I B. Tech I Semester Supplementary Examinations May/June - 2016
ENGINEERING PHYSICS
(Common to ECE, EEE, EIE, BioTech, EComE, Agri.E)

Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
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PART-A

1. (a) Distinguish between a polarized light and an unpolarized light.
   (b) State Bragg's law for X-ray diffraction. What is its limiting condition?
   (c) What are polar and non-polar dielectrics?
   (d) Define magnetization and show that $B = \mu_0(H+M)$.
   (e) What are matter waves and list out their properties?
   (f) Describe the principle behind working of a photoconductor.

                                                              [4+4+4+4+3+3]

PART-B

2. (a) Describe and explain the formation of Newton's rings in reflected light. Deduce expressions for getting bright and dark rings in terms of the diameters.
   (b) A grating of width 2inches is ruled with 15000 lines per inch. Find the smallest wavelength separation that can be resolved in second order at a mean wavelength of 500nm.
   (c) Discuss any four applications of Hall Effect.

                                                              [8+4+4]
3. (a) Define acceptance angle of an optical fibre and derive an expression for it in terms of refractive indices of the core and cladding.
   (b) X-rays of wavelength 0.12nm are found to undergo second order reflection at a Bragg angle of 28^0 from a lithium fluoride crystal. What is the inter-planar spacing of reflecting planes in the crystal?
   (c) Explain the terms relaxation time, drift velocity and mean free path as applied to electric conduction.

                                                              [8+4+4]
4. (a) Explain the behavior of a dielectric material in an alternative electric field. Discuss various causes for dielectric break down.
   (b) A solid elemental dielectric with density 3×10^{28} atoms/m^3 shows an electronic polarizability of 10^{-40} Fm^2. Calculate the ε_r of the material.
   (c) What are Miller indices? Explain.

                                                              [8+4+4]
5. (a) What are the factors affecting the architectural acoustics of a building? Explain remedies.
   (b) State Gauss divergence and Stokes theorems.
   (c) What is a SQUID? Explain its functioning.

                                                              [8+4+4]

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6. (a) Explain quantum free electron theory. Derive an expression for current density based on this theory.
   (b) A particle is moving in a one-dimensional potential box of infinite height and of width 2.5nm. Calculate the probability of finding the particle within an interval of 0.5nm at the centre of the box when it is in its state of least energy.
   (c) Distinguish between spontaneous and stimulated emission.

[8+4+4]

7. (a) What is Hall Effect? Deduce an expression for Hall coefficient.
   (b) Find the resistivity of intrinsic germanium at 300K, if the intrinsic carrier density is 2.5×10^{19}/m^3 and mobility of electron and hole is 0.39m^{2}V^{-1}s^{-1} and 0.19m^{2}V^{-1}s^{-1} respectively.
   (c) State and explain Rayleigh's criterion for resolution.

[8+4+4]

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I B. Tech I Semester Supplementary Examinations May/June - 2016
ENGINEERING MECHANICS
(Common to CE, ME, CSE, PCE, IT, ChemE, AeroE, AME, MinE, PE, MetalE, Textile Engg.)

Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
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PART-A

1. (a) What is meant by angle of repose? Explain.
   (b) Enunciate any two principles of equilibrium.
   (c) Differentiate center of gravity & centroid.
   (d) Derive the equation for moment of inertia of a rectangular section about centroidal axis.
   (e) Explain the kinetics of a rigid body when it is in plane motion.
   (f) Explain the concept of work-energy for a rigid body.

                                                        [3+3+4+4+4+4]

PART–B

2.   A 108 N block is held on a 40^0 incline by a bar attached to a 150 N block on a horizontal plane Figure 1 as shown below. The bar which is fastened by smooth pins at each end is inclined 20^0 to the horizontal. The co-efficient of friction between each block and its plane is 0.325. For what horizontal force P applied to 150 N block will motion to the right be impending?
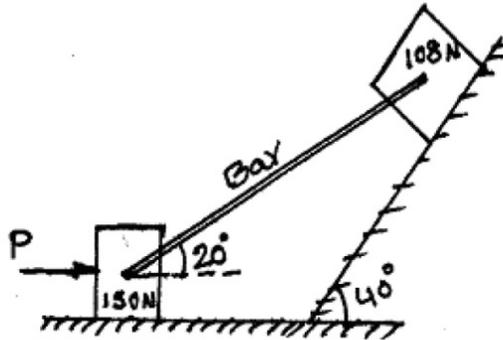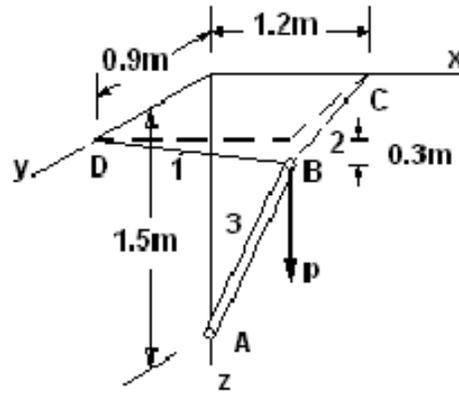

Figure 1

                                                        [16]

3. A mast AB supported by a spherical socket at A and guy wires BC and BD carries a vertical load P at B as shown below. Point B is 0.3 m vertically below the xy plane. Find the axial force induced in each of the three members of this system.

[16]

4. (a) Find the centroid of quadrant of an ellipse, whose equation is $x^2/a^2 + y^2/b^2 = 1$ from basic principles.
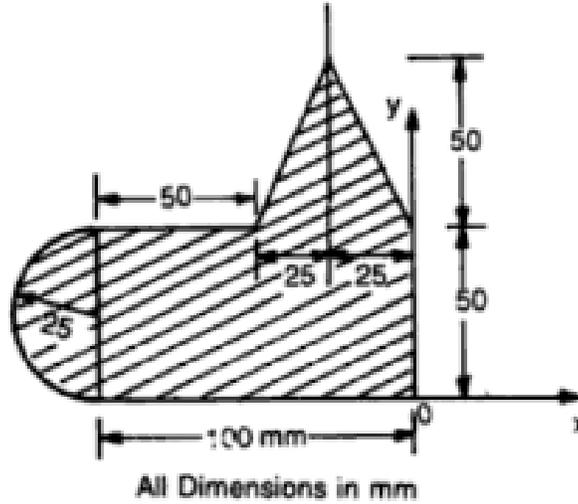   (b) Find the centroid of the plane uniform lamina shown in Figure 2, w.r.t. the axes shown.

All Dimensions in mm

Figure 2

[8+8]

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5. (a) Calculate the moment of inertia of shaded region shown below Figure 3 about the horizontal axis AA.

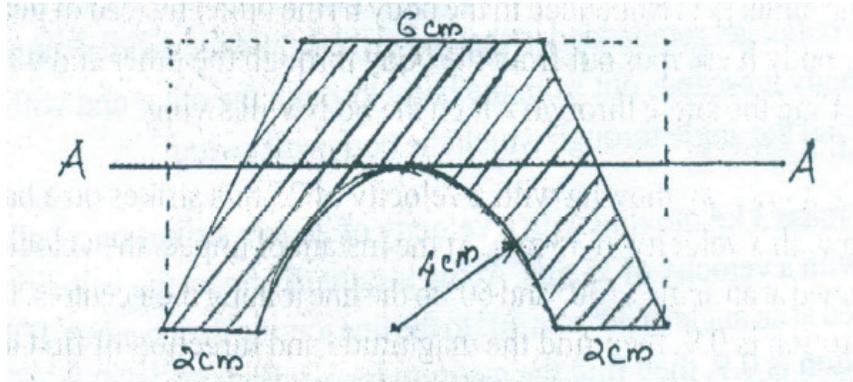Figure 3

   (b) State and prove parallel axis and perpendicular axis theorems.

[9+7]

6. (a) A projectile is fired at a speed of 800 m/s at an angle of elevation of 50^0 from the horizontal. Neglecting the resistance of air, calculate the distance of the point along the inclined surface at which the projectile will strike the inclined surface which makes an angle of 15^0 with the horizontal.

   (b) Explain various types of motions of a rigid body.

[8+8]

7. (a) An automobile moving with a uniform velocity of 40 Kmph is accelerated by increasing the traction force by 20%. If the resistance to motion is constant, find the distance traveled before it acquires 50 Kmph. Use work-energy method.

   (b) What is the energy of motion for a rigid body rotating about a fixed axis?

[8+8]

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I B.Tech I Semester Supplementary Examinations May/June - 2016
ENGINEERING CHEMISTRY-I
(Common to All Branches)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Briefly explain how air-conditioning differ from refrigeration.
   (b) Define Osmosis. Explain the phenomenon of reverse osmosis in desalination of brackish water.   [7+8]

2. (a) Explain the mechanism of contact catalysis with suitable example.
   (b) Discuss Tyndall effect and Brownian movement.   [7+8]

3. (a) What is a biosensor? How does it function? Give the applications of biosensor.
   (b) Explain fluorescence and phosphorescence with a neat Jablonski diagram.   [7+8]

4. (a) Give the important properties of superconductors.
   (b) What are intrinsic semiconductors? Differentiate p- and n- semiconductors.   [7+8]

5. (a) Discuss the working of bomb calorimeter with a neat sketch.
   (b) Why is coke preferred than coal in metallurgical process?
   (c) How is nitrogen determined in a coal sample?   [7+4+4]

6. (a) Explain the measurement of pH of solution using glass electrode.
   (b) Derive Nernst's equation for single electrode potential.
   (c) Explain the construction and working of H_2-O_2 fuel cell.   [5+5+5]

7. (a) Differentiate between nuclear fission and nuclear fusion.
   (b) Explain how radioactive waste can be disposed.
   (c) Write notes on moderator and coolants parts of a nuclear reactor.   [5+5+5]

8. (a) What are green house gases? How can they be minimized?
   (b) Discuss solar heaters, solar reflectors and PV cells.   [6+9]

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