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UNIVERSITY OF MUMBAI



Bachelor of Engineering

First Year Engineering (Semester I & II), Revised course
(REV- 2012) from Academic Year 2012 -13,
(Common for All Branches of Engineering)

(As per Credit Based Semester and Grading System with
effect from the academic year 2012–2013)

**First Year Engineering (Semester I & II), Revised course from
Academic Year 2012 -13, (REV- 2012),**

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC101	Applied Mathematics-I	04	-	01	04		01	05
FEC102	Applied Physics-I	03	01	-	03	0.5	-	3.5
FEC103	Applied Chemistry -I	03	01	-	03	0.5	-	3.5
FEC104	Engineering Mechanics	05	02	-	05	01	-	06
FEC105	Basic Electrical & Electronics Engineering	04	02	-	04	01	-	05
FEC106	Environmental studies	02	-	-	02	-	-	02
FEL101	Basic Workshop Practice-I	-	04	-	-	02	-	02
		21	10	01	21	05	01	27

(Common for all branches of Engineering)

Scheme for FE - Semester - I

Sub. Code	Subject Name	Examination Scheme							Total	
		Theory Marks				End sem. exam	Term Work	Pract.		Oral
		Internal Assessment								
		Test 1	Test 2	Average of Test 1 and Test 2						
FEC101	Applied Mathematics-I	20	20	20	80	25	-	-	125	
FEC102	Applied Physics-I	15	15	15	60	25	-	-	100	
FEC103	Applied Chemistry -I	15	15	15	60	25	-	-	100	
FEC104	Engineering Mechanics	20	20	20	80	25	-	25	150	
FEC105	Basic Electrical & Electronics Engineering	20	20	20	80	25	-	25	150	
FEC106	Environmental studies	15	15	15	60	-	-	-	75	
FEL101	Basic Workshop Practice-I	-	-	-	-	50	-	-	50	
				105	420	175		50	750	

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC101	Applied Mathematics-I	04	-	01	04		01	05

Sub. Code	Subject Name	Examination Scheme							Total
		Theory				Term Work	Prat.	Oral	
		Internal Assessment			End sem. exam				
		Test 1	Test 2	Av. of Test 1 & 2					
FEC101	Applied Mathematics-I	20	20	20	80	25	-	-	125

Detailed Syllabus

Sr.No	Topics	Hrs
1	<p><u>Pre-requisite</u>: Review on Complex Number-Algebra of Complex Number, Different representations of a Complex number and other definitions, D'Moivre's Theorem.</p> <p>Module-1: Complex Numbers:-</p> <p>1.1: Powers and Roots of Exponential and Trigonometric Functions.</p> <p>1.2: Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Logarithmic functions.</p> <p>1.3: Separation of real and Imaginary parts of all types of Functions.</p> <p>1.4: Expansion of $\sin^n\theta, \cos^n\theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta, \cos n\theta$ in powers of $\sin\theta, \cos\theta$</p>	<p>2hrs</p> <p>2 hrs</p> <p>6 hrs</p> <p>3 hrs</p> <p>2 hrs</p>

2	<p>Module-2: Matrices and Numerical Methods:-</p> <p>2.1: Types of Matrices(symmetric, skew- symmetric, Hermitian, Skew Hermitian,Unitary, Orthogonal Matrices and properties of Matrices).Rank of a Matrix using Echelon forms, reduction to normal form, PAQ forms, system of homogeneous and non –homogeneous equations, their consistency and solutions. Linear dependent and independent vectors.</p> <p>2.2: Solution of system of linear algebraic equations, by (1) Gauss Elimination Method (Review) (2) Gauss Jordan Method (3) Crouts Method (LU) (4) Gauss Seidal Method and (5) Jacobi iteration (Scilab programming for above methods is to be taught during lecture hours)</p>	<p>9 hrs</p> <p>6 hrs</p>
3	<p>Module-3:Differential Calculus:-</p> <p>3.1: Successive differentiation: nth derivative of standard functions. Leibnitz’s Thoerem (without proof) and problems.</p> <p>3.2: Partial Differentiation: Partial derivatives of first and higher order, total differentials, differentiation of composite and implicit functions.</p> <p>3.3: Euler’s Theorem on Homogeneous functions with two and three independent variables (with proof).Deductions from Euler’s Theorem.</p>	<p>5 hrs</p> <p>7 hrs</p> <p>3 hrs</p>
4	<p>Module-4: Application of Partial differentiation, Expansion of functions , Indeterminate forms and curve fitting:-</p> <p>3.1.: Maxima and Minima of a function of two independent variables. Lagrange’s method of undetermined multipliers with one constraint. Jacobian, Jacobian of implicit function. Partial derivative of implicit function using jacobian.</p> <p>3.2: Taylor’s Theorem(Statement only) and Taylor’s series, Maclaurin’s series (Statement only).Expansion of e^x, $\sin x$, $\cos x$, $\tan x$, $\sinh x$, $\cosh x$, $\tanh x$, $\log(1+x)$, $\sin^{-1}x$, $\cos^{-1}x$, Binomial series. Indeterminate forms, L-Hospital Rule, problems involving series also.</p> <p>3.3: Fitting of curves by least square method for linear, parabolic, and exponential. Regression Analysis(to be introduced for estimation only) (Scilab programming related to fitting of curves is to be taught during lecture hours)</p>	<p>4 hrs</p> <p>6 hrs</p> <p>5 hrs</p>

Recommended Books:

- 1: A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar, Vol – I and –II by Pune Vidyarthi Graha.
- 2: Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
- 3: Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
- 4: Matrices by Shanti Narayan.
- 5: Numerical by S.S.Sastry, Prentice Hall

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
- 3: Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- 4: Remaining question will be randomly selected from all the modules.
- 5: Weightage of marks should be proportional to number of hours assigned to each Module.

Term Work:

General Instructions:

- (1) Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practicals.
- (2) Students must be encouraged to write Scilab Programs in tutorial class only. Each Student has to write **at least 4 Scilab tutorials (including print out) and at least 6 class tutorials on entire syllabus.**
- (3) SciLab Tutorials will be based on (1) Guass Jordan Method (2) Crouts Method (LU) (3) Guass Seidal Method and (4) Jacobi iteration (5) Curve Fitting for linear, parabolic and exponential functions

The distribution of marks for term work will be as follows,

Attendance (Theory and Tutorial) :05 marks

Class Tutorials on entire syllabus :10 marks

SciLab Tutorials :10

The final certification and acceptance of term-work ensures the satisfactory

Performance of laboratory work and minimum passing in the term work.

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC102	Applied Physics-I	03	01	-	03	0.5	-	3.5

Sub. Code	Subject Name	Examination Scheme							Total	
		Theory (out of 75)					Term Work	Pract.		Oral
		Internal Assessment (out of 15)			End sem. exam (out of 60)					
		Test 1	Test 2	Average of Test 1 and Test 2						
FEC102	Applied Physics-I	15	15	15	60	25	-	-	100	

Detailed Syllabus:

1. CRYSTAL STRUCTURE

(15)

Crystallography: Space lattice, Unit Cell, Lattice parameters, Bravais lattices and Crystal systems, Cubic crystal system & lattices; Density & Packing Fraction; Miller indices of crystallographic planes & directions; interplanar distance; Diamond structure, NaCl structure, HCP structure, BaTiO₃ structure; Ligancy and Critical radius ratio; Determination of crystal structure using X-ray diffraction techniques viz. Laue method, rotating crystal method (Bragg method) & powder method; Real crystals & point-defects; photonic crystals; Liquid crystal phases and application in LCD (with brief introduction of optical polarization).

2. SEMICONDUCTOR PHYSICS

(14)

Energy bands of solids and classification of solids; Concepts of holes, effective mass; drift mobility and conductivity in conductors, intrinsic semiconductors and extrinsic semiconductors; Fermi-Dirac distribution function and Fermi energy level in a conductor, insulator, intrinsic & extrinsic semiconductor; Effect of impurity concentration and temperature on the Fermi Level; Hall Effect (applied electric field along x-axis and applied magnetic field along z-axis) and its application.

Drift and Diffusion of charge carriers across the Energy band structure of P-N Junction leading to formation of depletion region and potential barrier; concept of carrier current densities in p-n junction in

equilibrium, forward bias and reverse bias; Uses of p-n junction in Light emitting diode (LED), photoconductors & photovoltaic solar cells.

3. DIELECTRICS & MAGNETIC MATERIALS

(09)

Dielectric material, dielectric constant, polarization, polarizability & its types; relative permittivity; Piezoelectrics, Ferroelectrics, Applications of dielectric materials - Requirement of good insulating material, some important insulating material.

Origin of magnetization using Atomic Theory; classification of magnetic materials based on Susceptibility value; Qualitative treatment of Langevin's and Weiss equation for Dia, Para and Ferro magnetic materials (no derivation); Microstructure of ferromagnetic solids- Domains and Hysteresis loss; Soft & hard magnetic materials and their uses; Magnetic circuits and microscopic Ohm's Law.

4. ACOUSTICS & ULTRASONICS:

(07)

Introduction to architectural acoustics; reverberation and Sabine's formula; Common Acoustic defects and Acoustic Design of a hall

Ultrasonic Waves and their applications; Methods of production of ultrasonic waves (Piezoelectric Oscillator & Magnetostriction Oscillator)

Books Recommended:

1. A Textbook of Engineering physics - Avadhanulu & Kshirsagar, S.Chand
2. Applied Solid State Physics - Rajnikant, Wiley india
3. Engineering Physics- Uma Mukherji (third edition), Narosa
4. Engineering Physics - R.K.Gaur & S.L. Gupta, Dhanpat Rai publications
5. Solid State physics - A.J. Dekker, Macmillan Student Edition
6. Modern Engineering Physics – Vasudeva, S.Chand
7. Solid State Physics- Charles kittle, EEE Pbl
8. Concepts of Modern Physics- Arther Beiser, Tata Mcgraw Hill

Suggested Experiments: (Any five)

1. Study of SC, BCC, FCC.
2. Study of Diamond, NaCl ,BaTiO₃.
3. Study of HCP structure.

4. Study of Miller Indices Plane and direction.
5. Study of Hall Effect.
6. Determination of energy band gap of semiconductor.
7. Determination of 'h' using photocell.
8. Study of Ultrasonic Distance Metre.
9. Determination of losses using hysteresis loop.
10. Study of I / V characteristics of semiconductor diode.

Note: Distribution of marks for term work

1. Laboratory work (Experiments and Journal): 15 marks
2. Assignments :05 marks
3. Attendance (Practical and Theory): 05marks

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Total 4 questions need to be solved.
- 3: Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- 4: Remaining question will be randomly selected from all the modules.
- 5: Weightage of marks should be proportional to number of hours assigned to each Module.

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC103	Applied Chemistry - I	03	01	-	03	0.5	-	3.5

Sub. Code	Subject Name	Examination Scheme							Total
		Theory (out of 75)				Term Work	Pract.	Oral	
		Internal Assessment (out of 15)			End sem. exam (out of 60)				
		Test 1	Test 2	Average of Test 1 and Test 2					
FEC103	Applied Chemistry - I	15	15	15	60	25	-	-	100

Details of the syllabus:-

Sr. No.	Details	Hrs
Module 1	<p>Water:</p> <ul style="list-style-type: none"> • Impurities in water, Hardness of water, Determination of Hardness of water by EDTA method and problems. Softening of water by Hot cold lime soda method and problems. Zeolite process and problems. Ion Exchange process and problems. • Drinking water or Municipal water, Treatments removal of microorganisms, by adding Bleaching powder, Chlorination (no breakpoint chlorination), Disinfection by Ozone, Electrodialysis and Reverse osmosis, ultra filtration. • BOD, COD(def,& significance), sewage treatments activated sludge process, numerical problems related to COD. 	12

Module 2	<p>Polymers:</p> <ul style="list-style-type: none"> • Introduction to polymers, Thermoplastic and Thermosetting plastic. • Ingredients of the plastic (Compounding of plastic.) • Fabrication of plastic by Compression, Injection , Transfer, Extrusion molding. Preparation, properties and uses of Phenolformaldehyde, PMMA , Kevlar. • Effect of heat on the polymers (Glass transition temperatures) Polymers in medicine and surgery. • Conducting polymers, Industrial polymers. <p>Rubbers:</p> <ul style="list-style-type: none"> • Natural rubber (latex), Drawbacks of natural rubber, Compounding of rubber (vulcanization of rubber), Preparation, properties and uses of Buna-S, Silicone and Polyurethane rubber. 	12
Module 3	<p>Lubricants</p> <ul style="list-style-type: none"> • Introduction , Definition, Mechanism of Lubrication, Classification of lubricants, Solid lubricants (graphite & Molybdenum disulphide) , Semisolid lubricants (greases Na base , Li base , Ca base, Axle greases.) , Liquid lubricants(blended oils). • Important properties of lubricants , definition and significance ,viscosity ,viscosity index, flash and fire points, cloud and pour points, oiliness, Emulsification, Acid value and problems, Saponification value and problems . 	08
Module 4	<p>Phase Rule</p> <ul style="list-style-type: none"> • Gibb’s Phase Rule, Explanation, One Component System (Water) , Reduced Phase Rule, Two Component System (Pb-Ag), Limitations of Phase Rule. 	05
Module 5	<p>Important Engineering Materials</p> <ul style="list-style-type: none"> • Cement- Manufacture of Portland Cement, Chemical Composition and Constitution of Portland Cement , Setting and Hardening of Portland Cement, Concrete RCC and Decay. Refractories Preparation, properties and uses of Silica bricks, Dolomite bricks , Silicon Carbide (SiC). • Nanomaterials , preparation (Laser and CVD method), properties and uses of CNTS 	08

Theory Examination:

1. Question paper will comprise of total 6 questions, each of 15 marks.
2. Total four questions need to be solved.

3. Question - 1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.

4. Remaining questions will be mixed in nature (for example suppose Q.2 has part (a) from module 3 then part (b) will be form any module other than module 3).

5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term work:

Term work shall consist of minimum five experiments. The distribution of marks for term work shall be as follows:

Laboratory Work (Experiments and journal) : 10 marks

Attendance (Practical and Theory) : 05 marks

Assignments : 10 marks

Total : 25 marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

Suggested Experiments - Applied Chemistry I
1) To determine total, temporary and permanent hardness of water sample.
2) Removal of hardness using ion exchange column.
3) To determine Saponification value of a lubricating oil.
4) To determine acid value of a lubricating oil.
5) To determine free acid PH of different solutions using PH meter / Titration.
6) To determine metal ion concentration using colorimeter.
7) To determine flash point and fire point of a lubricating oil
8) To determine Chloride content of water by Mohr's Method.
9) To determine melting point and/or glass transition temperature of a polymer.

10) To determine conductance of polymer.
11) To determine the percentage of lime in cement.
12) Hardening and setting of cement using Vicat's apparatus
13) To determine the COD of the given water sample. / Dichromate method.
14) Viscosity by Redwood Viscometer.

Recommended Books:

1. Engineering Chemistry – Jain & Jain, Dhanpat Rai
2. Engineering Chemistry – Dara & Dara, S Chand
3. Engineering Chemistry – Wiley India (ISBN-9788126519880)
4. A Text Book of Engineering Chemistry – Shashi Chawla (Dhanpat Rai)

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC104	Engineering Mechanics	05	02	-	05	01	-	06

Sub. Code	Subject Name	Examination Scheme							Total	
		Theory (out of 100)					Term Work	Pract.		Oral
		Internal Assessment (out of 20)				End sem. exam (out of 80)				
		Test 1	Test 2	Average of Test 1 and Test 2						
FEC104	Engineering Mechanics	20	20	20		80	25	-	25	150

Details of Syllabus:

Sr.No.	Topics	Hrs
01	1.1 System of Coplanar forces:- Resultant of Concurrent forces, Parallel forces, Non Concurrent Non Parallel system of forces, Moment of force about a point, Couples, Varignon's Theorem. Distributed Forces in plane.	05
	1.2 Center of Gravity and Centroid for plane Laminas.	04
02	2.1 Equilibrium of system of coplanar forces:- Condition of equilibrium for concurrent forces, parallel forces and Non concurrent Non Parallel general forces and Couples.	06
	2.2 Types of support , loads, Beams, Determination of reactions at supports for various types of loads on beams.	04
	2.3 Analysis of plane trusses by using Method of joints and Method of sections.(Excluding pin jointed frames)	04
03	3.1 Forces in space: Resultant of Noncoplanar force systems: Resultant of Concurrent force system, Parallel force system and Nonconcurrent nonparallel force system.	05

	<p>Equilibrium of Noncoplanar force systems: Equilibrium of Concurrent force system, Parallel force system and Nonconcurrent nonparallel force system.</p> <p>3.2 Friction: Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders.</p>	06
04	<p>4.1 Kinematics of Particle: - Velocity & acceleration in terms of rectangular co-ordinate system, Rectilinear motion, Motion along plane curved path, Tangential & Normal component of acceleration, Motion curves (a-t, v-t, s-t curves), Projectile motion, Relative velocities.</p>	10
05	<p>5.1 Kinematics of Rigid Bodies :- Introduction to general plane motion, Instantaneous center of rotation for the velocity, velocity diagrams for bodies in plane motion, (up to 2 linkage mechanism)</p>	06
06	<p>6.1 Kinetics of a Particle: Force and Acceleration:- Introduction to basic concepts, D'Alemberts Principle, Equations of dynamic equilibrium, Newton's Second law of motion.</p> <p>6.2 Kinetics of a Particle: Work and Energy: -Principle of Work and Energy, Law of Conservation of Energy.</p> <p>6.3 Kinetics of a Particle: Impulse and Momentum:-Principle of Linear Impulse and Momentum. Law of Conservation of momentum. Impact and collision.</p>	<p>04</p> <p>03</p> <p>03</p>

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
- 3: Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
4. Remaining questions will be mixed in nature.(e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3) having 15 marks each.
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Oral examination:-

Oral examination will be based on entire syllabus.

Term work:-

Term work shall consist of minimum six experiments, assignments consisting numerical based on above syllabus, at least 3 numerical from each module.

The distribution of marks for term work shall be as follows:

Laboratory work (Experiment/ programs and journal) **:10 marks**

Assignments **: 10 marks**

Attendance (Theory and Practical) **: 05 marks**

The final certification and acceptance of term work ensures the satisfactory performance of laboratory work and minimum passing in the term work.

List of experiments:-

1. Polygon law of coplanar forces.
2. Non concurrent non parallel (general).
3. Bell crank lever.
4. Support reaction for beam.
5. Simple / compound pendulum.
6. Inclined plane (to determine coefficient of friction).
7. Collision of elastic bodies (Law of conservation of momentum).
8. Moment of Inertia of fly wheel.
9. Screw friction by using screw jack.

Any other experiment based on above syllabus.

Recommended Books

1. Engineering Mechanics by Hibblar, McMillan.
2. Engineering Mechanics by Beer & Johnson, Tata McGraw Hill
3. Engineering Mechanics by Merium, Wiley.
4. Engineering Mechanics by F. L. Singer, Harper & Raw Publication
5. Engineering Mechanics by Macklin & Nelson, Tata McGraw Hill
6. Engineering Mechanics by Shaum Series,
7. Engineering Mechanics by Tayal, Umesh Publication.

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC105	Basic Electrical & Electronics Engineering	04	02	-	04	01	-	05

Sub. Code	Subject Name	Examination Scheme							Total	
		Theory (out of 100)					Term Work	Pract.		Oral
		Internal Assessment (out of 20)			End sem. exam (out of 80)					
		Test 1	Test 2	Average of Test 1 and Test 2						
FEC105	Basic Electrical & Electronics Engineering	20	20	20	80	25	-	25	150	

Detailed Syllabus:

Module	Content	Hours
Prerequisite	<p>A. Concept of e.m.f, potential difference, current, ohm's law, resistance, resistivity, series and parallel connections, power dissipation in resistance, effect of temperature on resistance</p> <p>B. Capacitors, with uniform and composite medium, energy stored in capacitor, R-C time constant.</p> <p>C. Magnetic field, Faraday's laws of Electromagnetic induction, Hysteresis and eddy current losses, energy stored in an inductor, time constant in R-L circuit.</p>	No questions to be asked in Theory paper on Prerequisite 02
1	<p>D.C. circuits: (only independent sources). Kirchhoff's laws, Ideal and practical voltage and current source, Mesh and Nodal analysis (super node and super mesh excluded), Source transformation, Star-delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, (Source transformation not allowed for Superposition theorem, Mesh and Nodal analysis)</p>	20

2	A.C Circuits : Generation of alternating voltage and currents, RMS and Average value, form factor , crest factor, AC through resistance, inductance and capacitance, R-L , R-C and R-L-C series and parallel circuits, phasor diagrams , power and power factor, series and parallel resonance, Q-factor and bandwidth	12
3	Three phase circuits : Three phase voltage and current generation, star and delta connections (balanced load only), relationship between phase and line currents and voltages, Phasor diagrams, Basic principle of wattmeter, measurement of power by two wattmeter method	10
4	Single phase transformer : Construction, working principle, Emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, O.C. and S.C test, Efficiency	10
5	Electronics (no numericals): Semiconductor diode, Diode rectifier with R load: Half wave, full wave–center tapped and bridge configuration, RMS value and average value of output voltage, ripple factor, rectification efficiency, introduction to C and L filter (no derivation). CE, CB, CC transistor configuration, CE input-output characteristics.	06

Theory Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
3. Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
4. Remaining question will be randomly selected from all the modules.
5. Weightage of marks should be proportional to number of hours assigned to each Module.

List of laboratory experiments (Minimum Six):

1. Mesh and Nodal analysis.
2. Verification of Superposition Theorem.
3. Verification Thevenin's Theorem.
4. Study of R-L series and R-C series circuit.
5. R-L-C series resonance circuit
6. R-L-C parallel resonance circuit.
6. Relationship between phase and line currents and voltages in 3 – phase System (star & delta)

7. Power and phase measurement in three phase system by two wattmeter method.
8. O.C. and S.C. test on single phase transformer
9. Half wave and full wave rectifier circuits

Recommended Books

Text Books

1. V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, (Revised Edition)
2. Electrical Engineering Fundamentals" by Vincent Del Toro, PHI Second edition ,2011
3. Electronics Devices & Circuit Theory" by Boylestad, Pearson Education India
4. Edward Hughes: Electrical and Electrical Technology, Pearson Education (Tenth edition)
5. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13 th edition 2011.

Reference Books:

1. B.L.Theraja "Electrical Engineering " Vol-I and II,
2. S.N.Singh, "Basic Electrical Engineering" PHI , 2011

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
6	Environmental studies	02	-	-	02	-	-	02

Sub. Code	Subject Name	Examination Scheme							Total
		Theory (out of 75)				Term Work	Pract.	Oral	
		Internal Assessment (out of 15)			End sem. exam (out of 60)				
		Test 1	Test 2	Average of Test 1 and Test 2					
6	Environmental studies	15	15	15	60	-	-	-	75

Details of the syllabus:-

Sr. No.	Details	Hrs
Module 1	<p>Multidisciplinary Nature of Environmental Studies:</p> <ul style="list-style-type: none"> • Scope and Importance • Need for Public Awareness • Depleting Nature of Environmental resources such as Soil, Water, Minerals, and Forests. • Global Environmental Crisis related to Population, Water, Sanitation and Land. • Ecosystem: Concept, Classification, Structure of Ecosystem, overview of Food chain, Food web and Ecological Pyramid 	04

Module 2	Sustainable Development <ul style="list-style-type: none"> • Concept of sustainable development • Social, Economical and Environmental aspect of sustainable development. • Control Measures: 3R (Reuse, Recovery, Recycle), Appropriate Technology, Environmental education, Resource utilization as per the carrying capacity. 	04
Module 3	Environmental Pollution: <ul style="list-style-type: none"> • Air Pollution: Sources, Effects of air pollution with respect to Global Warming, Ozone layer Depletion, Acid Rain, Photochemical smog, Two Control Measures- Bag house Filter, Venturi scrubber . Case Study: Bhopal Gas Tragedy • Water Pollution: Sources and Treatment, Concept of waste waters - Domestic & Industrial and treatment. Case Study: Minamata Disease. • Land Pollution: Solid waste, Solid waste Management by Land filling, Composting. • Noise Pollution; Sources and Effects • E-Pollution: Sources and Effects. 	07
Module 4	Environmental Legislation: <ul style="list-style-type: none"> • Overview • Ministry of Environment and Forests (MoE&F). Organizational structure of MoE&F. • Functions and powers of Central Control Pollution Board. • Functions and powers of State Control Pollution Board. • Environmental Clearance, Consent and Authorization Mechanism. • Environmental Protection Act • Any two case studies pertaining to Environmental Legislation. 	05
Module 5	Renewable sources of Energy: <ul style="list-style-type: none"> • Limitations of conventional sources of Energy. • Various renewable energy sources. • Solar Energy: Principle, Working of Flat plate collector & Photovoltaic cell. • Wind Energy: Principle, Wind Turbines. 	05

	<ul style="list-style-type: none"> Hydel Energy: Principle, Hydropower generation. Geothermal Energy: Introduction, Steam Power Plant 	
Module 6	Environment and Technology <ul style="list-style-type: none"> Role of Technology in Environment and health Concept of Green Buildings, Indoor air pollution Carbon Credit: Introduction, General concept. Disaster Management: Two Events: Tsunami, Earthquakes, Techniques of Disaster Management Case Study: Earthquake in Japan 	05

Theory Examination:

1. Question paper will comprise of **total 6 questions, each of 15 marks.**
2. Total **four questions** need to be solved.
3. Question **Number One** will be **compulsory** and it will be based **on entire syllabus** wherein sub questions of 2 to 3 marks will be asked.
4. Remaining questions i.e Q.2 to Q.6 will be mixed in nature and will be divided in three parts (a),(b) &(c) and they will belong to different modules.
5. In question paper, weight of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Recommended Books:

1. Textbook of Environmental studies by Erach Bharucha, University Press.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.
3. Essentials of Environmental Studies by Kurian Joseph &Nagendran, Pearson Education
4. Renewable Energy by Godfrey Boyle, Oxford Publications.
5. Perspective Of Environmental Studies, by Kaushik and Kaushik,New Age International
6. Environmental Studies by. Anandita Basak, Pearson Education
7. Textbook of Environmental Studies by Dave and Katewa, Cengage Learning
8. Environmental Studies by Benny Joseph, TataMcGraw Hill

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEL101	Basic Workshop Practice - I	-	04	-	-	02	-	02

Sub. Code	Subject Name	Examination Scheme							Total	
		Theory					Term Work	Pract.		Oral
		Internal Assessment			End sem. exam					
		Test 1	Test 2	Average of Test 1 and Test 2						
FEL101	Basic Workshop Practice-I	-	-	-	-	-	50	-	-	50

Detailed Syllabus		Periods
Note:	<p>The syllabus and the Term- work to be done during semester I and Semester II is given together. Individual Instructor for the course is to design the jobs for practice and demonstration and spread the work over entire two semesters. The objective is to impart training to help the students develop engineering skill sets. This exercise also aims in inculcating respect for physical work and hard labor in addition to some amount of value addition by getting exposed to interdisciplinary engineering domains.</p> <p>The two compulsory trades (Sr. No. 1- Fitting and 2 - Carpentry) shall be offered in separate semesters.</p> <p>Select any four trade topics (two per semester) out of the topic at Sr. n. 3 to 11. Demonstrations and hands on experience to be provided during the periods allotted for the same. Report on the demonstration including suitable sketches is also to be included in the term – work</p>	
1.	<p>Fitting (compulsory)</p> <ul style="list-style-type: none"> Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping. Term work to include one job involving following operations : filing to size, one simple male- female joint, drilling and tapping 	30

2.	<p>Carpentry (compulsory)</p> <ul style="list-style-type: none"> • Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods. • Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning 	30
3.	<p>Forging (Smithy)</p> <ul style="list-style-type: none"> • At least one workshop practice job (Lifting hook and handle) is to be demonstrated. 	15
4.	<p>Welding</p> <ul style="list-style-type: none"> • Edge preparation for welding jobs. Arc welding for different job like, Lap welding of two plates, butt welding of plates with simple cover, arc welding to join plates at right angles. 	15
5.	<p>Machine Shop</p> <ul style="list-style-type: none"> • At least one turning job is to be demonstrated. 	15
6.	<p>Electrical board wiring</p> <ul style="list-style-type: none"> • House wiring, staircase wiring, wiring diagram for fluorescent tube light, Godown wiring and three phase wiring for electrical motors. 	15
7.	<p>PCB Laboratory Exercises</p> <p>Layout drawing, Positive and negative film making, PCB etching and drilling, Tinning and soldering technique.</p>	15
8.	<p>Sheet metal working and Brazing</p> <ul style="list-style-type: none"> • Use of sheet metal, working hand tools, cutting , bending , spot welding 	15
9.	<p>Plumbing</p> <ul style="list-style-type: none"> • Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic line involving fixing of a water tap and use of coupling, elbow, tee, and union etc. 	15
10.	<p>Masonry</p> <ul style="list-style-type: none"> • Use of masons tools like trowels, hammer, spirit level, square, plumb line and pins etc. demonstration of mortar making, single and one and half brick masonry , English and Flemish bonds, block masonry, pointing and plastering. 	15

11	<p>Hardware and Networking:</p> <ul style="list-style-type: none"> • Dismantling of a Personal Computer (PC), Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc. • Assembling of PC, Installation of Operating System (Any one) and Device drivers, Boot-up sequence. Installation of application software (at least one) • Basic troubleshooting and maintenance • Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping. <p>NOTE: Hands on experience to be given in a group of not more than four students.</p>	15
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Term work:

Term work shall consist of respective reports and jobs of the trades selected the distribution of marks for term work shall be as follows.

Laboratory work (Job and Journal) : 40 marks

Attendance (Practical and Theory) : 10 marks

The final certification and acceptance of term – work ensures the satisfactory performance of laboratory work.