

Semester

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	T
FEC101	Engineering Mathematics-I	3	--	1*	3	--	1	
FEC102	Engineering Physics-I	2		--	2		--	
FEC103	Engineering Chemistry-I	2	--	--	2	--	--	
FEC104	Engineering Mechanics	3	--	--	3	--	--	
FEC105	Basic Electrical Engineering	3	--	--	3	--	--	
FEL101	Engineering Physics-I	--	1	--	--	0.5	--	
FEL102	Engineering Chemistry-I	--	1	--	--	0.5	--	
FEL103	Engineering Mechanics	--	2	--	--	1	--	
FEL104	Basic Electrical Engineering	--	2	--	--	1	--	
FEL105	Basic Workshop practice-I	--	2	--	--	1	--	
Total		13	08	01	13	04	01	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Pract. /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEC101	Engineering Mathematics-I	20	20	20	80	3	25	--
FEC102	Engineering Physics-I	15	15	15	60	2	--	--
FEC103	Engineering Chemistry-I	15	15	15	60	2	--	--
FEC104	Engineering Mechanics	20	20	20	80	3	--	--
FEC105	Basic Electrical Engineering	20	20	20	80	3	--	--
FEL101	Engineering Physics-I	--	--	--	--	--	25	--
FEL102	Engineering Chemistry-I	--	--	--	--	--	25	--
FEL103	Engineering Mechanics	--	--	--	--	--	25	25
FEL104	Basic Electrical Engineering	--	--	--	--	--	25	25
FEL105	Basic Workshop practice-I	--	--	--	--	--	50	--

Total	--	--	90	360	--	175	50
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EM1

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC201	Engineering Mathematics-I	3	--	1*	3	1	--	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work		Pract./oral
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
FEC201	Engineering Mathematics-I	20	20	20	80	3	25	--

Module	Detailed Contents	Hrs.
01	Complex Numbers Pre-requisite: Review of Complex Numbers-Algebra of Complex Number, Cartesian, polar and exponential form of complex number. 1.1. Statement of D'Moivre's Theorem . 1.2. 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 $\sin \theta$, $\cos \theta$ 1.3. Powers and Roots of complex number.	2 2 2
02	Hyperbolic function and Logarithm of Complex Numbers 2.1. Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Separation of real and imaginary parts of all types of Functions. 2.2 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions. # Self learning topics: Applications of complex number in Electrical circuits.	4 2
03	Partial Differentiation 3.1 Partial Differentiation: Function of several variables, Partial derivatives of first and higher order. Differentiation of composite function. 3.2. Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem. # Self learning topics: Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.	3 3
04	Applications of Partial Differentiation and Successive differentiation.	3

	<p>4.1 Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint.</p> <p>4.2 Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems</p> <p># Self learning topics: Jacobian's of two and three independent variables (simple problems)</p>	3
05	<p>Matrices</p> <p>Pre-requisite: Inverse of a matrix, addition, multiplication and transpose of a matrix</p> <p>5.1.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 and PAQ form.</p> <p>5.2.System of homogeneous and non –homogeneous equations, their consistency and solutions.</p> <p># Self learning topics:Application of inverse of a matrix to coding theory.</p>	4 2
06	<p>Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function.</p> <p>6.1 Solution of Transcendental Equations: Solution by Newton Raphson method and Regula –Falsi method.</p> <p>6.2 Solution of system of linear algebraic equations, by (1) Gauss Jacobi Iteration Method, (2) Gauss Seidal Iteration Method.</p> <p>6.3 Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only). Expansion of $\sin(x)$, $\cos(x)$, $\tan(x)$, $\sinh(x)$, $\cosh(x)$, $\tanh(x)$, $\log(1+x)$, $\sin^{-1}(x)$, $\cos^{-1}(x)$, $\tan^{-1}(x)$.</p> <p># Self learning topics:Indeterminate forms, L- Hospital Rule, Gauss Elimination Method, Gauss Jordan Method.</p>	2 2 2

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 (i) Gauss Elimination Method (ii) Gauss Seidal Iteration method (iii) Gauss Jacobi Iteration Method (iv) Newton Raphson Method (v) Regula –Falsi method (vi) Maxima and Minima of functions of two variables

The distribution of Term Work marks will be as follows –

1	Attendance (Theory and Tutorial)	05 marks
2	Class Tutorials on entire syllabus	10 marks
3	SCILAB Tutorials	10 marks

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein 4 sub-questions of 5 marks each will be asked.
4. Remaining questions will be randomly selected from all the modules.
5. Weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

EP1

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	Tut.	Pract	Total	
FEC102	Engineering Physics-I	2	-	-	2	-	-	2	
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC102	Engineering Physics-I	15	15	15	60	2	--	--	75

Module	Detailed Contents	Hrs.
01	QUANTUM PHYSICS (Prerequisites : Dual nature of radiation, Photoelectric effect Matter waves-wave nature of particles, de-Broglie relation, Davisson-Germer experiment)	07
	De Broglie hypothesis of matter waves; properties of matter waves; wave packet, phase velocity and group velocity; Wave function; Physical interpretation of wave function; Heisenberg uncertainty principle; non existence of electron in nucleus; Schrodinger's time dependent wave equation; time independent wave equation; Particle trapped in one dimensional infinite potential well, Quantum Computing.	
02	CRYSTALLOGRAPHY	03

	<p>(Prerequisites : Crystal Physics (Unit cell, Space lattice, Crystal structure, Simple Cubic, Body Centered Cubic, Face Centered Cubic, Diamond Structure, Production of X-rays)</p> <p>Miller indices; interplanar spacing; X-ray diffraction and Bragg's law; Determination of Crystal structure using Bragg's diffractometer;</p>	
03	<p>SEMICONDUCTOR PHYSICS</p> <p>(Prerequisites: Intrinsic and extrinsic semiconductors, Energy bands in conductors, semiconductors and insulators, Semiconductor diode, I-V characteristics in forward and reverse bias)</p> <p>Direct & indirect band gap semiconductor; Fermi level; Fermi dirac distribution; Fermi energy level in intrinsic & extrinsic semiconductors; effect of impurity concentration and temperature on fermi level; mobility, current density; Hall Effect; Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias);</p> <p>Applications of semiconductors: LED, Zener diode, Photovoltaic cell.</p>	06
04	<p>INTERFERENCE IN THIN FILM</p> <p>(Prerequisites : Wave front and Huygen's principle, reflection and refraction, Interference by division of wave front, Youngs double slit experiment)</p> <p>Interference by division of amplitude, Interference in thin film of constant thickness due to reflected and transmitted light; origin of colours in thin film; Wedge shaped film; Newton's rings.</p> <p>Applications of interference - Determination of thickness of very thin wire or foil; determination of refractive index of liquid; wavelength of incident light; radius of curvature of lens; testing of surface flatness; Anti-reflecting films and Highly reflecting film.</p>	06
05	<p>SUPERCONDUCTORS AND SUPERCAPACITORS</p> <p>(Prerequisites : Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current, Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical resistivity and conductivity temperature dependence of resistance)</p> <p>Superconductors: Critical temperature, critical magnetic field, Meissner's effect, Type I and Type II and high T_c superconductors;</p> <p>Supercapacitors: Principle, construction, materials and applications, comparison with capacitor and batteries : Energy density, Power density,</p>	02
06	<p>ENGINEERING MATERIALS AND APPLICATIONS</p> <p>(Prerequisites: Paramagnetic materials, diamagnetic materials, ferromagnetic materials, crystal physics, Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance)</p> <p>Liquid crystals: Nematic, Smectic and cholesteric phases, Liquid crystal display. Multiferroics : Type I & Type II multiferroics and applications,</p>	02
	<p>Magnetoresistive Oxides: Magnetoresistance, GMR and CMR materials, introduction to spintronics.</p>	

Assessment

Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

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

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL101	Engineering Physics-I	-	01	-	-	-	0.5	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Practical/oral	
		Internal Assessment			End Sem. Exam.			Exam. Duration (in Hrs)
		Test1	Test 2	Avg.				
FEL101	Engineering Physics-I	--	--	--	--	--	25	--

Suggested Experiments: (Any five)

1. Determination of radius of curvature of a lens using Newton's ring set up
2. Determination of diameter of wire/hair or thickness of paper using Wedge shape film method.
3. Study of Miller Indices.
4. Study of Hall Effect.
5. Determination of energy band gap of semiconductor.
6. Study of Zener diode as voltage regulator.
7. Study of I/V characteristics of LED
8. Determination of 'h' using Photo cell.
9. Study of I / V characteristics of semiconductor diode
10. Charging and discharging characteristics of supercapacitor.
11. Simulation study of orientational ordering in Nematic like 2D liquid crystal.
12. Simulation experiments based on engineering materials using open source simulation softwares like Avogadro, Chimera, JMOL etc.

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

- Laboratory work (Experiments and Journal) : **10 marks**

· Project Groupwise (Topic Presentation) : **10 marks**

· Attendance (Theory and Tutorial) : **05 marks**

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

Course Code	Course Name	Teaching Scheme (Contact Hours)	Credits Assigned
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EC1

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned		
		Theory	Pract.	Tut.	Theory	Tut.	
FEC103	Engineering Chemistry-I	02	-	-	02	-	

Course Code	Course Name	Examination Scheme					
		Theory					Term Work
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)	
		Test1	Test 2	Avg.			
FEC103	Engineering Chemistry-I	15	15	15	60	2	--

Module	Detailed Contents	Hrs.
01	Atomic and Molecular Structure Atomic orbitals (s,p,d,f) orbital shapes, Electronic Configuration, Molecular orbital theory (MOT), bonding and anti-bonding orbitals, Molecular orbital diagrams of Homonuclear and Heteronuclear diatomic molecules-Be ₂ , O ₂ , CO, NO their bond order and magnetic properties,	04
02	Aromatic systems & their molecular structure Define Aromaticity, Huckel's rule, Structure and bonding of benzene and pyrrole.	02
03	Intermolecular Forces & Critical Phenomena Ionic, dipolar and Vander Waal's interactions, Equations of state of real gases and critical phenomena	03
04	Phase Rule-Gibb's Phase Rule Statement of Gibbs' Phase Rule, Terms involved with examples, One Component System (Water), Reduced Phase Rule, Two Component System (Pb-Ag), Advantages and Limitations of Phase Rule. Numerical problems on Phase Rule.	05
05	Polymers Introduction: Definition- Polymer, polymerization, Properties of Polymers Molecular weight (Number average and Weight average), Numerical problems on molecular weight, effect of heat on polymers (glass transition temperature), Viscoelasticity, Conducting Polymers, Classification-Thermoplastic and Thermosetting polymers; Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding, Preparation, properties	05

	and uses of PMMA and Kevlar.	
06	Water Introduction - Impurities in water, hardness of water- units (no conversions), types and numerical problems, determination of hardness of water by EDTA method and numerical problems. Softening of water by Ion Exchange process and numerical problems, BOD, COD- definition, significance and Numerical problems. Water purification-membrane technology- Electrodialysis, Reverse osmosis, and Ultra filtration.	05

Assessment

Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

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

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL102	Engineering Chemistry-I	-	01	-	-	-	0.5	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Pract./oral	
		Internal Assessment			End Sem. Exam.			Exam. Duration (in Hrs)
		Test1	Test 2	Avg.				
FEL102	Engineering Chemistry-I	--	--	--	--	--	25	--

Suggested Experiments:

1. To determine Chloride content of water by Mohr's Method.
2. To determine total, temporary and permanent hardness of water sample by EDTA method.
3. To determine free acid pH of different solutions using pH meter
4. To determine metal ion concentration using colorimeter.
5. Removal of hardness using ion exchange column.
6. Molecular weight determination of polymers by Oswald Viscometer.
7. Synthesis of UF, PF, Nylon 66.

8. Determination of COD
9. Synthesis of biodegradable polymer using corn starch or potato starch
10. Determination of Viscosity of oil by Redwood Viscometer

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**
- Assignments and Viva on practicals : **10 marks**
- Attendance (Theory and Tutorial) : **05 marks**

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

Course Code	Course Name	Teaching Scheme (Contact Hours)	Credits Assigned
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EM

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC104	Engineering Mechanics	3	--	--	3	--	--	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work		Pract./oral
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
FEC104	Engineering Mechanics	20	20	20	80	3	--	--

Self-Study/pre-requisites Topics:

Resolution of a forces. Use of trigonometry functions. Parallelogram law of forces. Law of triangle. Polygon law of forces, Lami's theorem. Concepts of Vector Algebra.

Uniformly accelerated motion along straight line, motion under gravity, projectile motion, Time of flight, Horizontal range, Maximum height of a projectile.

Law of conservation of Energy, Law of conservation of Momentum, Collision of Elastic Bodies.

Module	Detailed Contents	Hrs.
01	1.1 System of Coplanar Forces:	06

	<p>Classification of force systems, Principle of transmissibility, composition and resolution of forces.</p> <p>1.2 Resultant:</p> <p>Resultant of coplanar and Non Coplanar (Space Force) force system (Concurrent forces, parallel forces and non-concurrent Non-parallel system of forces). Moment of force about a point, Couples, Varignon's Theorem. Force couple system. Distributed Forces in plane.</p>	
	Centroid: First moment of Area, Centroid of composite plane Laminas	03
02	<p>2.1 Equilibrium of System of Coplanar Forces:</p> <p>Conditions of equilibrium for concurrent forces, parallel forces and non concurrent non- parallel general forces and Couples. Equilibrium of rigid bodies free body diagrams.</p> <p>2.2 Equilibrium of Beams:</p> <p>Types of beams, simple and compound beams, type of supports and reaction: Determination of reactions at supports for various types of loads on beams. (Excluding problems on internal hinges)</p>	<p>04</p> <p>03</p>
03	<p>Friction:</p> <p>Revision of Static Friction, Dynamic/ Kinetic Friction, Coefficient of Friction, Angle of Friction, Laws of friction. Concept of Cone of friction. Equilibrium of bodies on inclined plane. Application to problems involving wedges and ladders.</p>	04
04	<p>Kinematics of Particle:</p> <p>Motion of particle with variable acceleration. General curvilinear motion. Tangential&Normal component of acceleration, Motion curves (a-t, v-t, s-t curves). Application of concepts of projectile motion and related numerical.</p>	04
05	<p>Kinematics of Rigid Body:</p> <p>Translation, Rotation and General Plane motion of Rigid body. The concept of Instantaneous center of rotation (ICR) for the velocity. Location of ICR for 2 link mechanism. Velocity analysis of rigid body using ICR.</p>	03
06	<p>6.1 Kinetics of a Particle:</p> <p>Force and Acceleration: -Introduction to basic concepts, D'Alemberts Principle, concept of Inertia force, Equations of dynamic equilibrium, Newton's second law of motion. (Analysis limited to simple systems only.)</p>	04
	<p>6.2 Kinetics of a Particle: Work and Energy:</p> <p>Work Energy principle for a particle in motion. Application of Work – Energy principle to a system consists of connected masses and Springs.</p>	04
	<p>6.3 Kinetics of a Particle: Impulse and Momentum:</p> <p>Principle of linear impulse and momentum.</p> <p>Impact and collision: Law of conservation of momentum, Coefficient of Restitution. Direct Central Impact and Oblique Central Impact. Loss of Kinetic Energy in collision of inelastic bodies.</p>	03

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 20 marks. 2. 10 percentage of marks will be asked from the self-study topics.
3. Total 04 questions need to be solved.
4. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
5. 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)
6. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL103	Engineering Mechanics	--	2	--	--	--	1	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Pract /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEL103	Engineering Mechanics	--	--	--	--	--	25	25

List of Experiments:

Minimum six experiments from the following list of which minimum one should from dynamics.

1. Verification of Polygon law of coplanar forces
2. Verification of Principle of Moments (Bell crank lever.)
3. Determination of support reactions of a Simply Supported Beam.
4. Determination of coefficient of friction) using inclined plane
5. Verification of the equations of equilibrium for Non-concurrent non-parallel (General) force system.
6. Collision of elastic bodies (Law of conservation of momentum).
7. Kinematics of particles. (Uniform motion of a particle, Projectile motion, motion under gravity)
8. Kinetics of particles. (collision of bodies)

Sr No.	Assignments to be completed during Practical Session.	Minimum Number of Numerical
1	Resultant of Coplanar force system	4

2	Resultant of Non-Coplanar force system	3
3	Centroid of Composite plane Laminas	4
4	Equilibrium of System of Coplanar Forces	4
5	Beam Reaction	4
6	Equilibrium of bodies on inclined plane and problems involving wedges and ladders.	4
7	Kinematics of particles (Variable acceleration + Motion Curves +Projectile motion)	4
8	Kinetics of particles (D'Alemberts Principle, Work Energy Principle, Impulse momentum Principle, Impact and Collisions.)	5

Assessment:

Term Work: It comprises Laboratory Experiments and Assignments.

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

- Practical Work and Journal : 10 marks.
- Assignments : 10 marks.
- Attendance : 05 Marks

End Semester Examination:

Pair of Internal and External Examiner should conduct Oral examination based on entire syllabus.

Course Code	Course Name	Teaching Scheme (Contact Hours)	Credits Assigned
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BEE

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC105	Basic Electrical Engineering	3	--	--	3	--	--	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Pract /oral	
		Internal Assessment			End Sem. Exam.			Exam. Duration (in Hrs)
		Test1	Test 2	Avg.				
FEC105	Basic	20	20	20	80	3	--	--

	Electrical Engineering							
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Module	Detailed Contents	Hrs.
Prerequisite	Resistance, inductance, capacitance, series and parallel connections of resistance, concepts of voltage, current, power and energy and its units. Working of wattmeter, Magnetic circuits, MMF, Magnetic field strength, reluctance, series and parallel magnetic circuits, BH Curve, Time domain analysis of first order RL and RC circuits	--
01	DC Circuits: (Only independent source) Kirchhoff's Laws, Ideal and practical Voltage and current Sources, Source Transformation, Mesh and Nodal Analysis, Star-Delta / Delta-Star Transformations, Superposition, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem.	12
02	AC Circuits :Generation of alternating voltage, basic definitions, average and r.m.s values, phasor and phase difference, sums on phasors, Single-phase ac series and parallel circuits consisting of R, L, C, RL, RC, RLC combinations, definitions - real, reactive and apparent power, admittance (Y), Series and parallel resonance, Q factor	10
03	Generation of Three-Phase Voltages, voltage & current relationships in Star and Delta Connections, power measurement in three phase balanced circuit(Only two wattmeter method).	04
04	Transformers: Working principle of single-phase transformer, EMF equation of a transformer, Transformer losses, Actual (practical) and ideal transformer, Phasor diagram (considering winding resistance and magnetic leakage), Equivalent circuit, Open-circuit test (no-load test), short circuit (SC) test, efficiency.	06
05	Electrical Machines (Numerical not expected): Rotating magnetic field produced by three phase ac, principle of operation of Three-phase induction motor, constructional details and classification of Induction machines.	02
06	Principle of operation of Single-Phase induction motors, stepper motor (Single stack variable reluctance and permanent magnet) (Numerical not expected)	02
Self study Topic	Principle of operation of DC generators and DC motors, constructional details and classification of DC machines, e.m.f equation of generator/motor, applications. (Theory question can be asked in University exam, no numericals. The percentage of marks allotted should be maximum of 10% (max. 08marks))	--

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 20marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire

- syllabus wherein sub questions of 2 to 5 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)
 5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL104	Basic Electrical Engineering	--	2	--	--	--	1	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Practical /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEL104	Basic Electrical Engineering	--	--	--	--	--	25	25

Suggested List of laboratory experiments (Minimum Eight):

Also minimum two experiments from each course outcome shall be covered

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. To measure output voltage across load resistor/current through load resistor and verify the result using Mesh and Nodal analysis.
3. Verification of Superposition Theorem.
4. Verification Thevenin's Theorem.
5. Verification Norton's Theorem.
6. Verification Maximum Power Transfer Theorem.
7. To find the resistance and inductance of a coil connected in series with a pure resistance using three voltmeter method.
8. To find the resistance and inductance of a coil connected in parallel with a pure resistance using three ammeter method.
9. To find resonance conditions in a R-L-C series resonance circuit
10. To find resonance conditions in a R-L-C parallel resonance circuit.
11. To measure relationship between phase and line, currents and voltages in three phase system (star & delta)
12. To measure Power and phase in three phase system by two wattmeter method.
13. To find the equivalent circuit parameters by conducting OC and SC test on single phase transformer
14. To demonstrate cut-out sections of DC machine.
15. To demonstrate cut-out sections of single phase transformer.

Term Work: It comprises both part a and b

Term work consists of performing minimum 06 practical mentioned as below. Final certification and acceptance of the term work ensures satisfactory performance of laboratory work. The distribution of marks for term work shall be as follows:

- Laboratory work (Experiment/journal) : 10 marks.
- Assignments : 10marks.
- Attendance (Theory and Practical) : 05Marks

End Semester Examination:

Pair of Internal and External Examiner should conduct Oral examination based on entire syllabus.

BWP

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assi		
		Theory	Pract.	Tut.	Theory	Tut.	
FEL105	Basic Workshop Practice-I	--	2	--	--	--	
Course Code	Course Name	Examination Scheme					
		Theory					Term Work
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)	
		Test1	Test 2	Avg.			
FEL105	Basic Workshop Practice-I	--	--	--	--	--	50
		Detailed Content					Hrs.
<p>Note: Trade 1 and 2 are compulsory. Select any ONE trade topics out of the topic at trade 3 to 5. 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 CO-1 is related to Trade-1 CO-2 to CO-4 is related to Trade-2 CO-5 is related to Trade-3 CO-6 is related to Trade-4 CO-7 is related to Trade-5 CO evaluation is to be done according to the opted Trades in addition to Compulsory Trades.</p>							
Trade-1		<p>Fitting (Compulsory): · 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</p>					10
Trade-2		Hardware and Networking: (Compulsory)					08

	<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. NOTE: Hands on experience to be given in a group of not more than four students 	
Trade-3	Welding: <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. 	06
Trade 4	Plumbing: <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. 	06
Trade-5	Machine Shop: <ul style="list-style-type: none"> · At least one turning job is to be demonstrated and simple job to be made for Term Work in a group of 4 students. 	06

SEMESTER 2

Semester II

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	T
FEC201	Engineering Mathematics-II	3	--	1*	3	--	1	
FEC202	Engineering Physics-II	2	--	--	2	--	--	
FEC203	Engineering Chemistry-II	2	--	--	2	--	--	
FEC204	Engineering Graphics	2	--	--	2	--	--	
FEC205	C programming	2	--	--	2	--	--	
FEC206	Professional Communication and Ethics- I	2	--	--	2	--	--	
FEL201	Engineering Physics-II	--	1	--	--	0.5	--	

FEL202	Engineering Chemistry-II	--	1	--	--	0.5	--	
FEL203	Engineering Graphics	--	4	--	--	2	--	
FEL204	C programming	--	2	--	--	1	--	
FEL205	Professional Communication and Ethics- I	--	2	--	--	1	--	
FEL206	Basic Workshop practice-II	--	2	--	--	1	--	
Total		13	12	01	13	06	01	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Pract. /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEC201	Engineering Mathematics-II	20	20	20	80	3	25	--
FEC202	Engineering Physics-II	15	15	15	60	2	--	--
FEC203	Engineering Chemistry-II	15	15	15	60	2	--	--
FEC204	Engineering Graphics	15	15	15	60	3	--	--
FEC205	C programming	15	15	15	60	2	--	--
FEC206	Professional Communication and Ethics- I	10	10	10	40	2	--	--
FEL201	Engineering Physics-II	--	--	--	--	--	25	--
FEL202	Engineering Chemistry-II	--	--	--	--	--	25	--
FEL203	Engineering Graphics	--	--	--	--	--	25	50
FEL204	C programming	--	--	--	--	--	25	25
FEL205	Professional Communication and Ethics- I	--	--	--	--	--	25	--
FEL206	Basic Workshop practice-II	--	--	--	--	--	50	--
Total		--	--	90	360	--	200	75

EM2

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits As		
		Theory	Pract.	Tut.	Theory	Tut.	
FEC201	Engineering Mathematics-II	3	--	1*	3	1	
Course Code	Course Name	Examination Scheme					
		Theory				Term	

		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)	Work
		Test1	Test 2	Avg.			
FEC201	Engineering Mathematics-II	20	20	20	80	3	25
Module	Detailed Contents						
01	Differential Equations of First Order and First Degree 2.1 Exact differential Equations, Equations reducible to exact form by using integrating factors. 1.2 Linear differential equations (Review), equation reducible to linear form, Bernoulli's equation. # Self learning topics: Simple application of differential equation of first order and first degree to electrical and Mechanical Engineering problem						
02	Linear Differential Equations With Constant Coefficients and Variable Coefficients Of Higher Order 2.1. Linear Differential Equation with constant coefficient- complementary function, particular integrals of differential equation of the type $f(D)y = X$ where X is e^{ax} , $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax} \sin(ax + b)$, $e^{ax} \cos(ax + b)$. 2.2. Method of variation of parameters. # Self learning topics: Cauchy's homogeneous linear differential equation and Legendre's differential equation, Applications of Higher order differential equation.						
03	Beta and Gamma Function, Differentiation under Integral sign and Rectification Pre-requisite: Tracing of curves 3.1 Beta and Gamma functions and its properties. 3.2 Differentiation under integral sign with constant limits of integration. 3.3 Rectification of plane curves. (Cartesian and polar) # Self learning topics: Rectification of curve in parametric co-ordinates.						
04	Multiple Integration-1 4.1. Double integration-definition, Evaluation of Double Integrals. (Cartesian & Polar) 4.2. Evaluation of double integrals by changing the order of integration. 4.3. Evaluation of integrals over the given region. (Cartesian & Polar) # Self learning topics: Application of double integrals to compute Area, Mass.						
05	Multiple Integration-2 5.1. Evaluation of double integrals by changing to polar coordinates. 5.2. Application of double integrals to compute Area 5.3. Triple integration definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). # Self learning topics: Application of triple integral to compute volume.						
06	Numerical solution of ordinary differential equations of first order and first degree, and , Numerical Integration 6.1. Numerical solution of ordinary differential equation using (a) Euler's method (b) Modified Euler method, (c) Runge-Kutta fourth order method 6.2. Numerical integration- by (a) Trapezoidal (b) Simpson's 1/3rd (c) Simpson's 3/8th rule (all with proof). # Self learning topics: Numerical solution of ordinary differential equation using Taylor series method.						

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 (i) Euler Method, (ii) Modified Euler Method, (iii) Runge-Kutta Method of fourth order, (iv) Trapezoidal Rule, (v) Simpson's $1/3^{\text{rd}}$ Rule (vi) Simpson's $3/8^{\text{th}}$ rule

The distribution of Term Work marks will be as follows –

1	Attendance (Theory and Tutorial)	: 05 marks
2	Class Tutorials on entire syllabus	: 10 marks
3	SCILAB Tutorials	: 10 marks

Assessment:**Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 20 marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein 4 sub questions of 5 marks each will be asked.
4. Remaining questions will be randomly selected from all the modules.
5. Weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

EP2

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits As		
		Theory	Pract.	Tut.	Theory	Tut.	
FEC202	Engineering	2	--	--	2	--	

	Physics-II						
Course Code	Course Name	Examination Scheme					
		Theory					Term Work
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)	
		Test1	Test 2	Avg.			
FEC202	Engineering Physics-II	15	15	15	60	2	--
Module	Detailed Contents						Hrs.
01	DIFFRACTION (Prerequisites : Wave front and Huygen's principle, reflection and refraction, diffraction, Fresnel diffraction and Fraunhofer diffraction)						04
	Diffraction: Fraunhofer diffraction at single slit, Diffraction Grating, Resolving power of a grating; Applications of diffraction grating; Determination of wavelength of light using plane transmission grating						
02	LASER AND FIBRE OPTICS (Prerequisites: Absorption, recombination, energy bands of p-n junction, refractive index of a material, Snell’s law) Laser: spontaneous emission and stimulated emission; metastable state, population inversion, types of pumping, resonant cavity, Einsteins’s equations; Helium Neon laser; Nd:YAG laser; Semiconductor laser, Applications of laser- Holography Fibre optics: Numerical Aperture for step index fibre; critical angle; angle of acceptance; V number; number of modes of propagation; types of optical fibres; Fibre optic communication system;						06
03	ELECTRODYNAMICS (Prerequisites : Electric Charges, Coulomb's law-force between two point charges, Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, Gauss's law, Faraday’s law) Scalar and Vector field, Physical significance of gradient, curl and divergence in Cartesian co-ordinate system, Gauss’s law for electrostatics, Gauss’s law for magnetostatics, Faraday’s Law and Ampere’s circuital law; Maxwell’s equations (Free space and time varying fields).						05
04	RELATIVITY (Prerequisites: Cartesian co-ordinate system) Special theory of Relativity: Inertial and Non-inertial Frames of reference, Galilean transformations, Lorentz transformations (space – time coordinates), Time Dilation, Length Contraction and Mass-Energy relation.						02
05	NANOTECHNOLOGY (Prerequisites : Scattering of electrons, Tunneling effect, Electrostatic focusing, magneto static focusing) Nanomaterials : Properties (Optical, electrical, magnetic, structural, mechanical) and applications, Surface to volume ratio; Two main approaches in nanotechnology - Bottom up technique and Top down technique; Tools for characterization of Nanoparticles: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM). Methods to synthesize Nanomaterials: Ball milling, Sputtering, Vapour deposition,						04

	Solgel	
06	PHYSICS OF SENSORS (Prerequisites : Transducer concept, meaning of calibration, piezoelectric effect) Resistive sensors: a) Temperature measurement: PT100 construction, calibration, b) Humidity measurement using resistive sensors, Pressure sensor: Concept of pressure sensing by capacitive, flex and inductive method, Analog pressure sensor: construction working and calibration and applications. Piezoelectric transducers: Concept of piezoelectricity, use of piezoelectric transducer as ultrasonic generator and application of ultrasonic transducer for distance measurement, liquid and air velocity measurement. Optical sensor: Photodiode, construction and use of photodiode as ambient light measurement and flux measurement. Pyroelectric sensors: Construction and working principle, application of pyroelectric sensor as bolometer.	05

Assessment

Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

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

1. Question paper will comprise of 6 questions, each carrying 15 marks. 2.
- Question number 1 will be compulsory and based on maximum contents of the syllabus 3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL201	Engineering Physics-II	-	01	-	-	-	0.5	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Pract/oral	
		Internal Assessment			End Sem. Exam.			Exam. Duration (in Hrs)
		Test1	Test 2	Avg.				
FEL201	Engineering	--	--	--	--	--	25	--

	Physics-II							
--	------------	--	--	--	--	--	--	--

Suggested Experiments:(Any five)

1. Determination of wavelength using Diffraction grating. (Hg/Na source)
2. Determination of number of lines on the grating surface using LASER Source.
3. Determination of Numerical Aperture of an optical fibre.
4. Determination of wavelength using Diffraction grating.(Laser source)
5. Study of divergence of laser beam
6. Determination of width of a slit using single slit diffraction experiment(laser source)
7. Study of I-V characteristics of Photo diode.
8. Study of ultrasonic distance meter/ interferometer.
9. Study of PT100 calibration and use and thermometer
10. Study of J /K type thermocouple, calibration and use and thermometer
11. Simulation experiments based on nanotechnology using open source simulation softwares like Avogadro, Chimera, JMOL etc.

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**
- Project Groupwise (Execution & Submission) : **10 marks**
- Attendance (Theory and Tutorial) : **05 marks**

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

EC2

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC203	Engineering Chemistry-II	2	-	-	2	-	-	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work		Pract./oral
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
FEC203	Engineering Chemistry-II	15	15	15	60	2	--	--

Module	Detailed Contents	Hrs.
01	Principles of Spectroscopy: Introduction: Principle of spectroscopy, Definition, Origin of spectrum,	02

	Classification of spectroscopy – atomic and molecular, selection rules. Table of relation between electromagnetic spectrum, types of spectroscopy and energy changes.	
02	Applications of Spectroscopy Emission spectroscopy- Principle, Instrumentation and applications (Flame Photometry) Introduction to florescence and phosphorescence, Jablonski diagram, application of fluorescence in medicine only.	04
03	Concept of Electrochemistry Introduction, concept of electrode potential, Nernst equation, types of electrochemical cells, concept of standard electrode with examples, electrochemical series, simple numericals.	02
04	Corrosion: Definition, Mechanism of Corrosion- (I) Dry or Chemical Corrosion-i) Due to oxygen ii) Due to other gases. (II) Wet or Electrochemical corrosion- Mechanism i) Evolution of hydrogen type ii) Absorption of oxygen. Types of Corrosion- Galvanic cell corrosion, Concentration cell corrosion (differential aeration principle), Pitting corrosion, Intergranular corrosion, Stress corrosion. Factors affecting the rate of corrosion- (i) Nature of metal, (ii) Nature of corroding environment. Methods of corrosion control- (I) Material selection and proper designing, (II) Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method, (III) Metallic coatings- only Cathodic coating (tinning) and anodic coatings (Galvanising)	06
05	Green Chemistry and Synthesis of drugs Introduction – Definition, significance Twelve Principles of Green chemistry, numerical on atom economy, Conventional and green synthesis of Adipic acid, Indigo, Carbaryl, Ibuprofen, Benzimidazole, Benzyl alcohol, % atom economy and their numericals. Green fuel- Biodiesel.	04
06	Fuels and Combustion Definition, classification, characteristics of a good fuel, units of heat (no conversions). Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, Dulong's formula & numerical for calculations of Gross and Net calorific values. Solid fuels- Analysis of coal- Proximate and Ultimate Analysis- numerical problems and significance. Liquid fuels- Petrol- Knocking, Octane number, Cetane number, Antiknocking agents, unleaded petrol, oxygenates (MTBE), catalytic converter. Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.	06

Assessment

Internal Assessment Test

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Examination

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

1. Question paper will comprise of 6 questions, each carrying 15 marks.
2. Question number 1 will be compulsory and based on maximum contents of the syllabus
3. Remaining questions will be mixed in nature (for example, if Q.2 has part (a) from module 3 then part (b) will be from other than module 3)
4. Total four questions need to be solved.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL202	Engineering Chemistry-II	-	01	-	-	-	0.5	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Pract /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEL202	Engineering Chemistry-II	--	--	--	--	--	25	--

Outcomes: Learner will be able to...

1. Determine moisture and ash content of coal
2. Analyze flue gas
3. Determine saponification and acid value of oil
4. Determine flash point of a lubricating oil
5. Synthesize a drug and a biofuel.
6. Determine na/k and emf of cu-zn system

Suggested Experiments

1. Determination of Moisture content of coal.
2. Determination of Ash content of coal.
3. Flue gas analysis using Orsat's apparatus.
4. Saponification value of oil
5. Acid value of oil
6. Determination of Na/K by Flame photometry.
7. Preparation of Biodiesel from edible oil.

8. To estimate the emf of Cu-Zn system by Potentiometry.
9. Synthesis of Aspirin.
10. Determination of Flash point of a lubricant using Abel's apparatus

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**
- Assignments and Viva on practicals : **10 marks**
- Attendance (Theory and Practical) : **05 marks**

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

EG

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC204	Engineering Graphics	2	--	--	2	--	--	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Practical/oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEC204	Engineering Graphics	15	15	15	60	3	--	--

Module	Detailed Contents	Hrs.
01	Introduction to Engineering Graphics Principles of Engineering Graphics and their significance, usage of Drawing instruments, Types of Lines, Dimensioning Systems as per IS conventions. Introduction to plain and diagonal scales. Engineering Curves Basic construction of Cycloid, Involute and Helix (of cylinder) only.	2
02	Projection of Points and Lines Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines. @ Projection of Planes Triangular, Square, Rectangular, Pentagonal, Hexagonal andCircular planes inclined to either HP or VP only. (Exclude composite planes).	5
03	Projection of Solids (Prism, Pyramid, Cylinder, Cone only) Solid projection with the axis inclined	5

Code		Theory					Term Work	Practical/oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEL203	Engineering Graphics	--	--	--	--	--	25	50

Component-1 (Use half Imperial Drawing Sheet)

	Activities to be completed in the Drawing Laboratory.	Hrs
•	One Practice sheet on projection of solids(minimum 2 problems)	4
	# Term Sheet 1: Projection of Solids (3 Problems).	4
•	One Practice sheet on Section of Solids. (minimum 2 problems) # Term Sheet 2: Section of solids. (3 problems).	6
•	One practice sheet on Orthographic projection. (minimum 1 problem) # Term Sheet 3: Orthographic Projection (With section 1 problem, without section 1 problem).	6
•	One practice sheet on Isometric drawing. (minimum 2 problems) # Term Sheet 4: Isometric Projection. (3 problems).	4
# Term sheets to be done in laboratory only and to be submitted as part of term work . Note: Practice sheets to be done before starting the Term Sheets.		

Component-2

Self-study problems/ Assignment: (In A3 size Sketch book, to be submitted as part of Term Work)

1. Engineering Curves. (2 problems)
2. Projection of Lines (2 problems)
3. Projection of planes (2 problems)
4. Projection of solids. (2 problems)
5. Section of solids (2 problems)
6. Orthographic Projection. (With section 1 problem, without section 1 problem).
7. Missing views. (1 problem)
8. Isometric Drawing. (2 problems)

Computer Graphics: Engineering Graphics Software - Orthographic Projections, Isometric Projections, Co-ordinate Systems, Multi-view Projection.		
Part-A	To be Taught in laboratory.	Hrs
	Overview of Computer Graphics Covering:	3

	Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.	
	Customization & CAD Drawing: Consisting of set up of the drawing page and the printer including scale settings, Setting up of units and drawing limits, ISO and ANSI standards for coordinate dimensioning.	3
	Annotations, layering & other Functions Covering: Applying dimensions to objects, applying annotations to drawings, Setting up and use of layers, layers to create drawings, Create, edit and use customized layers, Changing line lengths through modifying existing lines (extend/lengthen), Printing documents to paper using the print command, orthographic projection techniques, Drawing sectional views of objects (simple machine parts).	4
Part-B	* Activities to be completed in the CAD Laboratory. (All printouts to be the part of Term Work. Preferably, Use A3 size sheets for print out.) Component-3	
	1. Orthographic Projections (without section)- 1 problem	4
	2. Orthographic Projection (with section)- 1 problem	4
	3. Orthographic Reading – 1 problem	2
	4. Isometric Drawing – 3 problem.	4

Note: * Give practice sheet problems before going for Term Sheet problems. Students are supposed to bring complete solution of problems before coming to CAD practical.

Term Work:

Component-1 : 7Marks

Component-2 : 6 Marks

Component-3 : 7 Marks

Attendance : 5 Marks

Total Marks : 25 Marks

Note: Satisfactory submission of all 3 components is mandatory to full fill the Term.

Topic for the End Semester Practical Examination (Auto CAD) (2

hours/ 50 Marks.) 1. Isometric drawing. (1 problem) (20 Marks)

2. Orthographic Projection (With Section) (1 problem). (30 Marks)

Note:

1. Printout of the answers have to be taken preferably in A3 size sheets and should be Assessed by External Examiner only.

2. Knowledge of Auto CAD software, concepts of Engineering Graphics

related to specified problem and accuracy of drawing should be considered during evaluation.

CP

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC205	C Programming	2	--	--	2	--	--	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Practical /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEC205	C Programming	15	15	15	60	2	--	--
Module	Detailed Contents							Hrs.
1	Introduction							5
	<ul style="list-style-type: none"> ● Introduction to components of a Computer System ● Introduction to Algorithm and Flowchart 							
	Fundamentals of C Programming							
	<ul style="list-style-type: none"> ● Keywords, Identifiers, Constants and Variables ● Data types in C ● Operators in C ● Basic Input and Output Operations ● Expressions and Precedence of Operators ● In-built Functions 							
2	Control Structures							7
	<ul style="list-style-type: none"> ● Introduction to Control Structures 							
	Branching and looping structures							
	<ul style="list-style-type: none"> ● If statement, If-else statement, Nested if-else, else-if Ladder ● Switch statement ● For loop, While loop, Do while loop ● break and continue 							
3	Functions							4
	<ul style="list-style-type: none"> ● Introduction to functions ● Function prototype, Function definition, Accessing a function and parameter passing. ● Recursion. 							
4	Arrays and Strings							4
	<ul style="list-style-type: none"> ● Introduction to Arrays 							

	<ul style="list-style-type: none"> ● Declaration and initialization of one dimensional and two-dimensional arrays. ● Definition and initialization of String ● String functions 	
5	Structure and Union <ul style="list-style-type: none"> ● Concept of Structure and Union ● Declaration and Initialization of structure and union ● Nested structures ● Array of Structures ● Passing structure to functions 	4
6	Pointers <ul style="list-style-type: none"> ● Fundamentals of pointers ● Declaration, initialization and dereferencing of pointers ● Operations on Pointers ● Concept of dynamic memory allocation 	4

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 15 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 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)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL204	C programming	--	2	--	--	--	1	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work		
		Internal Assessment			End Sem. Exam.			Exam. Duration (in Hrs)
		Test1	Test 2	Avg				

FEL204	C programming	--	--	--	--	--	25	
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Lab Description:

Weekly 2 hours of laboratory Programming Assignments on the following topics:

1. Basic data types and I/O operations
2. Branching Statements
3. Loop Statements
4. Arrays
5. Strings
6. Functions
7. Recursion
8. Structure and Union
9. Pointers

Term Work:

Experiments (20 Programs) and Assignments (2 Assignments) should be completed by students on the given time duration

Experiments: 15 Marks

Assignment: 05 Marks

Attendance: 05 Marks

Total: 25 Marks

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

Practical and Oral :

Practical and oral Exam should be conducted for the Lab, on Computer Programming in C subject for given list of experiments.

Implementation: 15 Marks

Oral: 10 Marks

Total: 25 Marks

PCE

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEC206	Professional Communication and Ethics- I	2	--	--	2	--	--	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Practical/oral	
		Internal Assessment			End Sem. Exa			Exam. Duration
		Test1	Test 2	Avg.				

					m.	(in Hrs)		
FEC206	Professional Communication and Ethics- I	10	10	10	40	2	--	--
1	FUNDAMENTALS OF COMMUNICATION 1.1. Introduction to Theory of Communication <ul style="list-style-type: none"> ● Definition ● Objectives ● Postulates/Hallmarks ● The Process of Communication ● Organizational Communication <ul style="list-style-type: none"> ○ Formal (Upward, Downward and Horizontal) ○ Informal (Grapevine) 1.2. Methods of Communication <ul style="list-style-type: none"> ● Verbal (Written & Spoken) ● Non-verbal <ul style="list-style-type: none"> ○ Non-verbal cues perceived through the five senses: (Visual, Auditory, Tactile, Olfactory and Gustatory cues) ○ Non-verbal cues transmitted through the use of: (The Body, Voice, Space, Time and Silence) 1.3. Barriers to Communication <ul style="list-style-type: none"> ● Mechanical/External 						12	
	<ul style="list-style-type: none"> ● Physical/Internal ● Semantic & Linguistic ● Psychological ● Socio-Cultural 1.4. Communication at the Workplace <ul style="list-style-type: none"> ● Corporate Communication - Case Studies ● Listening Tasks with Recordings and Activity Sheets ● Short Speeches as Monologues <ul style="list-style-type: none"> ○ Informative Speeches that Center on People, Events, Processes, Places, or Things ○ Persuasive Speeches to Persuade, Motivate or Take Action ○ Special Occasion Speeches for Ceremonial, Commemorative, or Epideictic purposes ● Pair-work Conversational Activities (Dialogues) ● Short Group Presentations on Business Plans 							
2	VERBAL APTITUDE FOR EMPLOYMENT 2.1. Vocabulary Building <ul style="list-style-type: none"> ● Root words (Etymology) ● Meaning of Words in Context ● Synonyms & Antonyms ● Collocations ● Word Form Charts ● Prefixes & Suffixes 						02	

	<ul style="list-style-type: none"> ● Standard Abbreviations 2.2. Grammar <ul style="list-style-type: none"> ● Identifying Common Errors <ul style="list-style-type: none"> ○ Subject - Verb Agreement ○ Misplaced Modifiers ○ Articles ○ Prepositions ● Tautologies ● Pleonasms (Redundancies) ● Idioms ● Cliches 		
3	DEVELOPING READING AND WRITING SKILLS	02	
	3.1. Reading Comprehension <ul style="list-style-type: none"> ● Long Passages ● Short Passages ● MCQs on Inferential Questions with 4 Options 3.2. Summarization of reading passages, reports, chapters, books <ul style="list-style-type: none"> ● Graphic Organizers for Summaries <ul style="list-style-type: none"> ○ Radial Diagrams like Mind Maps ○ Flow Charts ○ Tree Diagrams ○ Cyclic Diagrams ○ Linear Diagrams like Timelines ○ Pyramids ○ Venn Diagrams ● Point-form Summaries ● One-sentence Summaries of Central Idea 3.3. Paraphrasing <ul style="list-style-type: none"> ● Understanding Copyrights ● Running a Plagiarism Check on Paraphrased Passages ● Generating Plagiarism Reports 		

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	<ul style="list-style-type: none"> ● Basic APA and MLA Referencing Style and Format 		
4	BUSINESS CORRESPONDENCE	06	
	4.1. Seven Cs of Business Correspondence <ul style="list-style-type: none"> ● Completeness ● Conciseness ● Consideration ● Concreteness ● Clarity ● Courtesy ● Correctness 		

	<p>4.2. Parts of a Formal Letter and Formats</p> <ul style="list-style-type: none"> ● Parts/Elements of a Formal Letter <ul style="list-style-type: none"> ○ Letterheads and/or Sender's Address ○ Dateline ○ Inside Address ○ Reference Line (Optional) ○ Attention Line (Optional) ○ Salutation ○ Subject Line ○ Body ○ Complimentary Close ○ Signature Block ○ Enclosures/Attachments ● Complete/Full Block Format <p>4.3. Emails</p> <ul style="list-style-type: none"> ● Format of Emails ● Features of Effective Emails ● Language and style of Emails <p>4.4. Types of Letters in Both Formal Letter Format and Emails</p> <ul style="list-style-type: none"> ● Claim & Adjustment Letters ● Request/Permission Letters ● Sales Letters 	
5	<p>BASIC TECHNICAL WRITING</p> <p>5.1. Introduction</p> <ul style="list-style-type: none"> ● What is Technical Writing? ● Importance and Principles of Technical Writing ● Difference between Technical Writing & Literary Writing ● Framing Definitions ● Difference between Technical Description & Instructions <p>5.2. Description of a Technical Object</p> <ul style="list-style-type: none"> ● Definition ● Diagram ● Discussion of Parts/Characteristics <p>Working</p> <p>5.3. Writing User Instructions</p> <ul style="list-style-type: none"> ● User Instructions ● Special Notices (Note, Warning, Caution and Danger) ● Styles of Presentation <ul style="list-style-type: none"> ○ Impersonal ○ Indirect ○ Direct ● Imperative <p>5.4. Description of a Technical / Scientific Process</p>	02
	<ul style="list-style-type: none"> ● Definition ● Diagram ● Tools/ Apparatus/Software/ Hardware Used ● Working 	

	● Result	
6	PERSONALITY DEVELOPMENT AND SOCIAL ETIQUETTES 6.1. Personality Development ● Introducing Self and/or a Classmate ● Formal Dress Code 6.2. Social Etiquettes ● Formal Dining Etiquettes ● Cubicle Etiquettes ● Responsibility in Using Social Media ● Showing Empathy and Respect ● Learning Accountability and Accepting Criticism ● Demonstrating Flexibility and Cooperation ● Selecting Effective Communication Channels	02

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 10 marks each.

TEST I -Public speech on general topics (Maximum 5 mins. per student)

TEST II - Written test covering modules 1 - 6

The second test should be based on theory and application exercises as mentioned in the syllabus. (Note: Summarization should be a compulsory question in Test II and not in the End Semester Theory Examination.)

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.(e.g. Suppose Q.2 has part (a) from module3 then part (b) will be from 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
6. The first module (Fundamentals of Communication) will carry 40 % weightage.

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned		
		Theory	Pract.	Tut.	Theory	Tut.	Pract.
FEL205	Professional Communication and Ethics- I	--	2	--	--	--	1
Course Code	Course Name	Examination Scheme					
		Theory			Term		Pract

		Internal Assessment			End Sem. Exam.	Exam . Duration (in Hrs)	Work	/oral
		Test1	Test 2	Avg.				
FEL205	Professional Communication and Ethics- I	--	--	--	--	--	25	--

List of Assignments & Activities	Details of Assignments	Details of Activities	Hrs.
1.	Written record of listening activities	Listening practice tasks of 3 types (through audio recordings of (1) Monologues (2) Dialogues (3) Formal/Expert Talk or Lecture)	02
2.	Transcription of the public speech along with a plagiarism report	Practice public speech	02
3.	Transcription of the public speech along with a plagiarism report	Public speech (Internal Assessment - I)	02
4.	Written assignment on barriers and non-verbal communication	Role plays / case studies	02
5.	Summarization through graphic organisers (1. Text to graphic	NA	02
	organizer 2. Graphic organizer to text)		
6.	Written record of reading activities	Advanced level reading comprehension with MCQs (similar in level and format to CAT, GRE and GMAT verbal sections)	02
7.	Aptitude test on vocabulary and grammar	Aptitude test on vocabulary and grammar (similar in level and format to CAT, GRE and GMAT verbal sections)	02
8.	2 types of letters in complete block format	NA	02
9.	Written assignment on technical writing (Exercises based on framing Definitions, Describing Technical Objects, Framing User Instructions and Describing Technical Processes)	NA	02
10.	Documentation on case studies / role plays on Module 6	Case studies / role plays	02

Assessment:

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

- Assignments : **20 marks**
- Attendance (Theory and Practical) : **05 marks**

BWP 2

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	
FEL206	Basic Workshop Practice-II	--	2	--	--	--	1	
Course Code	Course Name	Examination Scheme						
		Theory					Term Work	Pract /oral
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)		
		Test1	Test 2	Avg.				
FEL206	Basic Workshop Practice-II	--	--	--	--	--	50	--
	Detailed Content						Hrs.	
<p>Note: Trade 1 and 2 are compulsory. Select any ONE trade topics out of the topic trade 3 to 5. 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> <p>CO-1 is related to Trade-1 CO-2 to CO-4 is related to Trade-2 CO-5 is related to Trade-3 CO-6 is related to Trade-4 CO-7 is related to Trade-5 CO evaluation is to be done according to the opted Trades in addition to Compulsory Trades.</p>								
Trade-1	Carpentry(Compulsory) 6. 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. 7. Term work to include one carpentry job involving a joint and report on demonstration of a job involving wood turning						10	
Trade-2	Basic Electrical work shop:(Compulsory): 8. Single phase and three phase wiring. Familiarization. of protection						08	

	<p>switchgears and their ratings (fuse, MCB, ELCB). Wiring standards, Electrical safety in the work place safe work practices. Protective equipment, measures and tools.</p> <p>9. Layout drawing, layout transfer to PCB, etching and drilling and soldering technique</p>	
Trade-3	<p>Masonry:</p> <p>10. 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.</p>	06
Trade 4	<p>Sheet metal working and Brazing:</p> <p>11. Use of sheet metal, working hand tools, cutting , bending , spot welding</p>	06
Trade-5	<p>Forging (Smithy):</p> <p>12. At least one forging job to be demonstrated and a simple job to be made for Term Work in a group of 4 students.</p>	06