

Blue print of Applied Maths 1 question paper

1	a	Relation between circular and hyperbolic function	(03 marks)
	b	Problems on basic partial derivatives	(03 marks)
	c	Jacobians	(03 marks)
	d	Expansion standard series	(03 marks)
	e	Properties of matrices	(04 marks)
	f	Problems on standard formula of successive derivatives	(04 marks)
2	a	Complex Numbers- Powers & Roots	(06 marks)
	b	Matrices PAQ/normal form	(06 marks)
	c	Euler's theorem with deduction	(08 marks)
3	a	Linear homogenous and non-homogenous equations	(06marks)
	b	Maxima and minima/Lagranges method	(06 marks)
	c	Separation of real & imaginary parts	(08 marks)
4	a	Jacobian of implicit functions/partial derivative of implicit functions using Jacobian	(06 marks)
	b	Logarithm of complex numbers	(06 marks)
	c	Numerical methods	(08 marks)
5	a	Expansion of sine and cosine, etc	(06 marks)
	b	Expansion of series/indeterminate forms	(06 marks)
	c	Problems on Leibnitz's theorem	(08 marks)
6	a	Linear independent & dependent vectors /Numerical methods	(06 marks)
	b	Composite/Implicit functions	(06 marks)
	c	Fitting of curves/Regression	(08 marks)

Note:

1. Each Question of 8 marks may be converted into two questions of 4 marks each
2. NO question on correlation coefficient is expected.

FE Sem 1 Applied Physics I (R-2012)

- Total 6 Questions of 15 marks each
- Q-1 Compulsory. Will contain 7 bits of 3 marks each.
- Solve any **Three** from (Q-2 to Q-6)

Question		Marks	Unit No.
Q-1	a	3	1.1
	b	3	2.2
	c	3	2.4
	d	3	3.1
	e	3	3.2
	f	3	4.1
	g	3	4.2
Q-2	a	8	2.1
	b	7	1.1
Q-3	a	8	3.2
	b	7	1.2
Q-4	a	5	1.1
	b	5	2.2
	c	5	3.1
Q-5	a	5	1.1
	b	5	2.3
	c	5	4.1
Q-6	a	5	1.3
	b	5	2.4
	c	5	4.2

Content Wise Blueprint

Module No.	Unit No.	Unit Title (and contents)	Unit wise Marks*	Module wise total marks*
01	1.1	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; inter-planar distance; Diamond structure, NaCl structure, HCP structure, BaTiO ₃ structure; Ligancy and Critical radius ratio;	20	32
	1.2	Determination of crystal structure using X-ray diffraction techniques viz. Laue method, rotating crystal method (Bragg method) & powder method;	07	
	1.3	Real crystals & point defects; photonic crystals; Liquid crystal phases and application in LCD	05	

02	2.1	Semiconductors: from energy bands of solids and classification of solids; Concepts of holes, effective mass; drift mobility and conductivity in conductors, intrinsic semiconductors and extrinsic semiconductors	08	28
	2.2	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	07	
	2.3	Hall Effect (applied electric field along x-axis and applied magnetic field along z-axis) and its application.	05	
	2.4	Drift and Diffusion of charge carriers to photovoltaic solar cells (refer syllabus)	08	
03	3.1	Dielectric Materials	08	20
	3.2	Magnetic Materials	12	
04	4.1	Acoustics	08	16
	4.2	Ultrasonics	08	
Grand Total				96#

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FE Semester 1 - Applied Chemistry I (R-2012)

- Total - 6 questions of 15 marks each.
- **Q.1 Compulsory.** Will contain 7 bits of **3 marks** each
- Solve any **Three** from the remaining **Five**

Q.1 Solve any **Five**:

Q.1 (a) to (e) 3 marks questions from all the modules

Q.1 (f) 3m – Polymer

Q.1 (g) 3m – Numerical from Water

Q.2 (a) Numerical from Water — 6m

Q.2 (b) Phase Rule — 5m

Q.2 (c) Important Engineering Material — 4m

Q.3 (a) Lubricant — 6m

Q.3 (b) Polymer — 5m

Q.3 (c) Phase Rule — 4m

Q.4 (a) Polymer — 6m

Q.4 (b) Water — 5m

Q.4 (c) Lubricant numerical — 4m

Q.5 (a) Important Engineering Material — 6m

Q.5 (b) Polymer — 5m

Q.5 (c) Water numerical — 4m

Engineering Mechanics Blueprint

1	a	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 (04 marks)
	b	Equilibrium of system of coplanar forces Condition of equilibrium for concurrent forces, parallel forces and Non-concurrent Non-parallel general forces and Couples (04 marks)
	c	Friction Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders. (04 marks)
	d	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 (04 marks)
2	e	Kinetics of a Particle: Force and Acceleration D'Alembert's Principle, Equations of dynamic equilibrium, Newton's second law of motion (04 marks)
	a	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 (06 marks)
	b	Equilibrium of system of coplanar forces Condition of equilibrium for concurrent forces, parallel forces and Non-concurrent Non-parallel general forces and Couples (08 marks)
	c	Kinetics of a Particle: Impulse and Momentum Principle of Linear Impulse and Momentum. Law of Conservation of momentum. Impact and collision (06 marks)
3	a	Center of Gravity and Centroid for plane Laminas (08 marks)
	b	Forces in space Resultant of Non-coplanar force systems: Resultant of Concurrent force system, Parallel force system and Non-concurrent non-parallel force system Resultant of Concurrent force system, Parallel force system and Non-concurrent non-parallel force system Equilibrium of Non-coplanar force systems: Equilibrium of Concurrent force system, Parallel force system and Non-concurrent nonparallel force system (06 marks)

	c	Kinetics of a Particle: Work and Energy Principle of Work and Energy, Law of Conservation of Energy (06 marks)
4	a	Types of support, loads, Beams, Determination of reactions at supports for various types of loads on beams (08 marks)
	b	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 (06 marks)
	c	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) (06 marks)
5	a	Analysis of plane trusses by using Method of joints and Method of sections. (Excluding pin jointed frames) (08 marks)
	b	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 (06 marks)
	c	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) (06 marks)
6	a	Forces in space Resultant of Non-coplanar force systems: Resultant of Concurrent force system, Parallel force system and Non-concurrent non-parallel force system Resultant of Concurrent force system, Parallel force system and Non-concurrent non-parallel force system Equilibrium of Non-coplanar force systems: Equilibrium of Concurrent force system, Parallel force system and Non-concurrent nonparallel force system (04 marks)
	b	Friction Introduction to Laws of friction, Cone of friction, Equilibrium of bodies on inclined plane, Application to problems involving wedges, ladders (08 marks)
	c	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 (04 marks)
	d	Kinetics of a Particle: Force and Acceleration Introduction to basic concepts, D'Alembert's Principle, Equations of dynamic equilibrium, Newton's second law of motion (04 marks)

Blue Print of BEE Paper

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

1	a	Source Transformation, Star-Delta Transformation	(03 marks)
	b	Superposition Theorem Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem	(03 marks)
	c	Generation of Alternating Voltage and Currents, RMS and Average Value, Form factor , Crest factor, AC through Resistance, Inductance and Capacitance	(03 marks)
	d	Series and Parallel Resonance, Q-factor and Bandwidth	(03 marks)
	e	Three Phase Voltage and Current Generation, Star and Delta connections (Balanced Load Only), Relationship between Phase and Line Currents and Voltages, Phasor Diagrams	(02 marks)
	f	Construction, Working Principle, EMF equation, Ideal and Practical Transformer, Transformer on No Load and on Load, Phasor Diagrams	(04 marks)
	g	Semiconductor Diode, Diode rectifier with Resistive Load, Half Wave, Full Wave– Center Tapped and Bridge Configuration, RMS value and Average Value of Output Voltage, Ripple factor, Rectification Efficiency	(02 marks)
2	a	Kirchhoff's Laws, Mesh and Nodal Analysis	(06 marks)
	b	R-L , R-C and R-L-C Series and Parallel Circuits, Phasor Diagrams , Power and Power Factor	(08 marks)
	c	Construction, Working Principle, EMF equation, Ideal and Practical Transformer, Transformer on No Load and on Load, Phasor Diagrams	(06 marks)
3	a	Three Phase Voltage and Current Generation, Star and Delta connections (Balanced Load Only), Relationship between Phase and Line Currents and Voltages, Phasor Diagrams	(08 marks)
	b	Equivalent Circuit, O.C. and S.C Test, Efficiency	(06 marks)
	c	Introduction to C and L filter (No Derivation)	(02 marks)
	d	CE, CB, CC Transistor Configurations, CE Input-Output Characteristics	(04 marks)
4	a	Source Transformation, Star-Delta Transformation	(07 marks)
	b	Generation of Alternating Voltage and Currents, RMS and Average Value, Form factor , Crest factor, AC through Resistance, Inductance and Capacitance	(05 marks)
	c	Measurement of Power by Two Wattmeter Method	(04 marks)
	d	Semiconductor Diode, Diode rectifier with Resistive Load, Half Wave, Full Wave– Center Tapped and Bridge Configuration, RMS value and Average Value of Output Voltage, Ripple factor, Rectification Efficiency	(04 marks)
5	a	Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem	(08 marks)
	b	R-L , R-C and R-L-C Series and Parallel Circuits, Phasor Diagrams, Power and Power Factor	(04 marks)
	c	Equivalent Circuit, O.C. and S.C Test, Efficiency	(08 marks)
6	a	Superposition Theorem	(07 marks)
	b	Series and Parallel Resonance, Q-factor and Bandwidth	(07 marks)
	c	Measurement of Power by Two Wattmeter Method	(06 marks)

FE Semester 1 - Environmental Studies

Maximum Marks for the paper: 60

Duration of the paper: 2 hrs

Sr No	Topic Name	Weightage	Q1	Q2	Q3	Q4	Q5	Q6	Total
1	Multidisciplinary Nature of Environmental Studies: <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 	8	3			5		5	13
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. 	8	3	5	5		5		13
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. 	16	6	5			5	5	26
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. 	8	3		5	5			13
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. • Hydel Energy: Principle, Hydropower generation. • Geothermal Energy: Introduction, Steam Power Plant 	12	3	5		5	5	5	18
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 	8	3		5				13
		60	15	15	15	15	15	15	96