

# END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER-2011

Paper Code: BCA109

Subject: Physics

Time : 3 Hours

Maximum Marks :75

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

- Q1
- (a) Do we need a net force to keep a body moving with uniform velocity? Justify your answer.
  - (b) What do you understand by a centripetal force? Explain briefly.
  - (c) Kilowatt-hour is a commercial unit of energy. How many joules are there in one kilowatt-hour?
  - (d) State Lami's theorem for equilibrium of a body under concurrent forces.
  - (e) How will kinetic energy and momentum of a body change when its speed is doubled (without any change in direction of motion)?
  - (f) You are given two capacitors each of capacitance  $C \mu\text{F}$ . In how many ways can they be combined? What will be the effective capacitance in each case?
  - (g) How will the current flowing through a conductor change if the voltage drop across the conductor is doubled? Assume that the conductor obeys Ohm's law. Justify your answer.
  - (h) Write important postulates of Bohr's atomic model.
  - (i) What is doping of an intrinsic semiconductor? Name the majority and minority charge carriers in p-type semiconductors.
  - (j) What are light emitting diodes (L.E.D.)? (2.5x10=25)

### UNIT-I

- Q2
- (a) Define Newton's second law of motion and define unit of force. (5)
  - (b) Explain how Newton's first law of motion follows from second law. (4)
  - (c) Why are shockers used in scooters and car? (3.5)
- Q3
- (a) Differentiate between static friction and limiting friction. Explain briefly. (7.5)
  - (b) The outer rail of a curved railway track is generally raised over the inner. Why? Explain briefly. (5)

### UNIT-II

- Q4
- (a) Define power. Name and define SI unit of power. (5)
  - (b) Define work energy theorem. (2.5)
  - (c) A car of mass 1000kg is moving with speed 10m/s on a level straight road. Brakes are applied to stop it. Find the work done by the brakes in stopping the car. (5)
- Q5
- (a) What are the main characteristics of an elastic collision and an inelastic collision? (4)
  - (b) Show that in an elastic collision in one dimension, the relative velocity of approach before collision is equal to relative velocity of separation after collision. (5)
  - (c) Define spring constant of a spring. Give its SI units. (3.5)

### UNIT-III

- Q6
- (a) What is quantization of charge? Explain briefly. (3.5)
  - (b) What do you understand by frictional electricity? A glass rod when rubbed with silk cloth acquires  $1.6 \times 10^{-13}$  Coulomb charge. What will be the charge on silk cloth? (5)
  - (c) State Gauss's theorem in electrostatics. Why is the electrical field inside a charged spherical conductor always zero? (4)
- Q7
- (a) A wire of uniform area of cross section of resistance  $R$  ohms and resistivity  $\rho$  ohm meter is cut in to two equal pieces. What are the resistance and resistivity of each piece? Justify your answer. (5)
  - (b) Draw the circuit diagram of a Wheatstone bridge. Briefly explain the meaning of a balanced Wheatstone bridge and write the condition for it. (4.5)

### UNIT-IV

- Q8
- (a) Explain briefly Rutherford's alpha scattering experiment and the atom's model based on the results of this experiment. (7.5)
  - (b) What are the drawbacks of Rutherford's atom model? (5)
- Q9
- (a) What are energy bands? Distinguish between insulators, conductors and semiconductors in terms of their energy band diagrams. (7)
  - (b) What is a transistor? Write briefly the action of a n-p-n transistor. (5.5)

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