(Please write your Exam Roll No.) *Exam Roll No.* 2008601/2005

END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER-2008

Paper Code: BCA109	***Subject: Basics of Physics***
Paper Id: 20109	***(Batch: 2005-2008)***
Time : 3 Hours	***Maximum Marks :75***

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

Q1 (a) 'Two electric field lines cannot intersect' is true or false. Justify.
(b) Give two examples each for conservative and non-conservative force.
(c) What is the physical significance of capacitance?
(d) According to Newton's third law any force is accompanied by an equal and opposite force. How can a movement take place?
(e) Can we use ac in electrolysis? Justify your answer.
(f) Give two examples of non-ohmic devices. Does the relation R=V/I holds for these?
(g) Can the kinetic energy of a system increased without applying any external force on it? Justify.
(h) A proton moving with speed 1.6×10^6 m/s in a straight line enters a strong magnetic field along the field direction, How shall its path and velocity changes.
(i) A meteriorite burns in the atmosphere before it reaches the earth's surface. What happens to its momentum?
(j) What are 'minority charge carriers' in semiconductor physics? **(10x2.5=25)**

UNIT-I

Q2 (a) Is it possible for a particle to describe a curved path if no force acts on it? Does the answer depend upon the frame of reference chosen to view the particle? Justify. **(7.5)**
(b) Compute the initial upward acceleration of rocket of mass 1.3×10^4 kg if the initial upward force produced by its engine (the thrust) is 2.6×10^5 N. Do not neglect the weight of the rocket. **(5)**

Q3 (a) What do you understand by the term 'limiting friction'? Discuss with the help of suitable examples. **(6.5)**
(b) A car of mass m is moving with velocity. If μ is the coefficient of friction between tyres and road, show that minimum stopping distance for car is $s = v^2 / \mu g$. **(6)**

UNIT-II

Q4 (a) The energy equivalent to a mass m is given by the relation $E=mc^2$. Discuss the experimental confirmation/justification for this relation. **(3.5)**
(b) Define the coefficient of restitution. What is its physical significance? **(5)**
(c) A block of mass m moving at a speed v collides with another block of mass 2m at rest. The lighter block comes to rest after the collision. Find the coefficient of restitution. **(4)**

Q5 (a) Show that in a perfect elastic collision of two bodies of equal mass m they interchange their velocities. **(6)**
(b) A vessel at rest explodes, breaking into three pieces. Two pieces, having equal mass, fly off perpendicular to one another with the same speed of 30 m/s. The third piece has three times the mass of each other piece. What are the direction and magnitude of its velocity immediately after explosion? **(6.5)**

UNIT-III

Q6 State Gauss's theorem. Derive expression for elastic field intensity (E) due to a non-conducting charged solid sphere of radius ® 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 from the center of the sphere. **(12.5)**

Q7 (a) Are Kirchhoff's laws applicable to both ac and dc circuits? **(4)**
(b) Define resistivity (ρ). Discuss the temperature dependence of resistivity in the context of conductor, semiconductor and insulators. **(8.5)**

UNIT-IV

Q8 (a) State the Joule's law of heating effects of electric current. Is it reversible or not? **(4)**
(b) State and explain the Lenz's law. **(4.5)**
(c) Compare the properties of a normal conductor and a semiconductor. **(4)**

Q9 (a) Define neutral temperature and temperature of inversion for a thermocouple and set up a relation between the two. **(6)**
(b) State the Peltier effect. Discuss in brief how it is complimentary to the Seaback effect. **(6.5)**

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