(Please write your Exam Roll No.) *Exam Roll No.* ....

END TERM EXAMINATION

FIRST SEMESTER [BCA]– DECEMBER 2010

Paper Code: BCA109	*Subject: Physics*
Paper ID: 20109	
Time : 3 Hours	*Maximum Marks : 75*

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

Q1 (a) The earth attracts a body with a force of magnitude F. What will be the magnitude of the force exerted by the body on the earth? It is given that the mass of the body is 1/100 times the mass of the earth.

(b) The momentum of a body is doubled. By what percentage will its kinetic energy increase?

(c) What is horse power? How many watts are in one horse power?

(d) State the condition for equilibrium of a body under concurrent forces.

(e) What are conservative forces? Give two examples.

(f) A uniform wire of resistance R and resistivity ρ is cut into two pieces of equal lengths. What are the resistance and resistivity of each piece? Give reasons to support your answer.

(g) Two electric field lines can't intersect each other. Is this statement true or false? Justify your answer.

(h) Define resistivity and state its SI unit.

(i) What is Seebeck effect?

(j) Name the majority and minority charge carriers in p-type semiconductors and n-type semiconductors. **(10x2.5=25)**

UNIT-I

Q2 (a) According to Newton's third law, every force is accompanied by an equal and opposite force. Should not these forces cancel each other? If it is so, then how can a movement take place? Explain briefly. **(5)**

(b) A 70kg woman stands on a weighing scale while riding in an elevator. What is the reading on the scale when the elevator is moving? **(7.5)**

(i) Upwards with constant speed of 10m/s.

(ii) Upwards with uniform acceleration of $1m/s^2$.

(iii) Downward with uniform acceleration of $1m/s^2$. Take $g=10m/s^2$.

Q3 (a) Why do we call static friction 'a self-adjusting force'? **(5)**

(b) Define limiting friction. **(2.5)**

(c) A metallic block of mass 12kg is placed on a table. The coefficient of friction between the block and table top is 0.15. A force of 15N is applied horizontally so as to move the block. Find the friction force that acts between the block and the table top. Predict whether the block will move or not. Take $g=10m/s^2$. **(5)**

UNIT-II

Q4 (a) Define work. Name and define SI unit of work. **(3.5)**

(b) What power must be developed by an aircraft engine to raise it to an altitude of 1km, if the aircraft weighs 3000 kgf and the time of ascent is one minute? Take $g=10m/s^2$. **(5)**

P.T.O.

(c) Using Einstein's formula of mass-energy equivalence, find the energy released, when 1mg of uranium is completely destroyed in an atom bomb. **(4)**

Q5 (a) Define coefficient of restitution. Prove that its value for perfect elastic collisions is one. **(5.5)**

(b) Two ball bearings each of mass m moving in opposite directions with equal speed v collide head on with each other. Show that after the collision, the two balls will move with the same speed v, but their directions will be reversed. Assume that the collision is perfectly elastic. **(7)**

UNIT-III

Q6 (a) Define Ohm's law. Can we use this law in case of semi-conductors also? Explain briefly. **(5)**

(b) State Gauss's Theorem in electrostatics. Apply this theorem to find the electric field (E) due to a uniformly charged (total charge Q) non-conducting solid sphere of radius R, at a point (i) inside the sphere (ii) outside the sphere. **(7.5)**

Q7 (a) What is the area of a 2-farad parallel plate capacitor, given that the separation between its plates is 0.2cm? Given $\varepsilon_0 = 8.854x10^{-12} C^2 N^{-1} m^{-2}$. **(5)**

(b) State and explain Kirchhoff's Rules (both Junction rule and Loop rule). Are these laws applicable to both ac and dc circuits. **(7.5)**

UNIT-IV

Q8 (a) Define neutral temperature of a thermocouple. The temperature of cold junction of a thermocouple is 30^0C and its temperature of inversion is 620^0C. What will be its neutral temperature? **(5)**

(b) Write the expression for force on a charged particle by a magnetic field. Discuss various cases. An electron moving with speed $2x10^8$m/s in a straight line enters a strong magnetic field of 2T along the field direction. How shall its path and velocity change? **(7.5)**

Q9 (a) State and explain Faradays laws of electromagnetic induction. **(5)**

(b) State Lenz's law. Show that it follows from the law of conservation of energy. **(4)**

(c) Distinguish between intrinsic and extrinsic semiconductors. **(3.5)**

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