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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 **(4.5)**
  - (b) Impact parameter **(4)**
  - (c) Forward biasing and reverse biasing in p-n junction **(4)**

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# 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<sup>-1</sup> undergoes a head-on collision with another ball of unknown mass at rest. After collision, it rebounds with velocity of 10 ms<sup>-1</sup>. 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)

P.T.O.

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