Register and memory. Memory organization. Computer registers: Dedicated/general purpose registers, Implicit and explicit registers, Stacks and procedures. Organization of CPU. Arithmetic and logical operations: Operations in registers, Operations in ALU. Design of ALU. Control Unit: Function of control unit, Hardwired implementation, PLA implementation, Microprogrammed control unit, Firmware, Coprocessors. Low level I/O, Memory hierarchy, Bussing and I/O subsystems. Computer buses: Data bus, Address bus, Status bus and control bus. Design of a simple virtual computer. Introduction to computer parallelism: Multiplicity of data/PE and instructions/CU.

References:

* Mano, M. M., Computer System Architecture, Prentice Hall Int., 1993.
* William Stallings, Computer Organization and Architecture: Principle of Structure and Function, Macmillan Publishing Co., 1995.
* Hsu, J.Y., Computer Architecture: Software Aspects, Coding and Hardware, CRC Press, 2001.

CSE 241 Logic Circuits

2nd Year: Electrical Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Review on number systems: Positional notation, Binary number systems, Number base conversion, Octal and hexadecimal, Negative numbers, Coded number systems. Switching functions: Main operators, Postulates and theorems, Analysis and synthesis of switching functions, Incompletely specified functions. Design using NAND and NOR gates. Storage devices:1-bit storage, Set-reset FF, Clocked SR-FF, Positive and negative-edge triggered SR-FF, JK-FF, Race-around condition, Master-slave JK-FF, D-FF, T-FF, Excitation table. Sequential circuits: State table and transition diagram, Design of digital systems, Incompletely specified states, Counters, Shift registers. Miscellaneous topics: Adders, Subtracters, Decoders, Coders, Multiplexer/demultiplexer, Memories (ROM, PLA, RAM). Introduction to microprocessors.

References:

* Mano, M. M., Digital Design, 3rd Ed., Prentice Hall, 2001.
* Chen, W. K., Logic Design, CRC Press, 2003.
* Farhat, H.A., Digital Design and Computer Organization, CRC Press, 2003.

Laboratory: ***Logic Design Lab.***

01 Synchronous counters

02 Logic design and simulation with logic gates using KMP (implementation)

CSE 271 Systems Dynamics & Control Components

2nd Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Dynamic system model building principles. Mechanical, Electrical and electro-mechanical systems. Parametric models (input, output, state space). Simulation and response to standard inputs. Relating system dynamics to its physical parameters. Nonparametric models (frequency/impulse/step/pulse responses). Nonlinear models and linearization techniques. Fluid systems (hydraulic/pneumatic). Thermal systems. Distributed models. Examples of practical systems. Measurement and control in closed loop control. Physical quantities and transducers. Static and dynamic specifications of transducers. Displacement, Velocity and acceleration transducers. Strain gauges and Wheatstone bridge. Thermal transducers. Pressure, Flow and level transducers. Analog signal conditioning and transmission. Digitizing analog signals (D/A, A/D). Data acquisition systems in digital control loops. PC interfaces through standard I/O bus cards and parallel and serial interfaces and their drivers. Programmable controllers. Power interfacing (power amplifiers, thyristors). Control valves. Electronic/pneumatic PID controllers.

References:

* Seborg Dale, E.; Edgar Thomas, F. and Mellichamp Duncan, A., Process Dynamics and Control, John Wiley and Sons, 1989.
* Ogunnaike, Babatunde A.; Ray, Harmon W. and Ogunnaike, Ray, Process Dynamics, Modelling and Control (Topics in Chemical Engineering), Oxford University Press, 1994.
* Karayanakis, N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
* Anderson, Norman A., Instrumentation for Process Measurement and Control, CRC Press, 1997.
* Curtis Johnson, Process Control Instrumentation Technology, Prentice Hall, 1997.
* Shearer, J., Dynamic Modelling and Control of Engineering Systems, Prentice Hall, 1997.
* Northrop, R. B., Introduction to Instrumentation and Measurements, CRC Press, 1997.

CSE 311 Computer Organization (2)

3rd Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Organization of processors, Controllers, Memories, Devices and communication links. Current state of computer architecture, Modern computer system components. Advanced processor architectures and interconnects. Instruction set design tradeoffs, Instruction set design: Minimal and reduced instruction set, Microinstruction format. Pipeline processors: Pipelining of instruction Set, Multifunction pipelines. Parallel computer organizations: Parallel processing, Multiple CPU systems, Multicomputers, Superscalar and supervector computers,

Scalability of parallel systems, Parallel programming concepts. Program partitioning, Granularity and latency. Memory hierarchy, Interleaving and bandwidth. Virtual memory. Microcontroller, Interrupts, DMA, cache memory. Memory system (access) controller. Bus protocols. Interconnection networks. Message routing mechanisms. Shared address space. Communication cost and latency-hiding techniques. Specific architectures: Shared memory multiprocessors, Message passing. Dataflow design.

References:

* Farhat, H.A., Digital Design and Computer Organization, CRC Press, 2003.
* Stallings, W., Computer Organization and Architecture: Designing for Performance, Prentice Hall, Pearson Education Inc., 2003.
* Kai Hwang and Briggs, Faye A., Computer Architecture and Parallel Processing, McGraw Hill Book Co., Latest Ed.

CSE 312 Microprocessor Based Systems

3rd Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

An introduction to microprocessors and its evolution, Internal organization, Data unit, Buses, Control units, Timing, Sequences and synchronization. Assembly language programming: Instruction set, Assembler directives, I/O devices. Interface design: I/O control method, I/O synchronization, LSI and MSI interface devices. Interrupt processing: Priority interrupt, Vectored and non-vectored interrupts, Peripheral devices, Real time programming, Microprocessors in automation systems with emphasis on implementation issues, Examples on other applications as data monitoring and data logging, Weighting systems, Measurement devices …, etc.

References:

* Lawrence, P.D. and Mauch, K., Real-Time Microcomputer System Design, McGraw Hill, 1987.
* Rafiquzzama, M., Introduction to Microprocessors and Microcomputer- Based System Design, CRC Press, 1995.
* Hall, Douglas V., Microprocessors and Interfacing/Programming and Hardware, 3rd Ed., McGraw Hill, 1998.
* Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
* Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

CSE 313 Microprocessor & Applications in Power Systems

3rd Year: Electrical Engineering - Power & Electrical Machines Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to microprocessors and its evolution. Architecture: Internal organization, Data and address unit, Buses, Control units, Timing, Assembly language, Fundamentals, Programming, Microprocessor system, Connections, Interrupts and interrupts and interrupt service procedure, Interfacing, Programmable chips, Signal conditioning and data acquisition systems, Applications of several control systems, Measurements, Protection, Electric derives and machines,…etc.

References:

* Greenfield, J. D. and Wray, W. C., Using Microprocessors and Microcomputers, the Motorola Family, John Wiley and Sons, 1988.
* Driscoll, F. F.; Couglin, R. F. and Villanucci, R. S., Data Acquisition and Process Control With the M68HCII Micro controller, McMillan, 1994.
* Rafiquzzama, M., Introduction to Microprocessors and Microcomputer- Based System Design, CRC Press, 1995.
* Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
* Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

CSE 314 Logic Design

3rd Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Number systems, Operation and codes, Logic gates, Boolean algebra and logic simplification, Karnaugh maps, Flip-Flops and related devices, Counters, Shift registers, Combinational logic and its functions (adders, comparators, decoders, encoders, multiplexers, DeMultiplexers, parity generators/checkers), Programmable logic devices, Memories (ROM, RAM, etc..), Interfacing (PIA, etc..).

References:

* Mano, M. M., Digital Design, 3rd Ed., Prentice Hall, 2001.
* Farhat, H.A., Digital Design and Computer Organization, CRC Press, 2003.
* Chen, W. K., Logic Design, CRC Press, 2003.

CSE 315 Computer Organization

3rd Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Fundamentals of computer architecture and organization. Basic computer organization and design: Information format, Instruction formats. Computer instructions, Timing and control execution of instructions. Register transfer, Microoperations, Control functions. Memory organization, CPU structure and function, Processor organization, Register organization, ALU. Hardwired and microprogrammed control unit. Instruction execution cycles, Control memory, Microinstruction sequencing and execution. Bus organization: Bus timing analysis, Memory devices and systems. I/O systems. Hardware implementation of datapath and memory systems: Control signalling and interrupts, Programmed I/O (direct I/O, memory mapped I/O), interrupted I/O, interrupt priority, Bidirectional bus interfaces. Programmable peripherals devices. Interface design issues. Introduction to embedded systems.

References:

* Rafiquzzaman, M. and Chandra, R., Modern Computer Architecture, West Publishing Co., 1988.
* Hamacher, V. C.; Vranesic, Z. G. and Zaky, S. G., Computer Organization, McGraw Hill Publishing Co., 1990.
* Hsu, J.Y., Computer Architecture: Software Aspects, Coding and Hardware, CRC Press, 2001.

CSE 321 Software Engineering

3rd Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction, Computer based system engineering, Software processes, Project management, Software requirements, Requirements engineering processes, System models, Exposition to commonly used software models, Software prototyping, Formal specification, Architectural design, Distributed systems architectures, Object oriented design, Real time software design, Design with reuse, User interface design, Software estimation techniques, Software metrics.

References:

* Leach, R., Introduction to Software Engineering, CRC Press, 1999.
* Sommerville Ian, Software Engineering, 6th Ed., Addison Wesley, 2001.
* Keyes, J., Software Engineering Handbook, CRC Press, 2002.

CSE 322 Operating Systems

3rd Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Operating system concepts, Processes, Interprocess communication, Process scheduling, Memory management, Swapping, Virtual memory, Page replacement

algorithm, Segmentation, File systems, Directories, File system implementation, File system security, I/O, interrupt handier, Device drivers, Clock software, input/output software, Deadlocks, Unix operating system, Windows operating systems. Network file system, client/server model. Remote procedure call, Threads.

References:

* Stallings William, Operating Systems: Internals and Design Principles, 4th Ed., Prentice Hall, 2000.
* Silberschatz Abraham; Greg Gagne; Peter Baer Galvin and Silberschatz, A., Operating System Concepts, 6th Ed., John Wiley and Sons, 2001.
* Tanenbaum Andrew, Modern Operating Systems, 2nd Ed., Prentice Hall, 2001.

Laboratory: *Operating Systems Lab.*

01 Unix and Unix shell scripting
02 Windows 2000 server operating system
03 Network File System NTFS
04 Unix programming
05 Window programming

CSE 323 Programming With Data Structures

3rd Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Programming essentials (conditions, operators, iterations, functions). Arrays, Pointers, Classes, Recursion. Stacks, Queues, Lists, Tables, Trees (binary trees), Search trees. Heaps and priority queues. Sorting.

References:

* Aho, Alfred V.; Hopcroft, John E. and Ullman Jeffrey, Data Structures and Algorithms, Addison Wesley Pub. Co., 1983.
* Parker, A., Algorithms and Data Structures in C++, CRC Press, 1993.
* Hubbard, John R., Schaum's Outline of Data Structures with C++, McGraw Hill Trade, 2000.
* Lafore Robert, Data Structures and Algorithms in Java, 2nd Ed., Sams, 2002.

CSE 324 Computer Programming

3rd Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Problem solving and algorithm specification. Elements of object oriented programming (functions, classes, objects, messages, and inheritance). Functions as computational units and basic types of constructs. Data types and declarations (variables and identifiers). Operators and expressions (arithmetic, relational and logical). Enumerations, Arrays and pointers. Iteration control. Data abstraction and encapsulation (classes and objects). Function calls and argument passing. Problem

solving with objects. (an objected oriented language like C++ or Java may be used throughout the course).

References:

* Wang, P. S., C++ With Object - Oriented Programming, PWS Publishing, 1994.
* Campione, M. and Walrath, K., The Java Tutorial (Object - Oriented Programming For the Internet), Addison Wesley, 1996.
* Deitel, Harvey M.; Dietel, Paul J.; Listfield, Jeffrey A.; Nieto, Tem R.; Yaeger, Cheryl H. and Zlatkina Marina, C# How to Program, Sams: Book and CD- ROM Ed., 2001.
* Chandra, B., Object Oriented Programming Using C++, CRC Press, 2002.

CSE 351 Electrical Testing (2)

3rd Year: Electrical Engineering - Computer & Systems (Cont.) Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+35+0) + (100+35+30)] = 200

Course Contents

Experiments were be developed to support the courses and the curricula at this level: It will focus on industrial measurements such as (temperature, torque, pressure, flow, velocity), Digital transducers, Digital encoders, Digital to analog conversion, ADC, Computer architecture aspects, Educational kits and modules to simulate control systems, Computer software methodologies, Experiments on network file systems, Operating systems and advanced window programming were be also included.

References:

* Laboratory Instructions, Manuals, Catalogues, Data Books.

CSE 371 Control Systems (1)

3rd Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Characteristics of closed loop systems: Introduction to feedback control systems, Advantages and disadvantages of feedback, Sensitivity to parameter variation. Performance of control systems: Standard test signals, Transient response, Response of first and second order systems, Properties of transient response. Stability of linear systems: The Routh-Hurwitz criterion, Special cases, Relative stability. The root locus method. Frequency response plots: Bode plots, Polar plots, Systems with transportation lag, Estimation of transfer functions from bode plots. Stability from frequency response: Nyquist criterion, Relative stability, The closed loop frequency response. Design and compensation: Using root locus, Using bode plots, Nichols charts computer aided analysis and design tools.

References:

* Levine, William S., The Control Handbook, IEEE Press, 1996.
* Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.

* Mutambara, Arthur G. O., Design and Analysis of Control Systems, CRC Press, 1999.
* Levine, William S., Control System Fundamentals, CRC Press, 2000.

CSE 372 Control Systems (2)

3rd Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction, Controllability and observability, Performance measures, Optimal control using pontryagin's maximum principle, Nonlinear control and the describing function, Parameter estimation and linear parametric model identification by least squares, Multivariable control, Robust control, Intelligent control, Control integration, Applications.

References:

* Ching Fang Lin, Advanced Control Systems Design, Prentice Hall Inc., 1994.
* Astrom, K.J. and Wittenmark, B., Adaptive Control, 2nd Ed., Addison Wesley, 1995.
* Dorf, Richard C. and Bishop, Robert H., Modern Control Systems, Addison Wesley, 1995.

CSE 411 Distributed Computer Systems

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

An introduction to distributed computer systems, Architecture of distributed systems, Distributed operating systems for computer networks, Distributed data bases, Distributed problem solving. Foundations of coordinated computing models: Shared variables, Exchange functions, Concurrent processes, Data flow, Communicating sequential processes, Processor management and scheduling techniques, Languages for distributed computing: ADA, Occam or other available languages examples of distributed systems.

References:

* Coulouris George, Dollimore Jean and Kindberg Tim, Distributed Systems: Concepts and Design, 3rd Ed., Addison Wesley Pub. Co., 2000.

CSE 412 Selected Topics in Computer Engineering

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Selected topics related to current developments in computer engineering, New computer architecture. New software engineering paradigms e.g: Object orientation, Multimedia, Virtual reality systems, Optical computers, GIS, Expert systems,

Intelligent information systems, Data mining, Machine translation and natural language understanding, … etc.

References:

* Oklobdzija, V., The Computer Engineering handbook, CRC Press, 2001.
* Hennessy John, L.; Patterson David, A. and Goldberg David, Computer Architecture: A Quantitative Approach, 3rd Ed., Morgan Kaufmann, 2002.
* Selected Articles from IEEE Transactions and Journals on Computers, Software Engineering, Networks, Neural Networks, etc.

CSE 413 Microprocessor Based Systems

4th Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

An overview of microprocessor architecture: Internal organization, Data processing unit, Buses, Control units, Timing, Sequences and synchronization. Assembly language programming: Instruction set, Assembler directives, I/O devices. Interface Design: I/O control method, I/O synchronization, and LSI and MSI interface devices. Interrupt Processing: Processing, Priority interrupt, Vectored and non-vectored interrupts. Peripheral devices: Keyboard and displays. Data acquisition subsystem design. Mass storage devices. Applications, with emphasis on microprocessor based systems in automation. Microcontrollers.

References:

* Greenfield, J. D. and Wray, W. C., Using Microprocessors and Microcomputers, the Motorola Family, John Wiley and Sons, 1988.
* Driscoll, F. F.; Couglin, R. F. and Villanucci, R. S., Data Acquisition and Process Control With the M68HCII Micro controller, McMillan, 1994.
* Rafiquzzama, M., Introduction to Microprocessors and Microcomputer- Based System Design, CRC Press, 1995.
* Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
* Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

CSE 421 Database Systems

4th Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to database systems and users, Architecture for a database system, Relational model: Domain, Relations and relational integrity, SQL: The relational database language standard, Database management system and examples such as oracle and access, Database design theory and methodology. Functional dependency and normalization for relational database, Entity/Relationship model

(ERM) and enhanced Entity/Relationship model (EERM), Mapping from ER-EER to relational database model, Data protection: Recovery, Concurrency, Security and integrity, Object oriented database. Advanced application in database: Multimedia databases, Distributed database and data mining, Database project: Different applications on database design and manipulation

References:

* Elmasri and Navathe, Fundamentals of Database Systems, 3rd Ed., Addison Wesley, 2000.
* Date, An Introduction to Database Systems, 7th Ed., Addison Wesley, 2000.
* Bagui, S. and Richard Earp, Database Design Using Entity-Relationship Diagrams, CRC Press, 2003.

CSE 422 Systems Software

4th Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Overview of system software including operating systems, Compilers and interpreters for different languages (procedural, functional, object oriented, portable, scripting, logic, …). Platforms for standalone computers, Levels of interconnection in networks and the web are indicated. Integrated development environments. Basic compiler and interpreter components. Introduction to formal grammars, In particular regular and context free. Lexical analysis or scanning and their finite automata models. Error detection. Syntactic analysis for context free grammars. Operator precedence parsing as a bottom up technique. Recursive descent parsing as a top down technique. Syntactic errors. Applications to C and Java. Code generation and machine-independent code optimization. Some machine-dependent considerations. Interpreters and Pseudo machine compilers. Applications using Java Virtual Machine. Java networking aspects and applets. Compiler-compilers and examples such as YACC for Unix. XML grammar specification and how to develop valid and well-formed XML documents. Parsing XML documents and applications. Integrated development environments with an example (e.g. .NET).

References:

* Fischer, C. N. and Leblanc, R. J., Crafting a Compiler with C, The Benjamin/Cumming Publishing Co., 1991.
* Campione, M. and Walrath, K., The Java Tutorial: Object, Oriented Programming for the Internet, Addison Wesley, 1996.
* Beck, L. L., System Software, 3rd Ed., Addison Wesley, 1997.
* Holzner, S., XML Complete, McGraw Hill, 1998.

CSE 431 Computer Networks

4th Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Introduction to computer networks, Uses of computer networks, Network structure, Network architecture, ISO/OSI reference model, TCP/IP model, Examples of networks, Network topology, Connectivity analysis, Delay analysis, Backbone design, Local access network design, Physical layer, Data communication networks, Telephone system, Integrated services digital network, Asynchronous transfer mode network, Data link layer design issues, Error handling, Elementary data link protocols, Sliding window protocols, Medium access protocols, Network layer design issues, Routing algorithms, Congestion control algorithms, internetworking, Transport layer services and protocols, Examples of transport protocols, Session layer services and protocols, Network security and privacy, Electronic mail, File transfer protocol, World wide web, Network management.

References:

* Fred Halsall, Data Communications, Computer Networks and Open Systems, Addison Wesley, 1996.
* Davie, Bruce S.; Peterson, Larry L. and Clark David, Computer Networks: A Systems Approach, 2nd Ed., Morgan Kaufmann, 1999.
* Hura, G. S.and Singhal, M., Data and Computer Communications: Networking and Internetworking, CRC Press, 2001.
* Tanenbaum, Andrew S., Computer Networks, 4th Ed., Prentice Hall PTR, 2002.
* Tanenbaum, Andrew S., Computer Networks, Prentice Hall, 2003.

CSE 432 Computer Security

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Overview of computer security (types of computer intrusion, computer and network security, methods of defence). Secure encryption systems (symmetric and public key encryption schemes, AES (advanced encryption standard), RSA standard). Security protocols (key distribution, authentication, and digital signature schemes). Software security (protection from viruses and similar programs, design of secure operating systems, database security). Network security (IP security and the IPSec protocol, firewalls, web security, electronic mail security, network management security aspects).

References:

* White, G. B.; Fisch, E. A. and Pooch, V. W., Computer System and Network Security, CRC Press, 1995.
* Cobb Chey, Network Security for Dummies®, John Wiley and Sons, 2002.

CSE 433 Local Area Networks

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Local area networks definition and functions, Local area network structure and topology. Transmission media, Protocol architecture and reference model, IEEE 802 standard, Medium access control, Bridges and routers. Logical link control services and protocol mechanisms, Traditional LANs, CSMA/CD Carrier Sense Multiple Access with Collision Detection. Ethernet, Token bus, Token ring, High speed Ethernet-like LANs, Gigabit Ethernet, ATM LANs, Wireless LANs, LAN performance, Performance measures, Factors that affect performance. Network management system, Network management services and protocols.

References:

* Slone, J. P., Local Area Network Handbook, 6th Ed., CRC Press, 2000.
* William Stallings, Local and Metropolitan Area Networks, Prentice Hall, 2000.

CSE 434 Computer Networks

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to computer networks, Uses of computer networks, Network structure, Network architecture, ISO/OSI reference model, TCP/IP model, Examples of networks, Network topology, Physical layer, Data communication networks, Telephone system, Integrated services digital network, Asynchronous transfer mode network, Data link layer design issues, Error handling, Elementary data link protocols, Medium access control protocols, Local area networks, Carrier sense multiple access with collision detection protocol, Ethernet like local area networks, High speed local area networks.

References:

* Fred Halsall, Data Communications, Computer Networks and Open Systems, Addison Wesley, 1996.
* Davie, Bruce S.; Peterson, Larry L. and Clark David, Computer Networks: A Systems Approach, 2nd Ed., Morgan Kaufmann, 1999.
* Hura, G. S.and Singhal, M., Data and Computer Communications: Networking and Internetworking, CRC Press, 2001.
* Tanenbaum, Andrew S., Computer Networks, 4th Ed., Prentice Hall PTR, 2002.
* Tanenbaum, Andrew S., Computer Networks, Prentice Hall, 2003.

CSE 441 Embedded Computer Systems

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Overview of embedded system. The concepts of pervasive computing, Internet based embedded systems and information appliances. Hardware, Software codesign of embedded systems. A methodology based on "codesign finite, state

machines" is presented together with simple illustrative examples. Introduction to VHDL for modelling digital hardware devices. Structural, dataflow and behavioural styles of modelling. Architecture and implementation of microcontrollers and their basic instruction set. Controller software design and implementation. Finite state machines and Petri nets could be used to illustrate the different concepts with specific applications. Specific architecture of a 16 bit microcontroller, Indicating the availability of other types of controllers. Real time operating systems and their testing. An overview of microelectromechanical systems (MEMS) and the scope of their different applications. An overview of Web technologies for embedded applications with illustrative examples.

References:

* IEEE MICRO, Selected Papers, , 1990-Now.
* Hintz, K. and Tabak, D., Microcontrollers: Architecture, Implementation and Programming, McGraw Hill, 1992.
* Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
* Douglass, Bruce Powel, Real- Time Design Patterns: Robust Scalable Architecture for Real- Time Systems, Addison Wesley Professional: Book and CD- ROM Ed., 2002.

CSE 442 Computer Interfacing

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to I/O organization of a typical computer, Computer peripheral interfacing (input and output devices). Micro computer ports: Serial, Parallel, Mouse. I/O multi processing interfacing, Inter processor communication schemes, Human computer interface. Virtual reality: Interface for real application, Wireless interfacing, Optical computing devices, Intelligent interface machines.

References:

* Driscoll, F. F.; Couglin, R. F. and Villanucci, R. S., Data Acquisition and Process Control With the M68HCII Micro controller, McMillan, 1994.
* Hall, Douglas V., Microprocessors and Interfacing/Programming and Hardware, 3rd Ed., McGraw Hill, 1998.
* Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
* Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

CSE 451 Electrical Testing (3)

4th Year: Electrical Engineering - Computer & Systems (Cont.) Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+35+0) + (100+35+30)] = 200

Course Contents

Experiments are offered to suppert courses taught at this level, They cover the

following: Computer interfacing techniques, Computer networks and Internet; Electronic instrumentation; Robotics and AI applications; Analog, Digital control systems; Nonlinear control systems; Computer control of industrial processes, Experimental projects are given to the students to implement HW/SW systems.

References:

* Laboratory Instructions, Manuals, Catalogues, Data Books.

CSE 461 Information Systems

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction, Importance of information management, Organization, General system model. System approach: Objectives, Decision making, Problem solving process. Data bases: Basic data concepts, Database approach, DBMS fundamentals. Computer based decision support system: General view, Uses of information, Reports, Queries, Simulation. Manufacturing information system: Objectives, Model of the MIS, Manufacturing intelligence subsystem, Industrial engineering subsystem, Internal accounting subsystem, Inventory subsystem, Quality subsystem, Production subsystem, Cost subsystem. Information system development planning, Analysis and design, Implementation, Operation and control.

References:

* Michael Hordeski, Computer Integrated Manufacturing, TAB Books, 1988.
* Raymond, Mcleod Jr., Management Information Systems, SRA, IBM, 1988.
* Jain, L.C., Evolution of Engineering and Information Systems and Their Applications, CRC Press, 1999.
* Auerbach, Information Management: Strategy, Systems and Technologies, CRC Press, 2000.
* Dewire, D.T., Information Systems Management, CRC Press, 2000.

CSE 462 Biomedical Engineering

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to mathematical modelling of physiological systems, Linear system approximation, Stochastic modelling, Cardiopulmonary system models, Myocardial mechanics, Cardiac energy and power analysis models, Models of gastrointestinal tract motility, Models of respiratory mechanics and chemical control of respiration.

References:

* Bronzino, J. D., The Biomedical Engineering Handbook, 2nd Ed., CRC Press, 1999.
* Northrop, R. B., Signal and Systems Analysis in Biomedical Engineering, CRC Press, 2003.

CSE 463 Neural Networks

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to neurocomputing and NN concepts: Definitions, Processing elements. Learning laws: Self adaptation equations, Coincidence learning, Competitive learning, Filter learning and spatiotemporal learning, Data transformation structures, Linear associative networks, Learning matrix network, Recurrent associative networks, Back propagation networks, Counter propagation networks, Boltzmann machine, Dynamic back propagation networks. Overview of verious engineering applications of neural networks.

References:

* Cichocki, A. and Unbehauen, R., Neural Networks for Optimization and Signal Processing, John Wiley and Sons, 1993.
* Fausett, Laurene V., Fundamentals of Neural Networks, 1st Ed., Prentice Hall, 1994.
* Schalkolf, Robert J., Artificial Neural Networks, McGraw Hill, 1997.
* Haykim, S., Neural Network: A Comprehensive Foundation, 2nd Ed., Prentice Hall, 1999.

CSE 464 Pattern Recognition & Image Processing

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to pattern recognition, Statistical and structural approaches, Recognition rules, Classifiers, Supervised and unsupervised learning, Digital image properties, Image enhancement, Image segmentation, Image compression, Image transformations, Image retrieval.

References:

* Gonzalez, Rafael C. and Woods, Richard E., Digital Image Processing, Addison Wesley, 1993.
* Schalkof, Robert J., Pattern Recognition: Statistical, Structural and Neural Approaches, McGraw Hill, 1997.
* Russ, J.C., The Image Processing Handbook, 4th Ed., CRC Press, 2002.

CSE 465 Selected Topics in Systems Engineering

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Selected topics related to the state of art in systems engineering, The course will

cover selected advanced topics on: Robust control systems, Optimal filtering and prediction of stochastic systems, Adaptive control, Intelligent control systems.

References:

* Selected Articles from IEEE Transactions and Other Related Journals on Control, Systems Man and Cybernetics, Neural Networks, Fuzzy Systems, etc.

CSE 466 Real Time Systems

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Synchronous programming, Time and simulation systems, Asynchronous signal processing, Data structures, Multi-independent processes, The operator's console, Event driven scheduling, Applications.

References:

* Lawrence, P.D. and Mauch, K., Real-Time Microcomputer System Design, McGraw Hill, 1987.
* Auslander, David M. and Than, Cheng H., Real-Time Software for Control, Prentice Hall Inc., 1990.
* Laplante, P., Real-Time Systems Design and Analysis: An Engineers Handbook, IEEE Press, 1993.
* Douglass, Bruce Powel, Real- Time Design Patterns: Robust Scalable Architecture for Real- Time Systems, Addison Wesley Professional: Book and CD- ROM Ed., 2002.

CSE 467 Modelling & Simulation

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Simulation of a single server queuing system, Simulation of inventory system, List processing in simulation, Simulation languages, Simulation of time sharing system, Simulation output data and stochastic processes, Random number generators, Building valid and credible simulation models, Verification of simulation computer programs, Perspectives on validation, Practical consideration.

References:

* Karayanakis, N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
* Law, Averill M. and Kelton, David W., Simulation Modelling and Analysis, 3rd Ed., McGraw Hill Science/ Engineering/ Math, 1999.

CSE 468 Image Processing

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Image and image representation: Spatial frequency domain, Descriptions of line and shape, Perspective transformations, Projective invariant, Descriptive methods in scene analysis. Feature analysis: Pre-processing, Feature extraction. Classification: the bays classifier, Discriminate functions and decision surfaces, Clustering application in image field.

References:

* Gonzalez, Rafael C.and Woods, Richard E., Digital Image Processing, 2nd Ed., Addison Wesley Pub. Co., 2002.
* Russ, J.C., The Image Processing Handbook, 4th Ed., CRC Press, 2002.

CSE 469 Expert Systems

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to expert systems. Major characteristics of expert systems. Knowledge representation, Inference techniques, Rule-based expert systems, Forward and backward chaining. Bayesian approach to inexact reasoning, Fuzzy logic, Frame based expert systems, Knowledge acquisition and domain expert knowledge acquisition vie rule induction, Decision tree, Performance validation, Hybrid expert systems, Knowledge engineering, Implementation issues.

References:

* Krishnamoorthy, C.S. and Rajeev, S., Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996.
* Russell Stuart, J. and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Ed., Prentice Hall, 2002.

CSE 471 Computer Controlled Systems

4th Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction, Sampled data systems, Z-transform and its properties, Inverse of Z-transform, Closed loop performance and stability. Computer control schemes: Supervisory and direct digital control systems, Digital PID control design, Pole placement digital control, Independent regulation and tracking pole placement control. SCADA systems. Real time programming considerations. Applications.

References:

* Astrom, K.J., Computer Controlled Systems, Addison Wisley, 1994

CSE 472 Robot Systems

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction, Robot arm kinematics, the direct kinematics problems. The reverse kinematics solution. Robot arm dynamics, General dynamic equation, Control of robot arms. Planning of manipulator motion. Robot programming languages: Characteristics of robot-level languages and characteristics of task-level languages. Robot intelligence and task planning. Expert systems and knowledge engineering in robot's applications.

References:

* Health, Fundamentals of Robotics, Theory and Applications, Reston P. C., 1985.
* Wolovich, W. A., Robotics, Basic Analysis and Design, Holt, Rinehart and Winston, 1987.
* Chernousko, F. L.; Bolotnik, N. N. and Gradetsky, V. G., Manipulation Robots Dynamics, Control and Optimization, CRC Press, 1993.
* Murray, R.; Li, Z. and Sastry, S., A Mathematical Introduction to Robotic Manipulation, CRC Press, 1994.
* Gorinevsky, D.; Formalsky, A. and Schneider, A., Force Control of Robotics Systems, CRC Press, 1997.

CSE 473 Digital Control

4th Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction, Sampled data systems, Z-transform and its properties, Inverse of Z-transform, Closed loop performance and stability, Digital PID control design, Pole placement digital control, Independent regulation and tracking pole placement control, Applications.

References:

* LANDAU, J. D., System Identification and Control Design, Prentice Hall Inc., 1990.
* Phillips Charles, L., Nagle Troy, H. and Nagle H. Troy, Digital Control System Analysis and Design, 3rd Ed., Prentice Hall, 1994.
* Ogata, K., Solving Control Engineering Problems with MATLAB, Prentice Hall Inc., 1994.

CSE 474 Industrial Control

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Dynamic elements in the control loop (dead time, capacity, lag), Characteristics of

real processes, Nonlinear elements in the loop, Analysis of some common loops (flow control loop-pressure control loop-liquid level control loop, temperature control loop). Controllers, Linear controllers (PI, PID, complementary feedback controller). Digital control systems, Nonlinear controllers (on, off controller, the dual mode concept, nonlinear PID controller). Improved control through multiple loops, Including cascade control, Multiple output control system, Selective control loops and adaptive control systems. Feed forward control, Ratio control, Dynamic compensation, Effects of interaction, Decoupling.

References:

* Shinskey, F.G., Feedback Controllers for the Process Industries, McGraw Hill, 1994.
* Shinskey, F.G., Process Control Systems: Applications, Design and Tuning, 4th Ed., McGraw Hill, 1996.
* Bateson, Robert N., Introduction to Control System Technology, Prentice Hall, 1999.

CSE 475 Advanced Control Systems

4th Year: Mechanical Engineering - Mechatronics Hrs/Week: [(0+0) + (3+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction, Controllability and observability, Performance measures, Optimal control using pontryagin's maximum principle, Nonlinear control and the describing function, Parameter estimation and linear parametric model identification by least squares, Multivariable control, Robust control, Intelligent control, Control integration, Applications.

References:

* Ching Fang Lin, Advanced Control Systems Design, Prentice Hall Inc., 1994.
* Astrom, K.J. and Wittenmark, B., Adaptive Control, 2nd Ed., Addison Wesley, 1995.
* Dorf, Richard C. and Bishop, Robert H., Modern Control Systems, Addison Wesley, 1995.
* Jain, L. C. and Silva, C. W., Intelligent Adaptive Control: Industrial Applications, CRC Press, 1998.

CSE 481 Artificial Intelligence

4th Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to AI. Introduction to AI languages. Problem solving, State space representation, Search, Heuristics, Game playing, Knowledge representation, Production systems, Logic, Probabilistic reasoning, Frames. Applications.

References:

* Winston, P.H., Artificial Intelligence, Addison Wesley Publishing Co., 1992.
* Russel and Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 1995.

* Krishnamoorthy, C.S. and Rajeev, S., Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996.
* Giarratano, Joseph C., Expert Systems: Principles and Programming, 3rd Ed., Brooks Cole, 1998.

CSE 482 Expert Systems

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Architecture of expert systems and their basic components. Knowledge representation and reasoning (propositional and predicate calculus and resolution as an inferencing mechanism). Probabilistic and graph theoretic considerations related to expert systems (modelling human reasoning, reasoning under uncertainty, The principle of maximum entropy, directed acyclic graphs). Rule based expert systems (representation of uncertainty, inference networks). Typical examples. Causal or belief networks for expert systems (probability propagation, typical examples). Using prolog in expert systems (Prolog's inference engine, backward chaining with uncertainty, forward chaining, applications).

References:

* Merritt, D., Building Expert Systems in Prolog, Springer Verlag, 1989.
* Neapolitan, R. E., Probabilistic Reasoning in Expert Systems, Wiley, 1990.
* Krishnamoorthy, C.S. and Rajeev, S., Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996.
* Nilsson, N. J., Artificial Intelligence: A New Synthesis, Morgan Kaufmann, 1998.
* Russell Stuart, J. and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Ed., Prentice Hall, 2002.

CSE 483 Intelligent Control Systems

4th Year: Electrical Engineering - Computer & Systems Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to intelligent control, Introductory fuzzy logic, Fuzzy logic controller structure and design, Self organizing fuzzy logic control. Principles of neural networks, Network topology and learning techniques, Neural networks for control and modelling. Neuro fuzzy control systems, Advanced applications in engineering domain.

References:

* Harris, C. J.; Moore, C. G. and Brown, M., Intelligent Control Aspects of Fuzzy Logic and Neural Nets, World Scientific Publishing Co., 1993.
* Jang, J-S R., C-T S. and Mizutani, E., Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, Prentice Hall Inc., 1997.
* Jain, L.C. and Silve, C.W., Intelligent Adaptive Control: Industrial Applications, CRC Press, 1998.

CSE 499 Project

4th Year: Electrical Engineering - Computer & Systems (Cont.) Hrs/Week: [(1+1) + (1+5)]

Marks:[(0+25+0) + (0+75+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Design & Production Engineering

MDP 021 Engineering Drawing & Projection

Preparatory Year: General Engineering - . (Cont.) Hrs/Week: [(1+4) + (1+4)]

Marks:[(0+50+0) + (150+50+0)] = 250

Course Contents

Engineering drawing techniques and skills. Conventional lettering and dimensioning, Geometric constructions, Theories of view derivation, Orthographic projection of engineering bodies, Projection of points, Lines, Surfaces and bodies, Derivation of views from isometric drawings and vice versa, Derivation of views and sections from given views, Intersection of bodies and surfaces, Development of surfaces, Steel construction, Symbols of electrical circuits, Fasteners, Assembly drawings for some mechanical components, Computer aided drafting.

References:

* Thomas, E. F., Fundamentals of Engineering Drawing, McGraw Hill Co., 1998.
* Hart, K. R., Engineering Drawing, English Universities Press Ltd., 1999.
* Thomas, E. F. and Vierck, C. J., Engineering Drawing and Graphic Technology, McGraw Hill Co., 2001.

MDP 022 Production Technology & Engineering History

Preparatory Year: General Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Production technology: Properties of engineering materials and material selection, Casting and joining of metals, Forming processes, Basic machining processes, Measurement, Standardization, International measuring systems, Cost analysis and estimation, Maintenance (systems, types and programming), Organization structure, Engineering history: Art, Science, Engineering and technology, Role of engineering and technology in development and establishment of civilizations, Methods and tools used to satisfy needs through exploitation of human and natural resources in ancient time, Middle ages and modern times, Technology and environment, Technology transfer and technology gap, Inventions and technological innovation.

References:

* Singer, C.; Holmyard, E.J. and Hill, A.R., A History of Technology, Oxford University Press, London, 1975.
* Garrison, E.G., History of Engineering and Technology: Artful Methods, CRC Press, 1998.

MDP 111 Manufacturing Technology (1)

1st Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Machining: Principles of machining, Materials of cutting tools, Turning machines and processes, Drilling machines and processes, Shaping and planning machines and processes, Milling machines and processes, Grinding machines and processes, Methods of tools and work piece fixation, Machining time, Non-conventional cutting processes (ECM, EDM, USM, AJM, WJM and AWJM), Metal forming: Introduction includes mechanical behaviour of the materials, Plastic deformation, Effect of temperature on plastic behaviour, Types of forming processes: Hot, Cold, Massive or sheet metal work, Metal forming processes: Forging and its types, Rolling, Extrusion,Types of drawing (rod, wire, tube, and deep), Sheet metal work (shearing, pressing, blanking, spinning, bending, coining, etc.), Brief explanation to forming machines and equipment, Heat treatment of alloys: Diffusion and phase transformation in alloys, Heat treatment processes for iron and steel alloys, Heat treatment processes for non-ferrous alloys.

References:

* Serope Kalpakjian, Manufacturing Engineering and Technology, Addison Wesley Publishing Co., 1992.
* Walker, John R., Machining Fundamentals, The Goodheart Willcos Co., 1993.
* Krar, S.F., Technology of Machine Tools, McGraw Hill Co., 1996.
* Groover, Mikell P., Fundamentals of Modern Manufacturing, Prentice Hall Int., 1996.

Laboratory: *Production Workshop Lab*

01 Turning machines and processes
02 Shapers
03 Planers and slotters
04 Horizontal and vertical milling machines
05 Universal milling machine
06 Grinding machines and processes
07 Free, die forging and upsetting
08 Bending
09 Rolling
10 Extrusion
11 Wire and deep drawing
12 Harden ability test
13 Hardening of steel
14 Precipitation hardening

MDP 131 Materials Engineering & Testing

1st Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(4+4) + (0+0)]

Marks:[(120+40+40) + (0+0+0)] = 200

Course Contents

Materials engineering: Types of engineering materials, Crystal structure, Imperfections in crystalline structures and their relation to properties, Strengthening mechanisms, Solidification and grain formation, Binary phase diagrams, Iron carbon diagram, Heat treatment, Engineering alloys and their properties. Polymers: Structure, Types, Properties, Deformation and applications. Ceramics: Structure,

Types, Properties and applications, Composite materials. Testing of materials: Mechanical behaviour of materials (elastic and plastic behaviour), Mechanical testing (tension, compression, bending, shear, hardness, impact, creep, fatigue), Type of fracture, Property/structure relationship, Wear, non destructive tests, Corrosion and corrosion prevention.

References:

* Van Vlack, Materials for Engineering: Concepts and Applications, Addison Wesley Press, 1982.
* Smith, W., Materials and Engineering, McGraw Hill Publ., 1990.
* Callister, W., Materials Science and Engineering, John Wiley Pub., 1997.

Laboratory: ***Metalberg Lab***

01 Identificaiton of materials
02 Crystal structure
03 Sample preparation and grain size measurement
04 Cooling curves
05 Phase diagrams
06 Iron carbon diagram
07 Microstructure evaluation
08 Characterization of polymers
09 Applications
10 Tension test
11 Compression test
12 Bending test
13 Problems applications
14 Hardness test
15 Impact test
16 Creep test
17 Fatigue test
18 Corrosion test

MDP 161 Machine Drawing

1st Year: Mechanical Engineering - . (Cont.) Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+40+0) + (120+40+0)] = 200

Course Contents

Methods used in drawing and designing offices, Kinds of drawings, Positioning of dimensions, Views of sections, Parts and elements of machines, Drawing parts of machines using computer.

References:

* Hart, K. R., Engineering Drawing With Problems, John Wiley and Sons, 1982.
* Giesecke, F., Technical Drawing, Macmilan Publisher Co., 1986.

MDP 211 Manufacturing Technology (2)

2nd Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Part (1): Metal casting technology: Introduction, Solidification processing, Liquid metals, Principles of solidification, Primary (wrought) and casting, Metals and alloys, Production of primary metals, Production of shaped casting, Patterns, Moulding techniques: Moulding techniques and dynamics, Melting procedures and equipment, Design considerations, Structure, Properties and defects of casting, Computer applications in metal casting, Quality control in casting. Part (2): Metal welding technology: Classification of welding operations for ferrous materials, Thermal welding, Oxy-Acy, Welding, Arc welding, Resistance welding, Submerged arc welding, Spot and seam welding, Plasma welding, Cold pressure welding, Adhesive welding, Testing of welded joints, Classification of vehicles, Main principles of operation and schematic representation of the different types of part: Automotive engine, Transmission line, Braking system, Suspension, Tires, Frame and body.

References:

* أحمد سالم الصباغ، هندسة لحام المعادن، عالم الكتب، ١٩٧٧.
* Charles, F. Walton (ed) and Timothy, J. Opar, (Co ed) Iron Casting, Iron Casting Soc, Inc., USA, 1981.
* John Campell, Butterworth, Heinemann, Casting, Ltd. Publishing Co., 1991.
* Metals Handbook, V.15 -Casting, ASM Int., USA, 1998.

Laboratory: *Production Workshop Lab*

01 Project
02 Casting processes (1)
03 Casting processes (2)
04 Casting design/ pattern
05 Fluidity
06 Forces acting on mould
07 Gating system design
08 Feeding system design
09 Material balance
10 Ingot structure and grain refinement (1)
11 Ingot structure and grain refinement (2)
12 Casting defects
13 Sand testing
14 Mould/ core making
15 Furnaces and equipment
16 Cast iron
17 Computer aided temperation recording
18 Oxy- Acy- welding
20 Oxy- Acy- cutting
21 Arc welding
22 Variables affecting arc welding
23 Spot welding
24 Welding symbols

MDP 221 Stress Analysis

2nd Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Properties of plane areas, Combined stresses, Mohr's circle, Theories of elastic failure, Transmission shafts, Slopes and deflections, Strains and deformations, Plane analysis and calculation of internal forces for statically indeterminate beams, Flexural analysis of curved beams, Thin shell pressure vessels, Thick cylinders, Buckling of compression members and plates, Thermal stresses in bars, Plates, Pistons and cylinders.

References:

* Popov, E.P., Mechanics of Materials, Prentice Hall Int., London, 1978.
* Khurmi, R.S., Strength of Materials, S.CH and Company, New Delhi, 1998.

MDP 251 Mechanics of Machines (1)

2nd Year: Mechanical Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(0+30+0) + (140+30+0)] = 200

Course Contents

Mechanisms: Definitions, Inversions of reciprocating engine, Inversions of double slider mechanism, Motor vehicle steering mechanism, Hook's joint-velocity and acceleration, Equilibrium of machines and force analysis: Static and power analysis, Friction and inertia-effect, Center of percussion, Flywheel and turning moment diagram, Cams: Types of cams, Types of followers, Motion of followers, Cam profile and motion of followers, Gears: Types of gears, Gear geometry and gear trains, Balancing: Introduction, Balancing of rotating masses, Balancing of the reciprocating engines and engine out of balance, Gyroscopes.

References:

* Hannah, J., Mechanics of Machines, British Library, 1984.
* Mobie, H. H., Mechanics and Dynamics of Machinery, John Wiley and Sons, 1987.

MDP 252 Machine Construction

2nd Year: Mechanical Engineering - . (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(0+40+0) + (120+40+0)] = 200

Course Contents

Basic considerations in casting, Forging, Machining and assembly operations, Margins and factor of safety, Springs design, Design of permanent joints (Welding, riveting), Design of detachable joints, Prestressed bolted joints under static and dynamic loading, Design of shafts, Construction and design of couplings and chains.

References:

*
* Orlove, Fundamentals of Machine Design, MIR Publisher, 1977.
* Shigly, Machine Design, McGraw Hill Co., 1999.

MDP 321 Manufacturing Technology (3)

3rd Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Forming technology: Forming of metals (process and tool design of forging, extrusion, wire, tube and deep drawing), Roil-pass design, High-energy-rate terming (explosive, electro-hydraulic, electro-magnetic forming), Powder metallurgy (powder production, compaction, sintering and sizing), Forming and shaping plastics and composite materials, Funning and shaping of ceramics and glasses.

References:

* Lyman,T., Metals Handbook, Machining, American Society for Metals Park, Ohio 44073, USA, 1976.
* Krar, S.F. and Others, Machine Tool Operations, Gregg Division, McGraw Hill Book Co., 1983.

MDP 322 Work Study

3rd Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Productivity: Factors affecting productivity and role of management, Introduction to work study: Objectives, Techniques applied, Method study techniques: Steps controlling the technique, Charts and diagrams, Critical examination and analysis, Developing new methods, Measures and controls, Work measurements: Direct and indirect methods, Relaxation allowances and calculation of standard time, Learning curves: Concept, Application in work study and determination of standard time, Incentive schemes: Design elements, Study of some known schemes, Human factors.

References:

* Currie, R. M., Work Study, Pitman, London, 1977.
* International Labour Office ILO, Introduction to Work Study, Geneva, 1995.

MDP 323 Quality Systems

3rd Year: Mechanical Engineering - Production Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Basic concepts, Definitions, Terminology, History of quality control, Quality systems for design and development, Development of quality control systems, Quality

control of purchases, Planning, Organization, Quality costs, Economics of quality, Training, Quality control during product use, Employee participation programs.

References:

* Juran, Joseph M. and Blanton, Godfery A., Juran's Quality Control Handbook, McGraw Hill Book Co., 2000.
* Gryna, Frank M., Quality Planning and Analysis, McGraw Hill Book Co., 2001.

MDP 324 Reliability Engineering

3rd Year: Mechanical Engineering - Production Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

The increasing emphasis on product reliability, The evaluation of formal product reliability, What is product reliability, Establishing product reliability requirements, Developing the reliability program, Reliability in design, Reliability demonstration, Quantitative reliability measures, Dynamic reliability, Static reliability models, Introduction to life distribution, Success and failure testing, Dynamic reliability models, Introduction to sequential testing, Reliability growth, Reliability modelling.

References:

* Michael Beasley, Reliability for Engineers, Macmillan Education Ltd., 1991.
* Carter, A. D. S., Mechanical Reliability, Macmillan, 1996.

MDP 325 Quality of Service Industries

3rd Year: Mechanical Engineering - Production Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

The meaning of quality in the service sector, The need for improved service quality, Characteristics of the service sector, The characteristics of quality and their measurement, The nature and scope of errors, Error prevention, The management of quality, The cost of quality, Service system design, Starting a quality control program, From quality control to continuous improvement, Increasing quality and competitiveness, Case studies.

References:

* Rosander, A. C., The Quest For Quality in Service, ASQC, Milwaukee, Wisconsin, 1989.
* Milakovich, Michael E., Improving Service Quality, Dehay Beach, Florida, 1995.

MDP 331 Engineering Materials (Advanced)

3rd Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Metal alloys: Ferrous, Non-ferrous, Refractory, Super alloys, Controlling material

properties. Thermal processing of metal alloys: Annealing, Heat treatment of steels, Precipitation hardening, Composite materials, Failure of materials, Corrosion and degradation of materials, Materials selection, Case studies

References:

* Callister, W., Materials Science and Engineering, John Wiley, 1999.

Laboratory: *Metalberg Lab*

01 Phase diagram review
02 Heat treatment: hardenability test
03 Heat treatment: effect of C% and cooling media on hardening
04 Heat treatment: Al - Cu
05 Composite preparation and testing
06 Corrosion test
07 Case studies

MDP 341 Measuring Instruments

3rd Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(4+4) + (0+0)]

Marks:[(120+40+40) + (0+0+0)] = 200

Course Contents

International system of units, Theory of measurements, Instrument classification, Types of magnification (mechanical, electrical, optical, pneumatic), Measuring signals (static, ramp, dynamic), Dynamic response of measuring equipment, Sensors and transducers, Fits, Tolerances and limit gauges, Simple measuring Instruments (vernies, micrometers, dial gauges, angle gauges, protractors, sine bar, sensitive level), Comparators, Measuring machines, Errors and calibration of measuring equipment.

References:

* Gupta, R.C., Engineering Precision Metrology, Khanna Publishers, 1979.
* Jain, Engineering Metrology, Khanna Publishers, 1999.

Laboratory: *Measurement Lab*

01 Fixed gauges
02 Limit gauge design
03 Angle gauges
04 Slip gauges
05 Micrometers
06 Verniers
07 Dial indicators
08 Dial bore gauges
09 Measuring microscopes
10 Contour projector
11 ABBE vertical
12 Opto- mechanical comparators
13 Sine bar
14 Bevel protractors
15 Sensitive levels

16 Circular division
17 Interferometers
18 Miscellaneous measurement
19 Elec. strain gauge
20 Inductive transducer

MDP 351 Mechanical Vibrations & Automatic Control

3rd Year: Mechanical Engineering - Automotive (1st Term) Hrs/Week: [(4+3) + (0+0)]
Marks:[(125+50+0) + (0+0+0)] = 175

Course Contents

Mechanical Vibration: Introduction, Study and analysis of single and multi degree of freedom systems (transverse and tortional), Free undamped, Free damped and forced vibration, Whirling of shafts, Design of vibration absorber, Dynamic stresses, Critical speed of shafts, Automatic control: Introduction to feedback control systems, Transfer function of dynamic systems of single input single output, Determination of system response (in time domain, in Laplace domain and in frequency domain), Nyquist and bode diagrams, Analysis of linear control systems, System performance criteria, Servo systems: Characteristics and performance, Design of logic control systems.

References:

* Rao, Singiresu S.S., Mechanical Vibrations with Disk, Addison Wesley, 1995.
* Thomson, William T. and Marie Dillon Dahleh, Theory of Vibration with Applications, Simon and Schuster, 1997.
* Dorf, Richard C.C. and Bishop, Robert H., Modern Control System, Pearson Education, 2000.
* Katsuhiko Ogata, Modern Control Engineering, Pearson Education, 2001.
* Kuo, Benjamin C. and Farid Golnaraghi, Automatic Control System, John Wiley and Sons Incorporated, 2002.

MDP 352 Mechanics of Machines (2)

3rd Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Introduction, Vibration of single degree of freedom systems (free, damped, forced) Vibration isolation, Vibration of two degree of freedom systems (free, forced), Vibration absorber, Torsional vibrations (free, forced), Dynamic stresses, Equivalent torsional systems: Geared system, Crank system, Vibration of multi-degree of freedom systems (free, forced), Critical speeds of shafts: Shafts with lumped masses, Shafts with distributed masses.

References:

* Thomson, William T., Theory of Vibration with Applications, Prentice Hall, Inc., 1981.
* Rao, Singiresu S., Mechanical Vibrations, Addison Wesley Publishing Co., Inc., 1990.

MDP 353 Automatic Control

3rd Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction and objectives, Control systems configuration, Control system examples (concentration on logic systems and servos), Control system components: Logic control components (electric, electronic, pneumatic, hydraulic, mixed), Sensors, Switches, Shaft encoders, Synchros, Resolvers, Design of the logic control systems: Combinational and sequential systems, Using step and displacement diagrams, State -diagrams: Ladder diagram FC, Grafcet, Petri nets, With examples on CNC M/C and FMC, Introduction to servo systems: Electric, Electronic, Hydraulic, Pneumatic, Examples on slides M/c control in conventional and CNC workshop equipment.

References:

* Srivinas, D. and Richard, N., Sequential Logic Testing and Verification, Kluwer Academic Publishers, 1991.
* Lala, Parag K., Practical Digital Logic Design and Testing, Prentice Hall, 1995.
* Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.
* Levine, W. S., Control System Applications, CRC Press, 1999.

Laboratory: *Automatic Control Lab*

01 Demonstration and presentation of at least two types of logic control systems, a combinational and sequential LCS, using a real system or real models.

02 Testing and experimentation of the basic components of LSC.

03 Assembly and testing of at least two real LCS.

04 Presentation and testing of a position servo system aApplied on the slides control of a CNC or a robot model, two types of systems should be considdered.

MDP 354 Mechanics of Machines (2)

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction, Vibration of single degree of freedom systems (free, damped), forced, Vibration isolation, Vibration of two degree of freedom systems (free, forced), Vibration absorber, Torsional vibrations (free, forced), Dynamic stresses, Equivalent torsional systems: Geared system, Crank system, Vibration of multi-degree of freedom systems (free, forced. Critical speeds of shafts: shafts with lumped masses), Shafts with distributed masses.

References:

* Thomson, William T., Theory of Vibration with Applications, Prentice Hall, Inc., 1981.
* Rao, Singiresu S., Mechanical Vibrations, Addison Wesley Publishing Co., Inc., 1990.

MDP 355 Introduction To Mechatronics

3rd Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(2+1) + (0+0)]
Marks: [(50+25+0) + (0+0+0)] = 75

3rd Year: Mechanical Engineering - Automotive Hrs/Week: [(0+0) + (2+1)]
Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Introduction and basic definitions, Mechatronics as interdisciplinary subject, Configuration of a mechatronic system (examples from the field), Mechatronics approach in the design of smart machinery: Life cycle of a product, Mechatronics concurrent eng, Design methodology, Examples (field), Data processing and signal handling, I/O data transfer (analog I/O, digital I/O), A/D and D/A converters, Sensors and actuators for mechatronic systems, Data acquisition and control cards and systems, Design of mechatronic systems using PLC, PC and microcontrollers (hardware and software), Using labview and matlab for simulating the mechatronic systems (with examples).

References:

* Tomkinson, D. and James, H., Mechatronics Engineering, McGraw Hill, N.Y., 1996.
* David, G. and Michael, B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory: *Mechatronics Lab*

01 Demonstration and presentation of at least two mechatronic systems.
02 Performing some experiments on some basic components.
03 Using an ADDA card to control two types of systems through a PC, based system.
04 Using a PLC and a microcontroller to control two types of systems.
05 Simulating two types of systems using labview and simulink software packages.

MDP 357 System's Modelling & Simulation

3rd Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Basics of mathematical modelling, Experimental methods for mechatronics systems modelling and identification, Physical analogies (mechanical, electrical, thermal, hydraulic and pneumatic systems), Model transforms and approximations, Simulation and basics of parameter estimation methods, Methods of virtual reality and their applications to product development, Recent simulation software packages, Simulation with practical examples.

References:

* Karayanakis, N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
* Northrop, R. B., Introduction to Instrumentation and Measurements, CRC Press, 1997.
* Bernard, P.; Herbert, P. and Tag Jon Kim, Theory of Modelling and Simulation, Academic Press, 2000.

MDP 358 Automatic Control

3rd Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to automatic control systems, Course objectives, Control system configurations, Terminology, Examples on control systems (process, servo, logic), Process dynamics and mathematical modelling of physical systems (analytical, experimental, Engineering techniques for system modelling), Determination of the system response solution of the DE, Laplace, Convolution Frequency response, Polar and nyquist plots, Bode diagram, Analysis of feedback control systems: Steady state errors, Stability analysis techniques, Closed loop system, Performance indices, Synthesis of feedback control systems: Synthesis criteria, Design of process control systems with P, PI, PD, PID, Controllers-tuning techniques, Design of servo control systems using different types of compensators, Industrial control systems: Sensors, Transmitters, Controllers, Final control elements for process control and servosystems, Valves, Introduction to non-linear control systems.

References:

* Boris, J. and Paul, J., Classical Feedback Control, Marcel Dekker Inc., 2000.
* Dorf, R. and Bishor, R., Modern Control System, Prentice Hall, 2001.

Laboratory: *Automatic Control Lab*

01 Demonstration and presentation of at least three control systems of different types, process control system, servo system, logic control system.

02 Using hardwired, or digital, simulators to apply all concepts of stability analysis applied to different types of control systems.

03 Experimental determination of the performance indices of a process control system and a servo mechanism.

04 Testing and calibration of the P, PI, PD, PID, controller types applied To simulated controllers or industrial controllers.

05 Tuning of industrial controllers in a process control system and tuning of compensator for a servo system.

06 Studying the performance of some final control elements, e. g. motorized pneumatic valve; DC and AC servo motors.

07 Studying the perrformance and the calibration techniques of some industrial transmitters and signal converter elements.

MDP 359 Mechatronics (1)

3rd Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Basic components of mechatronic systems, Electric circuits including grounding and electrical interference, Semiconductor electronics including optoelectronic devices, System response including system modeling and analogies, Analog signal processing using operational amplifiers, Digital circuits including some special

purpose digital integrated circuits, Data acquisition system including digital/analog conversion, Hardware, Software codesign of embedded systems based on codesign finite-state machines, Introduction to VHDL for modeling digital hardware devices using structural, Dataflow and behavioral styles.

References:

* Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
* Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory:

01 Demonstration and presentation of at least two mechatronic systems.
02 Performing some experiments on some basic components.
03 Using an ADDA card to control two types of systems through a PC, based system.

MDP 361 Machine Design

3rd Year: Mechanical Engineering - Production (Cont.) Hrs/Week: [(2+2) + (2+2)]
Marks:[(0+40+0) + (120+40+0)] = 200

Course Contents

Part I: Power transmission: Clutches (positive and friction), Variation in geometry of friction surface (plane, conical, cylindrical), Various forms for force generation (mechanical, electromagnetic, hydraulic, pneumatic), Introduction to reological clutches, Belt drives: Flat, V-shape and ribbed, Variable speed drives: Stepped and stepless, Disk, Cone and Spherical drives, Gears: Straight spur, Helical, Bevel (straight, spiral, skew) and worm drives, Gear loading forms (static, dynamic, endurance and wear resistance). Part II: Brakes (radial and axial, internal and external, single and double) and band brakes, Rolling bearings: Dynamic and static capacities, Grease and oil lubrication, Rubbing and non- rubbing seals. Sliding bearings: Hydrodynamic and hydrostatic lubrication. Part III: Introduction to the use of computers in machine design.

References:

* Reshetov, D. N., Machine Design, MIR Publisher, 1978.
* Shigley, J. E., Mechanical Engineering Design, McGraw Hill Book Co., 1986.
* Stolariski, T. A., Tribology in Machine Design, Hienemann Newness, 1990.

MDP 362 Machine Construction & Design of Mechanical Equipment

3rd Year: Mechanical Engineering - Mechanical Power (1st Term) Hrs/Week: [(3+4) + (0+0)]
Marks:[(125+50+0) + (0+0+0)] = 175

Course Contents

Introduction on main design considerations (type of stresses, factor of safety, material properties), Design of transmission shaft, Transmission machine parts: Clutches, Brakes, Belts drives (flate, V), Rolling bearings: Dynamic and static capacities, Selection of bearing, Grease and oil lubrication, Rubbing and non-

rubbing seals, Sliding bearing: Hydrodynamic theory of lubrication, Thermal equilibrium and hydrostatic lubrication, Design of gears: Straight spur, Helical, Bevel and worm drives gear units, Design of springs, Design of cylinders, Design of some mechanical equipment.

References:

* Shigley, M., Mechanical Engineering Design, McGraw Hill, 1997.
* Orlov, P., Fundamentals of Machine Design, MIR Publisher, 1998.
* Jain, R. K., Machine Design, Khanna Publishers, 1999.

MDP 363 Introduction to Computer-Aided Design & Manufacturing

3rd Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Computer technology, The foundations of CAD/CAM. Part I: Computer aided design: Fundamentals of CAD, The design process, Applications of computers for design, Computer-aided design hardware, Computer-aided design software, Wire frame models, Solid modelling. Part II: Computer-aided manufacturing: Automation of manufacturing processes, Numerically controlled machines, Computerized numerically controlled machines (CNC), Flexible manufacturing cells, Material handling and movement, Industrial robots, Programming languages, Applications and performance of CAD/CAM systems.

References:

* Machover, C. and Blauth, R. E., The CAD/CAM Handbook, Computervision Corporation, Mass, 1980.
* Kalpakjian, S., Manufacturing Engineering and Technology, Addison Wesley Publishing Co., 1995.

MDP 371 Theory of Metal Cutting

3rd Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Basic concepts and definitions, Tool geometry (definitions, reference planes, geometry of single point tools, twist drills and milling cutters), Tool materials (types and applications), Chip formation (types of chips, built up edge BUE, chip compression ratio, determination of shear angle and shear strain), Mechanics of metal cutting (merchant's analysis, factors affecting cutting forces), Measurement of the cutting forces, Empirical cutting force relationships in conventional cutting (turning, drilling and milling), Heat in metal cutting (heat generation and dissipation, cutting temperature, measurement, distribution, relationships of cutting temperature), Tool failure (types and causes), Tool wear and its measurement, Tool life, Taylor's relationship, Factors affecting tool life, Chatter in machining (causes,

measurements, limiting width of cut, factors, affecting the limiting width of cut), Cutting fluids (functions, requirements, types and applications), Surface roughness (sources, parameters, factors affecting surface roughness, theoretical relationship), Machining economy (machining cost equation, optimum tool life, optimum machining variables), Machinability (definitions, criteria and indices).

References:

* Boothroyd, G., Fundamentals of Metal Machining and Machine Tools, McGraw Hill, Singapore, 1985.
* Shaw, M. C., Metal Cutting Principles, Oxford University Press, New York, 1996.
* Stephenson, D. A. and Agapiou, J. S., Metal Cutting Theory and Practice, Marcel Dekker, New York, 1997.

Laboratory: ***Metal Cutting Lab***

01 Metal cutting experiments
02 Tool geometry
03 Chip formation
04 Chip compression ratio
05 Cutting forces (orthogonal cutting)
06 Cutting forces (conventional cutting in turning and drilling)
07 Measurement of cutting temperature in turning
08 Measurement of tool wear and tool life
09 Chatter in turning (limiting width of cut)
10 Measurement of surface roughness in turning

MDP 372 Machines of Metal Cutting & Forming

3rd Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (4+4)]

Marks:[(0+0+0) + (120+40+40)] = 200

Course Contents

Performance criteria for machine tool design, Rigidity of the MFTW system and the accuracy of production on machine tools, Determination of principal specifications of the machine tool being designed, Drives of machine tools, Machine tool spindles and spindle bearings, Frame parts of machine tools, Joints of machine tools, Machine tool testing and research. Forming tools: Methods of forming sheet-metals, Types of dies (single, compound, combination and progressive dies), Shearing (blanking and piercing), Bending (U- and V-bending), Deep drawing of cylindrical cup with and without flanges, Quadratic and rectangular shapes, Ironing, Manufacturing of dies.

References:

* Achercan, H. C., Machinostroenie, Moscow, 1965.
* Koenigsberger, F. and Tlusty, J., Machine Tool Structures, Pergamon Press, 1970.

MDP 381 Theory of Metal Forming

3rd Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Engineering and true stress and strain, Stress strain curves and models of mechanical behaviour, Effect of temperature on stress strain curve, Strain rate and its effect on stress strain curve, Deformation and recrystalization, Cold and hot working, Strain hardening, Analysis of stress and strain, Elastic deformation, Plastic deformation of metals, Yield criteria, Methods of calculation of loads required to metal forming, Forging and dimensional changes, Calculation of load during friction and frictionless drawing and upsetting, Factors affecting forging load, Rolling and neutral point in deforming zone, Calculation of load, Torque and rolling mill power, Factors affecting rolling load, Extrusion and metal flow, Extrusion pressure diagram, Calculation of friction and frictionless extrusion pressure and parameters affecting extrusion, Wire drawing and wire drawing die, Calculation of friction and frictionless wire drawing load, Stress strain curve and maximum reduction permissible, Optimum wire drawing die angle and parameters affecting wire drawing, Tube drawing and dimensional changes in diameter and wall thickness, Calculation of drawing thin walled tubes, Plug tube drawing and mandrel tube drawing, Deep drawing and dimensional changes in flange and wall thickness, Calculation of deep drawing load, Redrawing and parameters affecting deep drawing.

References:

* Johnson, W. and Mellor, P. B., Plasticity for Mechanical Engineers, Van Nostrand, London, 1962.
* Chaaban, M. A., An Introduction to Metal Forming, Alselehder Printer, Cairo, 1976.

Laboratory: *Metal Forming Lab*

01 Springback in bending
02 Upsetting
03 Rolling
04 Drawing out
05 Extrusion
06 Wire drawing
07 Deep drawing
08 Mannesman
09 Cam plastometer
10 Tutorials
11 Plasticity
12 Forging
13 Rolling
14 Extrusion
15 Wire drawing
16 Tube drawing
17 Deep drawing

MDP 421 Industrial Organization & Quality Control

4th Year: Mechanical Engineering - Automotive (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Plant organization: Organization charts, Decision making process and theory. Project management: Planning and scheduling with gantt charts, PERT and CPM. Design of work systems: job design, Work measurement. Facilities layout: Basic types of layouts, Design of product layout (line balancing), Design of process layout, Production planning and control: Forecasting, Scheduling and sequencing, Inventory management. Operations research: Linear programming (formulation, graphical solution, simplex method), Transportation problem, Assignment problem. Control charts for: Variable (X, R, s charts), Attributes (P, np, c, u charts). Acceptance sampling: Statistical aspect, Sampling plan design and MIL-STD-105D.

References:

* Besterfield, Dale H., Quality Control, Prentice Hall Inc., 1983.
* Taha, Hamdy A., Operations Research, Prentice Hall Inc., 1997.
* Daniel Sipper and Bulfin, Robert L., Production: Planning, Control and Integration, McGraw Hill, 1998.

MDP 422 Quality Control

4th Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Presentation and description of data, Theory of probability, Discrete probability distributions, Continuous probability distributions, Sampling distributions, Estimation theory, Testing hypotheses, Regression and correlation analysis, Quality definitions and concepts, Process capability analysis, Theory of control charts, Statistical control charts for attributes, Statistical control charts for variables. Acceptance sampling: Principles and concepts, Acceptance sampling by attributes, Acceptance sampling by variables.

References:

* Grant, E. L., Statistical Quality Control, McGraw Hill, New York, 1996.
* Montgomery, D. C., Introduction to Statistical Quality Control, John Wiley and Sons N. Y., 1997.

MDP 423 Facilities Planning

4th Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction to production systems, Types and characteristics of production systems, Types of layouts, Advantages and disadvantages of each, Layout objectives, Types of layout data, Quantitative and qualitative data, Construction of flow matrix, Construction of activity relationship chart, Space determination, Number of machines and manpower, Quantitative and qualitative techniques for construction of initial layout, CORELAP, MAT, INLAYT, Optimal and suboptimal (heuristics) as

improvement layout techniques, Computerized layout techniques CRAFT, SZAKY, New trends in techniques for layout (SA, Genetic), Evaluation of solutions and selection of the optimum, Single facility location problem, Site selection, Factors affecting the selection, Introduction to materials handling equipment and systems.

References:

* Apple, J. M., Plant Layout and Materials Handling, John Wiley and Sons, 1995.
* Francis, L.R. and White, J. A., Facility Location and Layout: An Analytical Approach, Prentice Hall Inc., Englewood Cliffs, N.J., 1998.
* Tompkins, J. and White, J. A., Facilities Planning, John Wiley and Sons, 2000.

MDP 424 Operations Management

4th Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Forecasting and time series analysis, Aggregate production planning, Inventory management and control, Capacity planning, Materials requirement planning, Maintenance management and control, Work loading and scheduling, Marketing of engineering products.

References:

* Howard Barnett, Operations Management, Macmillan Press Ltd., 1996.
* Stevenson, William J., Production/Operations Management, McGraw Hill, 1997.

MDP 425 Introduction to Industrial Organization

4th Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Plant organization:Organizatiocharts, Decision making process and theory, Project management: Planning and scheduling with gantt charts, PERT/ CPM, Design of work systems: Job design, Work measurement, Facilities layout: Basit Typelayouts, Design of product layout (line balancing), Design of process layout, Production planning and control: Forecasting, Scheduling and sequencing, Inventory management, Operations research: Linear programming (formulation, graphical solution, simplex method), Transportation problem, Assignment problem.

References:

* Taha, Hamdy A., Operations Research, Prentice Hall Inc., 1997.
* Stevenson, William J., Production/Operations Management, McGraw Hill, 1997.
* Daniel Sipper and Bulfin, Robert L., Production: Planning, Control and Integration, McGraw Hill, 1998.

MDP 426 Introduction in Quality Systems

4th Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Basic concepts, History of quality control, Quality control engineering, Quality systems for design and development, Construction of quality control systems, Quality control of purchases, Planning, Organization, Quality costs, Economics of quality, Training, Quality control during product use, Introduction to statistical quality control and data analysis.

References:

* Juran, Joseph M. and Blanton, Godfery A., Juran's Quality Control Handbook, McGraw Hill Book Co., 2000.
* Gryna, Frank M., Quality Planning and Analysis, McGraw Hill Book Co., 2001.

MDP 427 Computer Applications in Industry

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

To develop an appreciation of the uses and advantages of the recent computer applications in industry.

References:

* Groover, Mikell P.; Emory, W. and Zimmers, Jr., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall Inc., 1984.
* Nazementz, John W.; Hammer Jr. William E. and Sadowski, Randa P., Computer Integrated Manufacturing Systems: Selected Readings, Industrial Engineering and Management Press, 1985.
* Eric Teicholz, CAD/CAM Handbook, McGraw Hill Book Co., 1985.

MDP 428 Ergonomics

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

A Systematic approach to the optimization of the human task environment system: Workspace design, Manual materials handling, Cumulative trauma disorders and environmental factors, Emphasis on industrial applications, Ergonomics process, Anatomy, Anthropometry, Workplace design, Hand use design, Office ergonomics, Handling loads, Work physiology, Design for special populations, Information processing, Noise, Vibration, illumination, Control and display design.

References:

* Amit Bhattacharya and McGlothin, James D., Occupational Ergonomic, Theory and

Application, Marcel Dekker Inc., 1996.
* Kromer, K. H. and Kromer-Elbert, K., Ergonomic, How to Design for Ease and Efficiency, Prentice Hall, Upper Saddle River, N. J., 2001.

MDP 429 Special Topics in Industrial Engineering

Course Contents

The course should include one or more of the following subjects: Supply chain management: Purchasing interface, Suppliers, Vendor analysis, Logistics, Distribution requirement planning. Just in time manufacturing: Elements of a JIT manufacturing, Work place organization, Relationship between JIT, PM and TPM, JIT production planning, JIT logistics, Quality issues in JIT, JIT discipline, Implementing JIT manufacturing. Decision support systems: Decision making systems and support, Decision support system development, Group decision making, Knowledge-based decision support systems, E-commerce: Electronic markets, The value chain, Strategic implications of IT, Electronic data interchange (EDI), Internet age systems, Integrating the supply chain. Flexible manufacturing systems: Scope of FMS subsystems of FMS, types of FMS, FMS equipment, FMS material handling systems, Automated storage and retrieval systems, Optimization of FMS.

References:

* Vahid Lotfi and Carl, Pegels C., Decision Support Systems for Operations Management and Management Science, IRWIN, 1996.
* Stevenson, William J., Production/Operations Management, McGraw Hill, 1997.
* David Whitele, E-Commerce: Strategies and Applications, McGraw Hill Publishing Co., 2000.

MDP 431 Materials & Process Selection

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Behaviour and processing of engineering materials: Metals, Polymers, Ceramics, Composites, Effect of material properties on design, Effect of manufacturing process on design, Economics of materials, Economics of manufacturing processes, The selection methods for materials and processes, Case studies.

References:

* Farag, M., Selection of Materials and Manufacturing Processes for Engineering Design, Prentice Hall, N.T, 1989.

MDP 441 Measurement

4th Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (4+4)]

Marks:[(0+0+0) + (120+40+40)] = 200

Course Contents

Measurement standards, Linear measurements, Angular measurement, Form measurement, Indirect measurements, Screw thread measurement (standard, power and pipe thread), Gear measurement (spur, helical, worm and bevel), Form error measurement (squareness, parallelism, alignment), Straightness, Flatness, Roundness measurement, Surface roughness measurement (2D and 3D measurement), Static tests for machine tools, Advanced measuring techniques (leaser measurement, computer- aided measurement, machine vision).

References:

* Jain, Engineering Metrology, Khanna Publishers, 1999.

Laboratory: *Measurement Lab*

01 Thread measurement using hand tools
02 Thread measurement using projectors
03 Thread measurement using microscope
04 Thread measurement using ABBE
05 Gear measurement using hand tools
06 Gear measurement using projectors
07 Gear measurement using microscope
08 Gear measurement using dividing head
09 Straightness using straight edge
10 Straightness using levels
11 Flatness using rochdale arm
12 Flatness using levels
13 Roundness using dividing head
14 Roundness using Taly- round
15 Roughness using non contact methods
16 Roughness using contact methods
17 Alignment test
18 Squareness and parallelism checking
19 Ball bearing measurement
20 Acceptance tests for machines
21 On line measurement

MDP 443 Systems Modelling

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Basic simulation models, Modelling complex systems, Simulation software, Building simulation models, Random number generators, Generating random variates, Output data analysis for a single system, Comparing alternative system configurations, Variance reduction techniques, Sensitivity analysis, Simulation of

manufacturing systems.

References:

* Averill Law and Kelton, David M., Simulation Modelling and Analysis, McGraw Hill Co., 1999.
* Kelton, David W., Sadowski, Randal P. and Sadowski, Deborah A., Simulation with Arena with CDROM, McGraw Hill Co., 2001.

MDP 444 Quality Control

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Presentation and description of data, Theory of probability, Discrete probability distributions, Continuous probability distributions, Sampling distributions, Quality definitions and concepts, Process capability analysis, Theory of control charts, Statistical control charts for attributes, Statistical control charts for variables, Acceptance sampling: Principles and concepts, Acceptance sampling by attributes.

References:

* Grant, E. L., Statistical Quality Control, McGraw Hill, New York, 1996.
* Montgomery, D. C., Introduction to Statistical Quality Control, John Wiley and Sons N. Y., 1997.

MDP 451 Tool Design

4th Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(3+3) + (0+0)]

Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Injection Moulding: Manufacturing processes of plastics, Types of injection moulds for thermoplastics, Clamping forces, Number of cavities and layout, Parting planes, Draft angles, Shrinkage, Feeding systems (runners, gate, sprue and vents), Cooling systems, Ejection systems, Tolerances, Min and max. Wall thickness, How to manufacture injection mould, Advantages of Jigs and fixtures, Principles of location, Types of locators, Over determined location, Principles of clamping, Types of clamping, Clamping forces, Design procedure, Drilling Jigs, Indexing Jigs, Milling Fixtures, Indexing table, Single and multiple piece Fixtures, Turning Fixtures, Welding Fixtures, Assembly Fixtures, Manufacturing of Jigs and Fixtures, Economy of Jigs and Fixtures. Machining: Modern cutting tool materials, Coated carbide tips, Boron nitride, Ceramics, Diamond tips, Design and manufacturing of cutting form tools, Turning form drilling tools, Form relieved milling cutters, Threading tools and broaching.

References:

* Wilson, F., Die Design Handbook, McGraw Hill, 1986.
* Hoffman, Edward G., Jigs and Fixtures Design, Galgatia Publ., New Delhi, 1987.

MDP 452 Pneumatic & Hydraulic Control

4th Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Introduction to pneumatic and hydraulic control systems (review to the basic principles of hydraulics and pneumatics), Hydraulic and pneumatic equipment (power units, actuators, valves), Pneumatic and hydraulic servo systems, Control of speed and pressure, Electro- pneumatic and electro- hydraulic systems, Fault diagnosis and maintenance of pneumatic and hydraulic systems.

References:

* Anthony Esposito, Fluid Power with Applications, Prentice Hall, 2003.

MDP 453 Robotics

4th Year: Mechanical Engineering - Mechatronics (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(110+40+0) + (0+0+0)] = 150

Course Contents

Basics of robotics, Analysis and design of robotic systems including arms and vehicles, Kinematics, Inverse kinematics and dynamics of robotics (stationary and mobile robotics), Algorithms for describing, planning and commanding, Robotic control systems, Position, speed and force control of robot grippers, Examples on various practical applications of robotics.

References:

* Ulrich Nehmzow, Mobile Robotics: A Practical Introduction, Springer Verlag, 1999.
* Murphy, Robin R., Introduction to AI Robotics, MIT Press, 2000.
* Jadran Lenarcic and Federico Thomas, Advances in Robot Kinematics: Theory and Applications, Kluwer Academic Publishers, 2002.

MDP 454 Mechatronics (2)

4th Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Microcontroller programming and interfacing including: Microcontroller architectures using a specific example with details of its assembly language programming and interfacing some common peripheral. Sensors including: position and speed measurement, Stress and strain measurement, Temperature measurement, Stress and strain measurement, Temperature measurement, Vibration and acceleration measurement, Pressure and flow measurement and semiconductor sensors and MEMS (microelectromechanical systems). Actuators including: solenoids and relays, Electric motors, Stepper motors, Hydraulic and pneumatic actuators. Mehatronic systems including: Control architectures and a number of case studies,

Using codesign concepts and VHDL.

References:

* Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
* Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory: *Mechatronics Lab*

01 Design examples of at least two mechatronic systems.

02 Using emulators, EVB, and software simulators to test and evaluate the embedded system microcontroller.

03 Using a PLC and a microcontroller to control two types of systems.

04 Implementation of a small project to apply the embedded microcontroller concepts to control a simple mechatronic system

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MDP 455 Operations Research

4th Year: Mechanical Engineering - Production Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Linear programming: Formulation, Graphical solution, Simplex method, and Duality and sensitivity analysis, Transportation models: Transportation algorithm, Assignment problem and transshipment problem, PERT/CPM: Network representation, Critical path computations and construction of the time scheduling, Network models: Minimal spanning tree algorithm, Shortest route problem and Maximum flow problem, Integer einear programming: Branch and bound algorithm, Queuing theory: Queuing decision models, Simulation models: Monte carlo simulation.

References:

* Frederick, S. Hillier and Lieberman, Gerald J., Introduction to Operations Research, McGraw Hill, 1995.
* Taha, Hamdy A., Operations Research, Prentice Hall Inc., 1997.

MDP 462 Quality Control

Course Contents

Presentation and description of data, Discrete probability distributions, Continuous probability distributions, Sampling distributions, Quality definitions and concepts, Process capability analysis, Theory of control charts, Statistical control charts for attributes, Statistical control charts for variables, Acceptance sampling: Principles and concepts, Acceptance sampling by attributes, Acceptance sampling by variables, Quality systems: Basic concepts, History of quality control, Total quality management.

References:

* Grant, E. L., Statistical Quality Control, McGraw Hill, New York, 1996.

* Montgomery, D. C., Introduction to Statistical Quality Control, John Wiley and Sons N. Y., 1997.

MDP 463 Engineering Management

Course Contents

Nature of organizations, Corporate objectives, The mission statement, Managing by objectives, Strategies for survival, Functions of the organization, Purchasing, operations, Marketing and sales, Finance, Products development, Quality and manpower, Finance accounting, Cash flow projection, Financial accounting ratio, Products development, Stages of design from concepts to specifications, Management techniques in products development, Types of production operations, Production planning, Materials management, Quality management, Inspection and testing, Quality assurance, Total quality management and ISO 9000, Project planning and management, Project definition, Project proposal, Planning the project, CPM and PERT, Cost analysis and control, Risk analysis and uncertainty.

References:

* Slack, N.; Chambers, S.; Harland, C. and Others, Operations Management, Pitman Publishing Co., London, 1966.
* Gail, F. B. and Balkwill, J., Management in Engineering: Principles and Practice, Prentice Hall, N.Y, 1996.

MDP 471 Numerical Control Machines

4th Year: Mechanical Engineering - Production (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

4th Year: Mechanical Engineering - Mechatronics (1st Term)

Course Contents

Components of CNC machines (mechanical parts, sensors, transducers, limit switch, speed drives and control, hot electrical panel), Describing the operation panel of CNC machine tool (emergency stop, mode select, cycle start, feed hold, single block, optional block skip, dry run, reference return, feed rate override, rapid traverse, machine lock, optional stop …. Etc), Data, Coding system, Data entry, Axes, Programming of CNC machines, Manual programming for complex work pieces, Manual programming using fixed cycles, Looping, Subroutines etc.

References:

* Steve Krar and Arthur Gill, CNC Technology and Programming, McGraw Hill Publishing Co., 1990.
* John Polywka and Stanley Gabrel, Programming of Numerical Controlled Machines, Industrial Press Inc., 1992.
* Mikel Ynch, Computer Numerical Control for Machining, McGraw- Hill, Inc., 1992.

Laboratory:

01 Analysis of CAM Profile Drawn by Auto CAD Software

02 Manual Data Input
03 Perforated Tape Input, Magnetic Tape Data Input
04 Data Input Via Portable Electronic Storage Unit, Magnetic Disk Input Via an Interfaced Computer
05 Machining a Simple WP (Straight Lines)
06 Machining WP of Combined Lines and Curved Shape

MDP 499 Project

4th Year: Mechanical Engineering - Production (Cont.) Hrs/Week: [(0+4) + (0+4)]
Marks:[(0+50+0) + (0+50+100)] = 200

4th Year: Mechanical Engineering - Mechatronics (Cont.)

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project text and at the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his coming engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Mechanical Power

MEP 111 Thermodynamics (1)

1st Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Basic concepts and definitions, System and control volume, Property and state, Processes and cycles, Work definition, Definition of heat transfer, Ideal gases, State equation, Specific heat at constant pressure and volume, Pure substances and phase equilibrium, Tables of thermodynamic properties, First law of thermodynamics, Internal energy and enthalpy. First law for closed cycle, closed and open systems: Steady flow and uniform state uniform flow, Application of first law of thermodynamics (reciprocating compressors), Gas mixtures, Combustion processes

References:

* Sonntag, R. E.; Borgnakke, C. and Van Wylen, G. J., Fundamentals of Thermodynamics, John Wiley and Sons Inc., 1998.
* Cengel, Y. A. and M. A., Thermodynamics: An Engineering Approach, WCB/McGraw Hill, 1998.

Laboratory: *Thermodynamic Lab*

01 Mechanical Equivalent of Heat
02 Reciprocating Compressor Test
03 Evaluation of Higher Heating Value of Gaseous Fuels
04 Evaluation of Air to Fuel Ratio Using ORSAT Apparatus
05 Steam Properties
06 Energy Conversion Test

MEP 211 Mechanical Engineering

2nd Year: Electrical Engineering - . (1st Term) Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Working fluid, The ideal gas, The first law of thermodynamics, Reversible processes, Irreversible processes. The second law of thermodynamics, Thermal cycles, Steam cycles, Entropy, fuel and combustion. Heat transfer by conduction, Forced convection, Heat transfer by radiation, Heat exchangers. Power generation plants, Heat cycles, Analysis and presentation on charts for pure substances, Steam units, Boilers, Steam turbines, Condensers, Pumps. Gas and combined units and operation of the gas turbine, Air compressors, Compound cycles, Heat recovery boilers from turbine exhaust gases. Diesel engine units, Performance and operation of diesel engines. Hydro-electric energy generation plants, Performance and operation of hydro-turbines.

References:

* Van Wylen, G. J. and Sonntag, R. E., Fundamentals of Classical Thermodynamics, John Wiley and Sons Inc., New York, 1973.
* El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.

* Holman, J. P., Heat Transfer, McGraw Hill Book Co., 1990.

Laboratory: *Heat Transfer Lab. & Thermal Systems Lab*

01 Heat transfer by conduction
02 Heat transfer by radiation
03 Steam boiler operation
04 Steam turbine operation

MEP 212 Thermodynamics (2)

2nd Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(4+4) + (0+0)]
Marks:[(120+40+40) + (0+0+0)] = 200

Course Contents

Second law of thermodynamics: Heat engines, Refrigerators and heat pumps, Two statements of the second law, Reversible and irreversible processes, Carnot cycle, Thermodynamic temperature scale, Entropy: The inequality of clausius, Entropy as a property of a system, Entropy change for reversible processes, Entropy changes for ideal gases, Liquids and solids, Entropy of pure substances, Principle of the increase of entropy, Isentropic efficiency, Availability and Irreversibility: Available energy, Reversible work and irreversibility, Availability and second law efficiency, Cycles: First law and second law analysis and representation on P,V and T,S diagrams for (steam cycles, air standard cycles), Thermodynamic relations: Maxwell relations, The clapeyron equation, General relations involving the change of internal energy, Enthalpy and entropy, Joule, Thompson coefficient, Real gas behaviour and equation of state, Generalized charts for change of enthalpy and entropy, Chemical reactions: First and second law analysis of reacting systems.

References:

* Sonntag, R. E.; Borgnakke, C. and Van Wylen, G. J., Fundamentals of Thermodynamics, John Wiley and Sons Inc., 1998.
* Cengel, Y. A. and M. A., Thermodynamics: An Engineering Approach, WCB/McGraw Hill, 1998.

Laboratory: *Thermodynamic Lab*

01 Mechanical Equivalent of Heat
02 Reciprocating Compressor Test
03 Evaluation of Higher Heating Value of Gaseous Fuels
04 Evaluation of Air to Fuel Ratio Using ORSAT Apparatus
05 Steam Properties
06 Energy Conversion Test

MEP 221 Heat & Mass Transfer

2nd Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (4+3)]
Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Basic fourier conduction equation and its application for steady state in simple and compound walls, Cylindrical and spherical surfaces. Study of the critical radius of

insulation, Extended surfaces (fins) and their efficiency charts. Study of the unsteady conduction for lumped and unlumped systems. General conduction equation in two and three dimensions. Planck's theory for thermal radiation. Calculate the view factors and surface properties to identify surface resistance. Draw the equivalent electric circuit and solve for temperatures and heat transfer by radiation. Study radiation from gases and emissivity charts for CO2 and H2O. Study all parameters affecting convection. Relations for free convection and forced convection for inner and outer surfaces, Heat exchangers: Types, Designs, Selection and performance, Basic equation of mass transfer and simulation with convection, Two applications are studied in distillation columns and cooling towers.

References:

* Bird, R. B.; Steward, W. E. and Lishtbast, E. N., Transport Phenomena, John Wiley and Sons Inc., 1960.
* Incroperal David, P. Devitt, Introduction to Heat Transfer, John Wiley and Sons, 1990.
* Holman, J. P., Heat Transfer, McGraw Hill Book Co., 1990.
* Geankoplis, C. J., Transport Processes and unit operations, Prentice Hall Int., 1993.

Laboratory: *Heat Transfer Lab*

01 Determination of the thermal conductivity coefficient of an insulating material
02 Determination of the heat transfer coefficient in forced and natural convection heat transfer
03 Determination of the temperature of a metal piece using the optical pyrometer
04 Heat exchanger evaluation
05 Study of surface properties of two tubes in steam condensation

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MEP 231 Fluid Dynamics

2nd Year: Mechanical Engineering - . (1st Term) Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Fundamental concepts: Definition of a fluid, Dimensions and units, Fuid properties. Fluid statics: Pressure and pressure measurements, Hydraulic forces on submerged surfaces, Rotating containers. Basic equations of fluid mechanics: Kinematics of flow, Control volume approach, Continuity, Momentum, Energy and Bernoulli's equations. Dimensional analysis and dynamic similitude: Dimensional homogeneity, Buckingham method, Similitude. Flow in closed conduits: Laminar and turbulent flow, Equation of motion, Primary and minor losses, Hydraulic and energy gradient lines. Compressible flow: Sonic velocity and mach number, Stagnation properties and Isentropic flow, Flow through channels of varying area, Convergent and convergent divergent nozzles, Shock waves. Flow over immersed bodies: Boundary layer growth and separation, Drag on various two dimensional bodies, Lift on airfoils. Inviscid flow: Navier-Stockes equation, Stream function and velocity potential, Laplace equation and various flow fields, Superposition of flows, Fow about circular cylinder and airfoil.

References:

* Roberson Crowe, Engineering Fluid Mechanics, Houghton Mifflin Co., 1975.
* John, James E. A., Introduction to Fluid Mechanics, Prentice Hall, 1983.

* Munson, Yound and Okiishi, Fundamental of Fluid Mechanics, John Wiley and Sons, 1990.

Laboratory: *Fluid Dynamics Lab*

01 Effect of Momentum Change
02 Velocity Survey in a Circular Pipe Using Pitot Tube
03 Primary and Secondary Losses in Pipes
04 Sonic and Supersonic Air Flow

MEP 271 Technical Installations

2nd Year: Architecture Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+1)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Preliminary studies for plumbing, Installations, Design of water supply and drainage systems, Fire fighting, special structures, Industrial control of thermal environments, Design criteria and suitability for architectural conditions, Distribution and integration of AC exits with other building systems.

References:

* Threlkeld, T. L., Thermal Environmental Engineering, Prentice Hall, 1962.
* Stoecker, W. F., Design of Thermal Systems, McGraw Hill, 1992.
* Mull, Tomas E., HVAC, Principles and Application Manual, McGraw Hill, 1997.
* Francis D. K. Ching and Cassandra Adams, Building Construction illustrated, John Wiley and Sons, 2000.
* ASHRAE Handbook Heating, Ventilation and Air Conditioning, ASHRAE Handbook, 2000.

MEP 281 Measurements

2nd Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Performance characteristics of measuring instruments: Calibration, Fixed and random errors, Error estimation, Sensitivity, Linearity, Dynamic characteristics. Pressure measurements: Mechanical pressure transducers, Manometers, Elastic pressure measurement, Electrical pressure transducers, Inductive transducers, Piezo electric transducers, Strain gauges, Flow measurements: Orifices nozzles, Venturi, Turbine flow meters, Magnetic flow meters, Rotameters, Positive displacement flow meters, Ultrasonic meters, Velocity measurements: Pitot tube laser doppler anemometers, Hot wire anemometers, Temperature measurements: Thermal expansion thermometers, Bimetallic expansion, Resistance thermometers, Semi conductor thermometers, Thermocouples, Thermal radiation thermometers, Analysis of combustion products: Props, Sample condition, Gas analysis equipments for measuring O2, CO, CO2, UHC, Nox and Sox, Gas chromatography, Force measurements: Weights and springs, Calibrating rings, Strain and deflection measurements. Strain and stress measurements: Load cells, Strain gauges.

References:

* Sawhney, A. K., A Course in Mechanical Measurements and Instrumentation, Dhanpat and Sons, Delhi, 1989.
* Doebelin, Erest O., Measurement Systems Applications and Design, McGraw Hill, 1990.
* Holman, J. P., Experimental Methods for Engineers, McGraw Hill, 1999.

Laboratory: *Measurement Lab*

01 Statical Analysis of Calibration Data of a Pressure Gauge.
02 Probability Analysis of Scattered Data Obtained Randomly for An Experimental Error.
03 Using the Temperature Measurement Bench for Calibrating a Thermocouple and Resistance Thermometers.
04 Temperature Measurements Using the Optical Pyrometer.
05 Calibrating Different Kinds of Pressure Transducers Fitted on an Experimental pressure Measurement Bench.
06 Using the Dead Weight Tester To Calibrate a Bourdon Tube Pressure Gauge.
07 Calibrating Different Kinds of Flow Meters Fitted on an Experimental Flow Measurement Bench.
08 Using the Pitot Tube to Measure the Distribution Over the Tube Cross Section of the Velocity of air Flowing Inside the Tube
09 Using the Orsat Apparatus to Analyze the Products of Combustion Gases Products

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MEP 331 Turbomachinery (1)

3rd Year: Mechanical Engineering - Mechanical Power (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Part A: Cavitation phenomenon in water turbines: Theory, Effects and avoidance. Water hammer phenomenon in pipelines: Theory, Effects and methods of protection. Hydraulic turbines: Theory, Turbine Classifications, Construction, Power calculations, Performance, Power house and environmental Impact, Non-conventional turbomachinery applications. Hydraulic power In Egypt. Part B: Centrifugal pumps: Theory, Construction, Performance, Operation, Cavitation, Axial and radial thrust, Maintenance trouble shooting and selection. Positive displacement pumps: Reciprocating pumps, Diaphragm pumps. Rotary pumps: gear pump, vVane type rotary pump, Rotary piston pumps, Radial cylinder pumps, Parallel cylinder pumps.

References:

* Church, A. J., Centrifugal Pumps and Blowers, John Wiely and Sons Inc. London, 1973.
* Govinda Rao, Fluid Flow Machines, McGraw Hill, 1983.
* Daugherty and Franzini, Fluid Machines with Engineering Applications, McGraw Hill, 1983.
* Sayers, A. T., Hydraulic and Compressible Flow Turbo machinery, McGraw Hill, 1990.

Laboratory: *Turbomachinery Lab*

01 Pelton Wheel Test
02 Francis Turbine Test
03 Kaplan Turbine Test
04 Priming of Centrifugal Pumps.

05 Performance of Centrifugal Pumps Under Different Speeds.
06 Performance of Two Centrifugal Pumps in Series Connection.
07 Performance of Two Centrifugal Pumps in Parallel Connection.

MEP 351 Power Stations

3rd Year: Mechanical Engineering - Mechanical Power (1st Term) Hrs/Week: [(3+1) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Improvements in rankine cycle to increase its thermal efficiency, Water tube boilers, Fire tube boilers, Condensers, Heat recovery boilers, Deareators and feed water heaters, Economizers, Superheaters, Air heaters, Steam pipes and steam traps cooling towers, Co-generation plants.

References:

* Domkundwor, S., Power Plant Engineering, Hanpat Ruixson, 1981.
* El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.
* Cole, H., Thermal Power Cycles, Edward Arnold, 1991.

Laboratory: *Thermal Systems Lab*

01 Performance of a fire tube steam boiler
02 Performance of a steam turbine

MEP 352 Renewable Energy

3rd Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(0+0) + (2+1)]
Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Introduction to renewable energy, Study the causes and the power of wind energy, Study of measuring equipment for wind speed and direction. Analysis of wind energy data: Energy and frequency curves, Wind turbine theory and aerofoil theory, Study of forces acting on the wind turbine and study the turbine performance. Study of solar thermal energy: Its intensity in outer space and the calculation of the solar intensity on earth, Study of solar angles, Shades and the equation of time, Study of the solar collector and its components.

References:

* Duffie and Beckman, Solar Engineering of Thermal Processes, John Wiley, 1980.

MEP 361 Combustion

3rd Year: Mechanical Engineering - Mechanical Power (1st Term) Hrs/Week: [(4+2) + (0+0)]
Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Chemical reactions, Properties of some hydrocarbon fuels, Enthalpy of formation, Application of first law of thermodynamics on reacting systems, Combustion

processes calculations, Chemical equilibrium, Chemical equilibrium constant, Equilibrium of single reaction, Equilibrium in multiple reactions, Chemical kinetics, Simple global reaction mode, Detailed mechanisms of reactions, Reaction rate formulae. Laminar premixed flame: Definitions, Simple mathematical model and solution of the equations, Factors affecting flame speed and thickness. Ignition, Extinction, Flammability limits, Flame stability, Laminar non-premixed flame, Definitions, Simple mathematical model and solution, Factors affecting flame height, Droplet evaporation. Applications, Simple mathematical model and solution, Evaporation rate, Time of evaporation, Factors affecting evaporation time. Burners: Gaseous fuel burners, Liquid fuel burners solid fuel burners.

References:

* Van Wylen, Gordon J. and Sonntag, Richar E., Fundamentals of Classical Thermodynamics, John Wiley and Sons Inc., 1965.
* Spalding, D. B., Combustion and Mass Transfer, Pergamon Press, 1979.
* Turns, S. T., An Introduction to Combustion, Concepts and Applications, McGraw Hill, Inc., 1996.

Laboratory: *Combustion Lab*

01 Flame Propagtion Characteristics.
02 Flame Stability Characteristics.
03 The Effect of Air, Fuel Ratio on Combustion Efficiency.
04 The Effect of Air, Fuel Ratio on Heat Transfer and Energy Balance.

MEP 362 Internal Combustion Engines (1)

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Definitions, Classification of I.C.E. The fuel -air standard cycle, Deviations between the actual cycle and fuel air standard cycle, Combustion in S.I.E. Combustion chambers of S.I.E., Combustion in C.I.E., Combustion chambers of C.I.E., Fuel properties and its impact on engine performance. Friction and lubrication, Effect of engine operating conditions on friction loss, Engine performance at constant speed, Effect of engine speed on friction loss, Engine performance at variable speeds and constant load, Properties and classification on engine lubricating oil, Testing of the lubricating oil, Oil filters for the engines, Cooling loss, Effect of engine operating conditions on cooling loss, Factors affecting the cooling of the engine surfaces, Temperatures limit for the engine cooling surfaces, Engine cooling systems, The engine actual thermal cycle. Sources of pollutant emissions from internal combustion engines to the atmosphere and the methods of reducing them

References:

* Ferguson, Coline R., Internal Combustion Engines, Johnwiley and Sons Inc., 1985.
* John, B., Internal Combustion Engines Fundamentals, Heywood Machmillan Book Co., 1988.
* Richard Stone, Introduction to Internal Combustion Engines, Machmillan Press Ltd., 1992.

Laboratory: *Internal Combustion Engines Lab*

Laboratory: ***Internal Combustion Engines Lab***

01 Test For Constant Speed Diesel Engine, Performance at Different Loads, Power, Thermal Efficiency, Specific Fuel Consumption.

02 Test For Variable Speed Spark ignition Engine Performance at Constant Throttle Opening, Power, Torque, Thermal Efficiency, Specific fuel consumption, F/ A Ratio.

03 Test of Friction Loss for Constant Speed Diesel Engine, Willan's line, and for Variable Speed Spark Ignition Engine, Morse Test.

04 Measurements of Flash Point, Open, Close and fire point, For light Diesel fuel oil.

05 Measerements of The Physical Properties of Engine Lubricating Oil, Viscosity test, Flash Point test, acidity test for used oil.

06 Measurements of Engine cooling Loss and Engine Heat Balance.

MEP 371 Refrigeration & Air Conditioning

3rd Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Meaning of air conditioning, Field of application, Properties of moist air, Psychometric chart, Psychometric processes, Applied psychometric processes, Summer air conditioning cycles, Winter air conditioning cycles, Air conditioning systems in automotive engineering, Thermal load calculations, Simple vapor compression cycles, Refrigeration systems, Refrigerants, Control device in refrigeration systems.

References:

* Threlkeld, T. L., Thermal Environmental Engineering, Prentice Hall, 1962.
* Sherratt, A. F. C., Air Conditioning System Design for Building, McGraw Hill, London, 1983.
* Stoecker, W. F., Design of Thermal Systems, McGraw Hill, 1992.
* Mull, Tomas E., HVAC, Principles and Application Manual, McGraw Hill, 1997.
* ASHRAE Handbook Heating, Ventilation and Air Conditioning, ASHRAE Handbook, 2000.

Laboratory: *Refrigeration & Air Conditioning Lab*

01 Performance study of An Educational Air, Cooled Refrigerating System at Different Operation conditions.

02 Performance study of An Educational Water, Cooled Refrigerating System at Different Operation Conditons

03 Performance study of an Educational Air Conditioning Unit at Different Operation Conditioins.

MEP 381 Automatic Control (1)

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term) Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (110+40+0)] = 150

Course Contents

Introduction: Definitions, Control terminology, Control system configuration, Classification of control systems. Modelling of the physical systems and process description: Mechanical, Electric, Hydraulic, Pneumatic, Thermal. Determination of system time and frequency responses: Solution of deferential equations, Laplace

transform, Convolution, Analog computers …etc. Industrial control systems: Sensors and transmitters, Controllers of different types, Control laws, Valves, Final control elements.

References:

* Tolbah, Farid A., Notes on Industrial Control Systems, Hakym Printshop, Cairo, 1985.
* Dorf, R. C., Modern Control Systems, Addison Wesley, 1995.
* Ogata, K., Modern Control Engineering, Prentice Hall Int., 1997.

MEP 382 Design of Applied Measurement Systems

3rd Year: Mechanical Engineering - Mechatronics (2nd Term) Hrs/Week: [(0+0) + (3+3)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Introduction to the design of measured systems: Classification and configuration, Analog, Digital. Design criteria and dynamic performance of ideal measurement systems: Design configuration of a traditional measurement system, Static and dynamic performance, Accuracy analysis, Special application to the analog and digital instruments, Statistical methods for error analysis. Design of measurement systems using PC-based data acquisition equipments: Data acquisition cards, EVB, SCADA systems. Design of smart measurement systems: Using small distributed microcontrollers and embedded systems, Linking the distributed systems to a host computer for data analysis, Diagnostics and repair instructions. Using sensor fusion techniques in the control purposes, With special reference to the aviation systems with multi sensors-based decision making systems.

References:

* Morton, T. D., Embedded Microcontrollers, McGraw Hill, 1990.
* Doebelin, Erest O., Measurement Systems Applications and Design, McGraw Hill, 1990.
* Bolton, W., Mechatronics, Electronic Control Systems in Mechanical Engineering, Longman Scientific and Technical, 1999.

Laboratory: *Measurement Lab*

01 Carrying out experiment to check the performance of some basic sensors such as, logic sensors and switch shaft encoders, level sensors and switches, flow sensors, temperature sensors, etc.

02 Carrying out experiment to be familiar with some basic components which are used in electronic circuits needed for digital measurement systems such as, amplifiers, comparators, timers, counters, etc.

03 Carrying out experiment to be familiar with exchanging digital and analog data with personal computers using cards.

04 Using optical encoders to measure linear displacements of moving vehicle using the personal comp (Designing and constructing the required electronic circuits and the software).

05 Using optical encoders to measure rotational speed of motor shaft using the personal computer (Designing and constructing the required electronic circuits and the software).

06 Using computer vision to measure a flame area (Using a frame grabber and video card attached to personal computer and constructing the required edge detection software).

07 Using the personal computer adapted with ADA card to measure different analog and digital signals. (temperature pressure flow, velocity, etc.)

MEP 421 Pipelines Networks

4th Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(2+1) + (0+0)]
Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Steady incompressible flow through simple pipe systems: Pipe flow, Smooth pipes, Rough pipes, Laminar flow, Turbulent flow. Minor losses in pipes: Sudden expansion, Sudden contraction, Gradual expansion or contraction, Entrance loss, Pipe fittings, Equivalent length. The siphon, Pipes connections, Pipes in series, Equivalent pipes, Pips in parallel, The haizen williams formula, Branching of pipes, Pumping from one reservoir to two or more other reservoirs. Graphical solution of branch line pumping systems. Branches in closed loop systems, Branches in open ended systems, Centrifugal pump bypass. Networks of pipes: The hardy cross method, Hydraulic path, Linear algebraic equations, Steady state hydraulic systems contain more than one fixed hydraulic grade line elevation reservoirs or pumps.

References:

* Streeter, Fluid Mechanics, McGraw Hill, 1983.
* Garzy, Z., Analysis and Control of Unsteady Flow in Pipe Lines, Butterworths, 1984.

MEP 431 Turbomachinery (2)

4th Year: Mechanical Engineering - Mechanical Power (Cont.) Hrs/Week: [(3+2) + (3+2)]
Marks:[(75+25+0) + (75+25+50)] = 250

Course Contents

Centrifugal fans, Blowers and compressors:Theory, Classification, Performance. Aerofoil theory: Axial flow pumps and compressors: Theory, Components, Performance. Hydrostatic power systems: Theory, Applications, Components, Energy calculations, Energy storage. Hydrodynamic power transmission systems: Theory, Application, Components, Energy. Calculations steam turbines: Theory – types, Components, Application, Energy calculation. Gas turbines: Theory, Types, Application, Components, Energy calculations.

References:

* Stepanoff, A. J., Centrifugal and Axial Flow Pumps, John Wiley and Sons Inc., London, 1957.
* Addison, H., Applied Hydraulics, Chapman and Hall Ldt. London, 1964.
* Church, Austin H., Centrifugal Pumps and Blowers, Jagdishlal Meropoitan Book Co., PVT. Ltd., Delhi-6, 1973.
* Harman, Richard T. C., Gas Turbine Engineering, Applications, Cycles and Characteristic, MacMillan Press Ltd., London, 1981.
* Yahya, S. M., Turbines, Compressors and Fans, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 1983.
* Steam Turbine, Theory and Practice, Kerrton Pitman and Sons Ltd., London, 1991.

Laboratory: ***Turbomachinery Lab & Thermal Systems Lab***

01 Performance of Steam Turbines
02 Performance of Gas Turbines
03 Performance of Centrifvgal Fan
04 Performance of Axial Flow Pumps

MEP 451 Power Stations

4th Year: Mechanical Engineering - Mechanical Power (Cont.) Hrs/Week: [(3+2) + (3+2)]
Marks:[(0+25+0) + (150+25+50)] = 250

Course Contents

Sources of classical and renewable energy, Energy conversion systems, Electric energy central power stations, Generation, Transmission and distribution of electric energy, Base load and variable load units, Energy storage systems. Performance characteristics of power stations, Heat rate and incremental rate, Optimum load division between units. Regulation of central units, Control in steam generators, Governing of steam turbines, Load, Frequency characteristics, Parallel operation, Lubrication systems, Protection and tripping systems. Nuclear power stations, Principles and types of reactors, Reactors calculations, Safety systems, Testing: Reliability tests, Acceptance tests, Guarantee figures, Costing, Power stations and the environment.

References:

* Skortzki, R. G. and Vopat, W. A., Applied Energy Conversion, McGraw Hill, 1985.
* Stocker, W. F., Design of Thermal Systems, McGraw Hill, 1992.
* Hicks, Tyler G., Power Plant Evaluation and Design Reference Guide, McGraw Hill, 1994.

Laboratory: *Thermal Systems Lab*

01 Use of convergent, divergent nozzles to measure thrust
02 Use of steam jet air ejector to create vacuum, influence of motive steam
03 Use of steam jet ejector as a thermo-compressor
04 Run plant of fire tube boiler and steam turbine to determine steam rate, heat rate and input, output characteristics

MEP 461 Internal Combustion Engines (2)

4th Year: Mechanical Engineering - Mechanical Power (2nd Term) Hrs/Week: [(0+0) + (4+1)]
Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Performance map and the performance of 4-stroke and 2-stroke engines. Engine fuel feeding systems: Spark ignition engine: The carburettor, Engine mixture requirements for best performance, The simple carburettor and methods of automatic mixture control. Fuel injection, Types of systems and components. Compression ignition engines: Diesel fuel injection systems, Types and components, Performance and tests. Supercharging: Methods, Turbocharging, Matching of engine and supercharger. Ignition: Types and components, Conventional and electronic ignition. Governors: Types, Components and testing.

References:

*

* Heywood, J. B., Internal Combustion Engine Fundamentals, McGraw Hill, 1994.
* BOSCH, Electric and Electronic, BOSCH Handbook, 1999.
* Norman, Diesel Technology, The Goodheart Willcox Co., 1999.

Laboratory: *Internal Combustion Engines Lab.*

01 Calibration and Testing of Diesel Fuel Injector.
02 Calibration and Testing of Diesel Fuel Injection Pupms
03 Performance tests and Performance Map of a Spark Ignition Engine.
04 Testing and Adjustment of the Hydraulic GM Engine Governor.

MEP 471 Refrigeration & Air Conditioning

4th Year: Mechanical Engineering - Mechanical Power (Cont.) Hrs/Week: [(3+2) + (3+2)]
Marks:[(75+25+0) + (75+25+50)] = 250

Course Contents

Refrigeration: Theoretical refrigeration vapor compression cycles, Actual refrigeration vapor compression cycles, Multi-stage compression systems, Different types of components of refrigeration systems, Refrigerants, Cooling load for cold stores, Performance and selection of refrigerating equipment, Control of refrigeration capacity, Absorption refrigeration, Miscellaneous refrigerating systems. Air conditioning: Meaning of air conditioning, Field of application, Properties of moist air, Construction of psychometrics chart, Psychrometric processes, Applied psychrometric processes, Summer air conditioning cycles, Winter air conditioning cycles, All year air conditioning cycles, Air conditioning cooling heating load calculations.

References:

* Stoecker, W. F., Refrigeration and Air Conditioning, McGraw Hill, 1955.
* Threlkeld, T. L., Thermal Environmental Engineering, Prentice Hall, 1962.
* Mull, Tomas E., HVAC, Principles and Application Manual, McGraw Hill, 1997.

Laboratory: *Refrigeration & Air Conditioning Lab*

01 Performance study of An Educational Air, Cooled Refrigerating System at Different Operation conditions.
02 Performance study of An Educational Water, Cooled Refrigerating System at Different Operation Conditons
03 Performance study of a Cooling Towers at Different Operation Conditions
04 Performance study of an Educational Air Conditioning Unit at Different Operation Conditioins.

MEP 481 Automatic Control (2)

4th Year: Mechanical Engineering - Mechanical Power (1st Term) Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Mathematical description and modelling of systems using difference equations: Z-transform, Sampling techniques, Etc. Equipment and components of digital control systems and SCADA: Signal samplers, Digital filters, A/D and D/A converters,

Interface circuits, Data acquisition and control cards, … etc. Design of process control Systems and servomechanisms using programmable control units: Based on ADA cards, PLC's and microcontrollers, Components and specifications, Hard ware and software requirements, Introduction to assembly C/C++ programming. Analysis and design of DC motors based and hydraulic valves based servomechanisms: Including all components and configurations. Introduction to topic control systems, LCS and classification of LCS components: Switches timers, Counters, Shaft encoders, Stepper motors, Fluidic control components. Design of LCS: Combinational and sequential, Using the basic principles of SFE, Grafcert, Petri-Nets…..etc., With enough practical examples.

References:

* Humphries, J. T. and Sheets, L. P., Industrial Electronics, Breton Publishers, 1983.
* Dorf, R. C., Modern Control Systems, Addison Wesley, 1995.
* Bolton, W., Mechatronics, Electronic Control Systems in Mechanical Engineering, Longman Scientific and Technical, 1999.
* Tolbah, Farid A., Design of Logic Control Systems, Hakym Printshop, Cairo, 2002.

MEP 482 Modelling & Simulation of Thermal Power Systems

4th Year: Mechanical Engineering - Mechanical Power Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Modelling and simulation of thermal systems, Applications in heat transfer by conduction, Convection and radiation, Applications in energy systems, Applications in fluid flow systems, Applications in refrigeration and air conditioning systems

References:

* Duffie, J. A. and Beckman, W. A., Solar Engineering of Thermal Processes, John Wiley, 1982.
* Sherratt, A. F. C., Air Conditioning System Design for Building, McGraw Hill, London, 1983.
* Curtis, F. Gerald and Wheathey, Patrick, O., Applied Numerical Analysis, Addison Wesley Publishing Co., 1984.
* Munson, Yound and Okiihi, Fundamental of Fluid Mechanics, John Wiley and Sons, 1990.
* Stoecker, W. F., Design of Thermal Systems, McGraw Hill, 1992.

MEP 499 Project

4th Year: Mechanical Engineering - Mechanical Power (Cont.) Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The

project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, in addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Automotive Engineering

MEA 311 Automotive Engineering (1)

3rd Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(3+2) + (3+2)]

Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Pneumatic tires: Tire forces and moments, Rolling resistance of tires, Tractive effort, Tire radii, Cornering properties. Brake systems: Types and function of brakes, Vehicle deceleration and stopping distance, Torque analysis of disc brake, Torque analysis of drum brake, Requirement of braking systems. Steering systems: Steering linkages, Construction of steering systems ackermann principle, Steering geometry errors steering gear ratio. Traction dynamics of vehicles: Road resistance, Traction and tractive effort, Road performance curves equation of motion, Dynamic performance certificate, Acceleration time and distance grodability and overtaking.

References:

* Artmonov, M.D., Motor Vehicle, Fundamentals and Design, MIR Publisher, 1976.
* Thomas Gillespie, Fundamentals of Vehicle Dynamics, SAE, 1992.
* Wong, J.Y., Theory of Ground Vehicles, John Wiley and Sons, 1993.
* Automotive Handbook, Bosch, 4th Ed., 1998.

MEA 312 Pneumatic & Hydraulic Systems

3rd Year: Mechanical Engineering - Automotive (2nd Term) Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Hydraulic systems: Constant displacement pumps, Outer and inner vane pumps, Outer and inner gear pumps, Variable displacement pumps, Piston pumps, Eccentric plate pumps, Pumps control systems: Systems efficiency, Hydraulic circuits types, Power losses at opening and closing also at partial load, Total efficiency for system and the control of speed at loading, The control of constant displacement pumps, Hydraulic motor: High speed motors, High torque and low speed, High and average displacement with high torque and low speed. Hydraulic transmission: Hydraulic system efficiency, Different application and control. Pneumatic systems: Air valves, Braking valves, Braking stopping valves, Vehicle loading sensor valves, Pressure measurements valves, Air pressure regulators, Safety valves air drying, Air cushion vehicle systems and performance studying.

References:

* Pneumatic and Hydraulic Systems, Bosch Publications, SAE, 1994.

MEA 321 Automotive Design (1)

3rd Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(4+3) + (4+3)]

Marks:[(125+50+0) + (125+50+0)] = 350

Course Contents

Classification of springs, Design of coil springs: Stresses, Deflection, Check on

buckling, Fatigue and natural frequency. Leaf springs: Stresses, Deflection, Neutral layer, Spring capacity. Torsion bar: Stresses, Equivalent stiffness, Design of rigid axle beam and king pin Independent suspensions, Design of double wishbone and Mcpherson suspensions. Bearings: Design of sliding, Ball and roller bearings, Relation between load and life. Drum and disc brakes: Mechanical advantage, Assisted brake systems. Introduction to chassis design, Chassis types. Belts: Stresses, Design, Load carrying capacity, Pulleys. Shafts, Rivets, Clutches: Axial spring clutch and diaphragm clutch, Axial and damping springs, Design of springs, Shaft, Splines, Rivets, Levers. Hydraulic coupling, Gears: Spur, Helical, Worm, Bevel. Gearbox: Gear ratios, Torque distribution, Shifts, Synchronizer, Shafts, Bearings.

References:

* Lukin, P., Gasparyants, G. and Radionov, V., Automobile Chassis Design and Calculations, MIR Publisher, Moscow, 1989.
* Limpert, R., Brake Design and Safety, Society of Automotive Engineers, Inc., 1992.

MEA 322 Aerodynamics of Road Vehicles

3rd Year: Mechanical Engineering - Automotive Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Aerodynamics forces and moments: Air flow over the exterior of the vehicle body and through the vehicle interior, Nature of the resultant aerodynamic forces due to air flow. Normal pressure and sheer stress, Viscosity property of air. Separation of air flow lines over the vehicle body. Flow properties: Pressure distribution and vortex systems. Air lift on vehicle: Ground effects, Reduction of air lift through vehicle body styling and utilization of air spoilers, Auxiliary means. Effects of aerodynamic forces on vehicle performance: Speed, Rate of fuel consumption, Acceleration, Handling, Braking, Longitudinal, Lateral and yaw moments. Design of scaled models and aerodynamic testing, Ideal vehicle body shape, Reduction of air resistance via increasing the air pressure in the wake regions, Principles of aerodynamic force analysis and its effects on the vehicle steady state and transient response stability.

References:

* Dorgham, M. A., Impact of Aerodynamics on Vehicle Design, U. K. Inderscience Enterprises Ltd., 1983.
* Hucho, W. H., Aerodynamics of Road Vehicles, London, Butterworths, 1987.

MEA 341 Automotive Engines & Fuel Systems

3rd Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(3+2) + (4+3)]

Marks:[(90+30+0) + (90+30+60)] = 300

Course Contents

Classification of internal combustion engines, Working cycles, Standard air cycles,

Standard air and fuel cycles, Combustion in spark ignition engines, Combustion periods, Ignition points, Flammability limits, Detonation, Different parameters affecting combustion delay, Flame propagation, Pressure rise, Combustion chambers. Combustion in compression ignition engines, Combustion periods, Knocking, Combustion chambers. Friction and lubrication, Lubrication system, Lubricating oil and additives properties, Oil consumption, Oil filters. Engine cooling, Heat transfer, Temperature of different engine parts, Cooling calculations, Comparison between different cooling systems. Supercharging of spark ignition and compression ignition engines, Purpose, Different types of supercharging performance of supercharged engines, Limit of supercharging and engine modifications. Testing and performance: performance characteristics and basic measurements (speed, fuel consumption, exhaust emissions, brake power and engine map). Fuel management, Fuel requirement at different operating conditions. Spark ignition and compression ignition fuel calibration. Electronic injection. Testing o injection systems.

References:

* Heywood, N.T., Fundamentals of Internal Combustion Engines, McGraw Hill Pub., 1992.
* Rogowski Tata, Elements of Internal Combustion Engines, Mars Publishing House, 1995.
* Ireland, G.E., Wads, W., Automotive Fuel, Ignition and Emission Control Systems, Mars Publishing House, 1996.

MEA 361 Automotive Measurements

3rd Year: Mechanical Engineering - Automotive (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction for measuring, Different phenomena and measuring of each phenomena. Measuring of: Pressure, Temperature, Linear and rotation speed, Volt, Current, Resistance, Acceleration, Weight, Force, Torque, Strain, Stress, Fuel consumption, Calibration, Static and dynamic measuring, Sensors, Curve fitting, Errors and its probability, Transducers, Analysis and recording of measure, Monitoring description of measuring instruments. Degree of measuring instrument, Application on automotive.

References:

* Hiller, V. A. W., Fundamentals of Motor Vehicle Technology, Arnold, Hodder Headline Group, 1991.
* Heinz Heisler, Vehicle and Engine Technology, Arnold, Hodder Headline Group, 1999.

MEA 371 Pollution from Vehicles

3rd Year: Mechanical Engineering - Automotive

Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Sources of pollution: Exhaust gas, Types of pollution and their effect on lumen

health. Methods of measurement: Carbon monoxide, Nitrogen oxides, Hydrocarbons, Sulphur oxides, Lead compounds. Effect of engine performance characteristics on pollutants levels in both diesel and petrol engines, (operating condition, ignition and injection timings, air fuel ratio, fuel gradients), Engine design (combustion chambers, swirl, injectors, exhaust muffler, methods of pollutant reduction from exhaust gas). Sources of noise emitted from vehicles: Engines, Mufflers, Tires, Side effect of exposure to noise, Noise measurement noise reduction. Vapors: Sources of pollution by vapors: Fuel tank, Engine crank case.

References:

* Strehlow, R.A., Combustion Fundamentals, McGraw Hill, Mars Publishing House, 1992.
* Ireland, G.E., Wads, W., Automotive Fuel, Ignition and Emission Control Systems, Mars Publishing House, 1996.

MEA 411 Automotive Theory (2)

4th Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(3+2) + (3+2)]

Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Dynamic performance of commercial vehicles: Buses, Truck trailer, Semi trailer, Fuel economy. Performance of hydrodynamic transmission and automatic gearbox. Braking performance of commercial vehicles: Theory of anti-blocking braking system. Dynamic performance of off- road vehicles: Soil mechanics and its effects on the vehicle interaction forces, Internal resistances, Road resistance, Thrust slip performance, Drawbar performance, Four wheel drive, Limited slip differential. Vehicle ride characteristics: Human response to vibration and the ISO standards, Vehicle body vibration modes, Analytical ride models, Oscillation centers, Road profile as a random excitation source, Ride comfort criteria. Handling characteristics of road vehicles: Definitions of neutral, Under steering, Over steering, Steady and transient responses to steering wheel and other inputs, Testing of handling characteristics, Directional stability of vehicle motion. Simulation models for the directional behaviour of a tractor semitrailer. Four wheel steering. Steering of tracked vehicles.

References:

* Ellis, J. R., Vehicle Dynamics, London, England, 1969.
* Wong, J. Y.and Bekker, M. G., Terrain Vehicle System Analysis, Canada, 1985.
* Wong, J. Y., Theory of Ground Vehicles, Prentice Hall, 1994.

MEA 421 Automotive Design (2)

4th Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(2+2) + (2+2)]

Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Cylinders block: Design factors, Cylinder liner types (wet and dry) mechanical and thermal stresses and liner installation, Used material specification, Cylinder head:

Design factors, Charge and exhaust tracks, Mechanical and thermal stresses, Solution by using fixed ends plates theory, Simple loading plates theory, Leakage prevent in combustion chamber, Piston group: Design factors, Piston types (gasoline engine, diesel engine), Stresses due to ovalization shape, Thermal stresses. Connecting rod: Design factors, Connecting rod types (gasoline engine, diesel engine) connecting rod kinematics and inertia forces, Stresses on thin rings. Valves: Design factors, Cam sbape, Forces analysis on different parts. Crankshaft: Design factors, Lubricant effect on bearing, Crankshaft balaning.

References:

* Khovakh, I., Motor Vehicle Engines, MIR Publisher, 1972.

MEA 431 Maintenance Engineering & Garage Planning

4th Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(4+2) + (4+2)]

Marks:[(100+25+0) + (100+25+50)] = 300

Course Contents

Maintenance: Test required to evaluate engine performance: Compression test, Vacuum test, Leakage test, Homogeneity test, By pass gases test and exhaust gas analysis. Periodic maintenance: Fault diagnosis and testing for the following aggregates: Fuel systems components (fuel tank, fuel pump, fuel filters, air filter, carburettor, … etc), Ignition systems (conventional and electronic) ignition coil, Distributor, circuits, Spark plugs, Charging system (battery, dynamos, alternators, cut-out, voltage and current regulators, starting systems (starting motors and its auxiliaries), Braking systems, Steering systems, Tiers. Garage planning: Workshop planning, Technology of maintenance processes, Calculation of manhour, Required for achieving maintenance and repair working. Repairing of different processes and equipment required. Assignment of labourites, Evaluation of auxiliary workshop surface area, Optimum planning of the workshop, Maintenance schedules. Maintenance economy, Planning of maintenance resources and management storage.

References:

* Jams, A., Johnsen, Automotive Diagnosis and Tune- Up, McGraw Hill Book Co., 1972.
* Ivan, D.H., Inerman, Automotive Engine Repair, G bencoc Publishing Comp. Inc., 1979.
* Robert, N., Brady, Electrical and Electronic Systems for Automobiles and Trucks, McGraw Hill Book Co., 1986.
* Martin, W., Stokel, Auto- Service and Repair, McGraw Hill Book Co., 1991.

MEA 441 Analysis of Car Accidents

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Motion: Definitions, Kinetics, Kinematics and dynamics. Impulse, Momentum and

drill. Impact: Direct central impact, Oblique central impact, Eccentric impact. Coefficient of restitution, Momentum conservation, Energy conservation. Methods of estimation of V accident. Analysis methods: Trajectory analysis and damage analysis. Automotive simulation methods and software: Accident reconstruction techniques, Measuring equipments, Method of simulation, Available softwares.

References:

* Artmonov, M.D., Motor Vehicle, Fundamentals and Design, MIR Publisher, 1976.
* Automotive Handbook, Bosch, 4th Ed., 1998.

MEA 451 Vehicle Automatic Control Systems

4th Year: Mechanical Engineering - Automotive (1st Term) Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction to automotive control systems: History, Examples of automotive control systems. Modelling of dynamic systems, State space representation. Mathematical modelling of physical systems (mechanical and electrical) basic control actions, Hydraulic and pneumatic controller, Antilock brake systems, Crash avoidance systems, Smart air bags, Vehicle dynamic control, Anti slip control, Navigation system, Active and semi-active suspension. Automatic gear box control, Traction control system, Restraint system electronics.

References:

* Ogata, K., Modern Control Engineering, 3rd Ed., Prentice Hall International, Inc., 1997.

MEA 452 Brake Systems

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Braking systems: Service braking, Parking barking, Hydraulic retarder, Exhaust braking and electrodynamics retarders, Brake circuit configurations, Braking systems for passenger cars, Braking systems for commercial vehicles, Air brake system, Air compressors, Pressure regulators, Control device, Transmission device, Air dryers, Brake valves, Anti lock brake systems for passenger car.

References:

* Robert Bosch Co-Operation, Bosch Technical Instruction Series: Compressed Air Brake Systems: Symbols, 4th Ed., 1998.
* Robert Bosch Co-Operation, Bosch Technical Instruction Series: Compressed Air Brake Systems: Equipment, 4th Ed., 1998.
* Robert Bosch Co-Operation, Bosch Technical Instruction Series: Compressed Air Brake Systems Schematic Diagrams, 4th Ed., 1998.
* Robert Scharff, Complete Brake Systems, Published by Delmar Publishers, Inc., 1998.

MEA 453 Simulation of Vehicle Systems

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(2+1) + (0+0)]

Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

Principles of vehicle simulation, Importance of vehicle simulation, Simulation of chassis under static and dynamic loading. Simulation of vehicle systems: Suspension, Braking steering, Safety, … etc. Matching of the vehicle systems. Interaction of the vehicle performance with road conditions. Simulation of the vehicle tests. Evaluation of the simulation process.

References:

* Simulation Software Packages, ALGOR, CARSIM, ARCSIM, TRUCKSIM, ADAMS, .

MEA 461 Automotive of Vehicle Systems

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Application of electronics in modern cars, Integrated circuits: Applications in modern cars, Sensors and their signal processing, Display technologies, Information technology, Technology of using software in engine control, Instrument used in electronic measurements, Electronic used on car engines, Electronic ignition, Triggering box of different ignition systems (transistorized, hole effect induction pulse generator, capacitive barge …), Electronic injection systems, Electronic systems in car chassis, Automatic transmission, Antilock brake system, Wheel anti ship systems, Differential lock system, Electronically controlled steering. Crash avoiding systems: Front sensing road obstacle detection, Audio, Visual driver warning electronically controlled suspension, Air conditioning control system.

References:

* Harper and Row, Automotive Electrical Systems, Check Chart Automotive Series, 1978.
* Automotive Electric and Electronic Systems, , By Robert Bosch, 1988.
* James, E., Duffy, Auto Electricity, Electronics, Computers, The Good Heart- Willcox Co., Inc., 1989.
* Ronald Jurgen, Automotive Electronics Handbook, McGraw Hill Book Co., 1994.
* د. محسن محمد مرسى عثمان، "الأنظمة الاليكترونية الحديثة فى السيارات" الجزء الأول، كلية الهندسة- جامعة الاسكندرية، ١٩٩٥.

MEA 471 Vehicle Manufacture

4th Year: Mechanical Engineering - Automotive Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (50+25+0)] = 75

Course Contents

Manufacturing and assembly processes: Welding, Riviting, Metal forming, Painting, Molding, Electrical connections. Assembly lines: Engine, Chassis, Power train

systems, Brakes, Suspension, Steering. Design of production lines and calculation of each station and man hours. Quality control and inspection. Testing of the final product. Economics of manufacturing and assembly: Site selection, Area required Transportation costs.

References:

* Hiller, V. A. W., Fundamentals of Motor Vehicle Technology, Arnold, Hodder Headline Group, 1991.
* Heinz Heisler, Vehicle and Engine Technology, Arnold, Hodder Headline Group, 1999.

MEA 499 Project

4th Year: Mechanical Engineering - Automotive (Cont.) Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, in addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

* Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Humanities

HUM x11 Technical English Language

Preparatory Year: General Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+0)]
Marks:[(0+0+0) + (35+15+0)] = 50

Course Contents

Practice in specific points of grammar to consolidate and extend learners existing knowledge. Analysis of syntax to help learners to develop their reading and comprehension skills. Skimming and scanning exercises. Comprehension questions to test his understanding, Interpretation and implication. Using activities and games to develop listening, Speaking and writing skills through a communicative, Functional approach. Suggested topics for discussion and exercises in summary writing and composition.

References:

* Fran Zimmerman, English for Science, Prentice Hall Regents, Englewood Cliffs, USA, .

HUM x12 Technical Report Writing

1st Year: Electrical Engineering - . (1st Term) Hrs/Week: [(2+1) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

1st Year: Mechanical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (50+25+0)] = 75

4th Year: Civil Engineering - Water & Hydraulic Structures (2nd Term)

4th Year: Civil Engineering - Public Works (2nd Term)

Course Contents

This course gives students the first principles needed for writing engineering reports and the logical bases for engineering writing. Also it provides the basics for writing engineering reports and provides the required details, Outlines and editing procedures of engineering writing. Moreover, The students take additional essential exercises to improve their writing ability.

Humanities

HUM x21 Management & Marketing

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term) Hrs/Week: [(2+1) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

3rd Year: Mechanical Engineering - Mechatronics (1st Term)

3rd Year: Mechanical Engineering - Production (2nd Term) Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (50+25+0)] = 75

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term)

4th Year: Mechanical Engineering - Automotive (2nd Term)

Course Contents

The concept and the elements of management: concept of management, Elements of management. The concept of marketing: define of marketing, The importance of marketing, The marketing system. Organizing of the marketing functions: Definition of organizing, The organizing of the marketing functions. Consumer behaviour: The concept of the consumer behaviour, The aspects of the consumer behaviour, Studying the markets. The product strategy: The product mix, The product life cycle, New products. The pricing strategy: The importance of pricing, Methods of pricing. Distribution strategy: Distribution channels, Distribution outlets. Promotion strategy: Advertising, Personal selling, Public relations.

References:

* Pride, Marketing Concepts, Baston, 1993.
* Stanton, Fundamentals of Marketing, New York, 1998.
* Kotlers, Marketing Management, Prentice Hall, London, 1999.

HUM x31 Engineering Economy

1st Year: Electrical Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (50+25+0)] = 75

2nd Year: Mechanical Engineering - . (2nd Term)

Course Contents

Origins of engineering economy, Principles of engineering economy, Design and manufacturing processes and EE, Cost estimation and cost terminology, Accounting, Balance sheet, Profit loss statement, Concept of equivalence, Money time relationships, Simple and compound interest rates, Single amounts and uniform series, Increasing and decreasing gradient, Application of money, Time relationships, Present value, Internal rate of return, External rate of return, Payback period, Evaluation of alternatives for different useful life and study period, Depreciation methods, Replacement analysis, Determination of the economic life of

challenger and defender, Engineering economy techniques for evaluation of public projects.

References:

* Bussey, L. E. and Eschenbach, T. G., The Economic Analysis of Industrial Projects, Prentice Hall, 1992.
* Canada, J. R.; Sulivan, W. G. and White, J. A., Capital Investment Decision Analysis for Engineering and Managements, Prentice Hall, 1996.
* Sullivan, W. G.; Bontadelli, J. A. and Wicks, E. M., Engineering Economy, Prentice Hall, 1999.

HUM x32 Project Management

3rd Year: Electrical Engineering - Computer & Systems (1st Term) Hrs/Week: [(2+2) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

4th Year: Mechanical Engineering - Automotive (1st Term)

3rd Year: Civil Engineering - . (2nd Term) Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (70+30+0)] = 100

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

3rd Year: Mechanical Engineering - Mechatronics (2nd Term)

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

4th Year: Mechanical Engineering - Production (2nd Term)

Course Contents

Definitions used in project management, The project life cycle, Project stages, Relationships and responsibilities of the different project parties, Execution phase responsibilities, Productivity, Quality management.

References:

* Gray, R. and Larson, K., Project Management: The Managerial Process, McGraw Hill, Irwin, New York, NY, 2002.
* Harris, R. and McCaffer, D., Modern Construction Management, Black Well Science, London, U.K., 2002.

HUM x41 Legislations & Contracts

3rd Year: Mechanical Engineering - Automotive (1st Term) Hrs/Week: [(2+1) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

4th Year: Civil Engineering - Public Works (1st Term)

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

4th Year: Mechanical Engineering - Production (1st Term)

4th Year: Mechanical Engineering - Mechanical Power (1st Term)

3rd Year: Architecture Engineering - Urban Planning & Design (2nd Term) Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (50+25+0)] = 75

4th Year: Civil Engineering - Structure (2nd Term)

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

4th Year: Mechanical Engineering - Mechatronics (2nd Term)

Course Contents

This course aims to give the student an overview of his liabilities and rights according to the valid laws and regulations governing the engineering works in all its specializations. It reviews and explains theoretically and practically, Such laws and makes references known to him. It concentrates on the laws and regulations concerning engineering syndicate, Contractors union and environment protection. It concentrates as well on the relationship between the parties of local and international (e.g.FIDIC) contracts in civil and administrative laws, The claims and/or disputes resulting thereof during execution of the works, The engineer's decision in this respect and the settlement of such disputes in local and international contracts amicably or by ad hoc or institutional arbitration.

HUM x42 Environmental Impact of Projects

1st Year: Civil Engineering - . (1st Term) Hrs/Week: [(2+1) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

1st Year: Architecture Engineering - . (1st Term)

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term)

4th Year: Mechanical Engineering - Mechatronics (1st Term)

3rd Year: Electrical Engineering - Computer & Systems (2nd Term) Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (50+25+0)] = 75

4th Year: Mechanical Engineering - Production (2nd Term)

4th Year: Mechanical Engineering - Mechanical Power (2nd Term)

Course Contents

The Environment is defined as the human surroundings and the different influencing factors. Human Influences of projects: Upgrading, Development, Economic factors, Social factors, Cultural factors, Aesthetic factors, Hygienic and psychological factors. Types of projects: Urban planning projects (residential projects, tourism projects, commercial projects, public buildings…etc.). Infrastructure projects (electricity plants, water supply and sewage networks, road networks, railroad networks, reservoirs, dams…etc.). Different Industrial projects (textile factories, steel Industries, cement factories, carpet factories, ceramic factories, food factories, electrical appliances, car industries…etc.). Environmental impact of projects: Negative and positive impacts (direct and indirect). The assessment of projects- both nationally and internationally- in order to avoid the negative consequences of projects on the environment. The approved rates and criteria for the compatibility of projects with environmental topics.

References:

* قانون البيئة ولائحتة التنفيذية لعام ١٩٩٤، ، جهاز شئون البيئة، .
* صلاح الحجار، دليل الاثر البيئى فى المشروعات الصناعية والتنمية، مكتبة نهضة مصر، ٢٠٠٠.