(Please write your Exam Roll No.) Exam Roll No. D14142202012

END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER-2012

Paper Code: BCA109 **Subject: Physics**

Time : 3 Hours **Maximum Marks :75**

Note: Attempt any five questions. Select one question from each unit including Q.no.1 which is compulsory.

Q1 (a) According to Newton's third law, "action and reaction are equal and opposite". Then why don't these two forces cancel each other?

(b) A boy is running with constant speed on a circular track. Is it an accelerated motion? If yes, then explain briefly the force that is acting on the boy to keep him in circular motion.

(c) A man of mass 60kg climbs a ladder of height 5m. Calculate the work done by the force of gravity. Take $g=10m/s^2$.

(d) "Static friction is a self adjusting force" Is this statement true? Justify your answer.

(e) Explain briefly elastic and perfectly inelastic collisions.

(f) Define Ohm's law. Is it a fundamental law or valid only for certain materials and devices? Justify your answer.

(g) 5J of work is done in moving a positive charge of 0.5C from one point to another. What is the potential difference between the two points?

(h) Write the two important conclusions of Rutherford's α-particle scattering experiment.

(i) Write the difference between metals, insulators and semiconductors on the basis of energy bands in solids.

(j) Name the majority and minority carriers in p-type and n-type semiconductors. **(2.5x10=25)**

UNIT-I

Q2 (a) What is wrong with the statement, "Because the car is at rest, there are no forces acting on it"? How would you correct the statement? **(4.5)**

(b) A person weighs a fish on a spring scale attached to the ceiling of an elevator. Show that is the elevator accelerates upwards or downwards, the spring scale reads an apparent weight different from the fish's true weight. Justify your answers by drawing free body diagrams of the fish. **(8)**

Q3 (a) State the laws of limiting friction. **(5)**

(b) The outer rail of a curved railway track is generally raised over the inner. Why? Explain briefly. **(7.5)**

UNIT-II

Q4 (a) Define work. What do you understand by negative work done by a force? **(4)**

(b) Does kinetic energy of a body depend upon the direction of motion? Justify your answer. **(3)**

(c) A toy car of mass 0.2kg is moving with speed 10m/s. Find its kinetic energy. If the car stops due to friction, find the work done by the force of friction. **(5.5)**

P.T.O.

Q5 (a) Define conservative force. Prove that the gravitational force is a conservative force. **(6)**

(b) Two identical ivory balls of mass 1kg each, moving in opposite directions with speeds 5m/s and 10m/s collide head on. Find the velocities of the balls after the collision. Assume that the collision is perfectly elastic and one dimensional. **(6.5)**

UNIT-III

Q6 (a) A glass rod when rubbed with silk cloth acquires positive charge of 1.6×10^{-13} Coulombs. Explain it in terms of transfer of electrons. Have the electrons transferred from the glass rod to the silk cloth or from the silk cloth to the glass rod? What is the number of electrons transferred? Charge on an electron=1.6×10^{-19}C. **(7.5)**

(b) Define Coulomb's Law. **(2.5)**

(c) Why no two electric field lines can intersect each other? Explain briefly. **(2.5)**

Q7 (a) What are the factors on which resistance of a conductor depends? Give the corresponding relationship. **(4)**

(b) Give three identical resistors each of resistance 30 Ohms. How can they be connected in a circuit to give a total resistance of 90 Ohms and 10 Ohms respectively? **(4)**

(c) State and explain briefly Kirchoff's Rules. **(4.5)**

UNIT-IV

Q8 (a) State the postulates of Bohr's atom model. Explain how these postulates overcome the drawbacks of Rutherford's atom model? **(7.5)**

(b) Explain briefly the formation of energy bands in solids. **(5)**

Q9 (a) Discuss briefly electrical conduction in semi conductors. **(4)**

(b) Which biasing makes the p-n junction resistance low? Justify your answer. **(3.5)**

(c) What is a transistor? Write briefly the action of a n-p-n transistor. **(5)**

****