

END TERM EXAMINATION

FIRST SEMESTER [BCA] DEC.-2019

Paper Code: BCA109

Subject: Physics

Time: 3 Hours

Maximum Marks: 75

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

- Q1
- a) Define angle of repose and angle of friction.
 - b) State Newton's 2nd law and derive the relation between force & momentum.
 - c) State & prove Lami's theorem
 - d) State & prove work energy theorem
 - e) State & prove Gauss's theorem
 - f) Why two electric field lines cannot intersect each other
 - g) Define Kirchhoff's first & second law
 - h) State and explain Coulomb's law.
 - i) What is Bohr's atomic model?
 - j) What is doping of an intrinsic semiconductor? Name the charge carries in p-type semiconductors? (2.5x10=25)

UNIT I

- Q2.
- a) What do you mean by banking of road? Calculate the angle of banking so that a vehicle of mass m can go with velocity v on a curved road of radius r without skidding. (5)
 - b) Calculate the weight of a body of mass m placed in lift, when the lift:
 - i) Moves vertically upward with acceleration a .
 - ii) Moves vertically downward with acceleration a .
 - iii) Moves with constant velocity v .
 - iv) At rest. (7.5)
- Q3.
- a) What is meant by limiting friction? Explain the Laws of friction. (5)
 - b) Two masses m_1 & m_2 are connected by a light string which passes over a frictionless pulley such that mass m_2 move vertically downward and m_1 move vertically upward, calculate acceleration and tension in the string. (7.5)

UNIT II

- Q4.
- a) Prove that total energy of falling freely body under gravity will remains same at all points on its path. (5)
 - b) Define conservative force. Prove that gravitational force is a conservative force. Also write the properties of conservative force. (7.5)
- Q5.
- a) What is Hooke's Law? Calculate the Potential Energy of a spring when it is pulled to a displacement x from its mean position. (5)
 - b) Show that when two bodies of equal masses suffer elastic collision in 1-dimension, they will exchange their velocities. (7.5)

UNIT III

- Q6.
- a) Obtain the expression for capacitance of parallel plate capacitor with dielectric slab. (5)
 - b) Define electric field intensity. Calculate electric field intensity at any point on the axis of uniformly charged circular ring. (7.5)

[P.T.O.]

- Q7. a) Find the total resistance when a number of resistances are connected in series and in parallel. (5)
b) Define Ohm's law. Explain the construction, working and principle & proof of wheat stone bridge with diagram in detail. (7.5)

UNIT IV

- Q8. a) Distinguish between insulators, conductors and semi-conductors in terms of their energy band diagrams. (5)
b) Explain briefly Rutherford's alpha scattering experiment and the atomic model based on the result of this experiment. (7.5)
- Q9. a) What is p-n junction diode? Explain the action of forward bias. (5)
b) What is a transistor? Explain construction and working n-p-n & p-n-p transistor with diagrams. (7.5)
