END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER-2009

Paper Code: BCA109 *Subject: Basics of Physics*
Paper Id-20109

Time : 3 Hours *Maximum Marks :75*

Note: Q.1 is compulsory. Attempt one question from each unit.

Q1 (a) Why is Newton's first law of motion called law of inertia?
(b) Give two examples each for conservative and non-conservative force.
(c) Define angle of friction.
(d) Define an expression of power in terms of velocity and force.
(e) Explain the physical significance of coefficient of restitution.
(f) Give one example when work done by a force is (i) positive (ii) negative (iii) zero.
(g) Give four properties of electric charge.
(h) Define resistivity and state its S.I. unit.
(i) State Faraday's laws of electromagnetic induction.
(j) What are majority carriers (charge) in semiconductors? **(10x2.5=25)**

UNIT-I

Q2 (a) What do you understand by the term 'friction'? State laws of friction. **(7.5)**
(b) A woman pushes a box of mass 20kg on a horizontal surface with a horizontal force of F. The coefficients of static and kinetic friction are μ_s=0.6 and μ_K=0.5. **(5)**
(i) What must F be in order that she can make the box start to slide?
(ii) If she maintains the same force once the block starts to slide, what will be its acceleration?

Q3 (a) State Newton's second law of motion and derive the equation of motion, F=ma. **(6)**
(b) State and prove principle of conservation of linear momentum. **(6.5)**

UNIT-II

Q4 (a) Show that in a perfect elastic collision of two bodies of equal mass m they interchange their velocities. **(7)**
(b) State the principle of conservation of energy. Prove it for the freely falling bodies. **(5.5)**

Q5 (a) Define coefficient of restitution. What is its physical significance? **(6)**
(b) A metal ball of mass 2kg moving with a speed of 36km/h has a head-on collision with a stationary ball of mass 3kg. If after collision, both the balls move together, then find the loss in kinetic energy due to collision. **(6.5)**

UNIT-III

Q6 State Gauss's theorem. Derive an expression for electric field intensity (E) due to a metallic hollow sphere of radius R at a point (a) inside the sphere (b) on the surface of the sphere (c) outside this sphere. Show graphically the variation of E with distance form the centre of the sphere. **(12.5)**

Q7 (a) Two cell's of emf 6V and 12V and internal resistances 1Ω and 2Ω respectively are connected in parallel so as to send current in the same direction through an external resistance of 15Ω. **(8)**
(i) Draw the circuit diagram
(ii) Using Kirchoff's law calculate (A) current through each branch of the circuit.
(B) Potential difference across the 15Ω resistance.
(b) Define resistivity and discuss its temperature dependence. **(4.5)**

UNIT-IV

Q8 (a) State and explain Lenz's law. **(5)**
(b) Explain the properties of semiconductors. **(4)**
(c) State Ampere's circuital law. **(3.5)**

Q9 What is induced e.m.f.? Show that Lenz's law follows from the principle of conservation of energy. Explain magnetic lorentz force and its applications. **(12.5)**

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