END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER 2016

Paper Code: BCA-109	Subject: Physics
Time: 3 Hours	Maximum Marks: 75

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

Q1 (a) Explain Newton's first law from Newton's second law. (2.5)
   (b) A 10 gram bullet is shot from a 5 kg gun with a velocity of 400 m/s. What is the speed of recoil of the gun? (2.5)
   (c) Define angle of repose and find expression for it. (2.5)
   (d) A ball of mass 0.5 kg moving with a velocity of 30 ms⁻¹ undergoes a head-on collision with another ball of unknown mass at rest. After collision, it rebounds with velocity of 10 ms⁻¹. Find the mass of other ball. (2.5)
   (e) What are *concurrent forces*? Obtain a condition for the equilibrium of three concurrent forces. (2.5)
   (f) Derive an expression for the resistances connected in series. (2.5)
   (g) State and prove *Gauss's theorem*. (2.5)
   (h) State and explain the postulates of Bohr's atomic model. (2.5)
   (i) Distinguish between intrinsic and extrinsic semiconductors. (2.5)
   (j) Three capacitors of capacitances 5, 4 and 3 farad respectively are connected with the first and second in series and the third in parallel with them. Find the capacitance of the combination. (2.5)

UNIT-I

Q2 (a) What is meant by *limiting friction*? State the laws of friction. (5)
   (b) Obtain an expression for the maximum speed of a vehicle on the banked road. (7.5)

Q3 (a) How does the weight of a man standing on a lift changes when the lift accelerates upwards and downwards with an acceleration "a"? Also discuss the variation of weight when the lift moves with uniform velocity and fall freely. (8.5)
   (b) A car of mass 1200 kg can take a turn on a circular level road of radius of 150 m with a maximum speed of 15m/s without skidding. Find the force of friction and the coefficient of friction. (4)

UNIT-II

Q4 (a) Show that the total mechanical energy of a body falling freely under gravity is conserved. (8)
   (b) Explain *work energy theorem*. (4.5)

Q5 (a) Define *coefficient of restitution* and discuss it for three types of collisions. (4)
   (b) Prove that when two bodies of equal masses undergo elastic collision in one dimension, their velocities are just interchanged. (8.5)

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UNIT-III

Q6 Stake Kirchhoff's first and second law and explain how they are applied to derive the principle of Wheatstone bridge.

(12.5)

Q7 Obtain Expression capacitance of the parallel plate capacitor with and without dielectric.

(12.5)

UNIT-IV

Q8 What are the drawbacks of Thomson's atom model? Explain Rutherford's experiment on scattering of alpha particles and state the significance of results.

(12.5)

Q9 Write notes on:-
(a) Distance of closest approach
(b) Impact parameter
(c) Forward biasing and reverse biasing in p-n junction

(4.5)
(4)
(4)

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