



HDR-003-001102

Seat No. _____

B. Sc. (Sem. I) (CBCS) Examination

November / December – 2017

Physics - 101

(Old Course)

Faculty Code : 003

Subject Code : 001102

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Symbols have their usual meanings.
(3) Figures to the right indicates marks.

1 Answer the following in short : 20

- (1) Define conservative force.
- (2) What is an inelastic collision?
- (3) State the theorem of parallel axis.
- (4) Give an equation for the moment of inertia of a circular ring.
- (5) State the Kepler's second law of planetary motion.
- (6) What is the intensity of the gravitational field at the center of a spherical shell?
- (7) What is the escape velocity of earth?
- (8) State Hooke's law.
- (9) Give the SI units of Young's modulus.
- (10) Define Poisson's ratio.
- (11) Define time constant of an L-R circuit while charging.
- (12) Define frequency of an alternating quantity.
- (13) Give equation for rms value of an alternating current.
- (14) Define Q-factor.

- (15) In a purely inductive circuit, what is the relation of phase between current and voltage?
- (16) State maximum power transfer theorem.
- (17) How is a galvanometer converted to voltmeter?
- (18) How many spin quantum numbers can be associated with an electron?
- (19) Define phase velocity.
- (20) If the kinetic energy of a moving particle is E , what is its de Broglie wavelength?

2 (a) Answer the following questions : (any **three**) **6**

- (1) State and explain the law of conservation of energy.
- (2) Discuss in brief radius of gyration.
- (3) Explain the state of weightlessness.
- (4) Explain in brief Bulk modulus.
- (5) Give MKS and CGS units of work.
- (6) Derive an equation for orbital speed of a satellite.

(b) Answer the following questions : (any **three**) **9**

- (1) Discuss in brief work and power.
- (2) Derive an equation for gravitational potential at a point.
- (3) State and prove the work energy theorem.
- (4) Obtain the relation between torque and angular momentum.
- (5) Discuss in brief moment of inertia with necessary diagrams.
- (6) Write a note on Poisson's ratio.

- (c) Answer the following questions : (any **two**) **10**
- (1) What is elastic collision? Derive an equation for final velocities of bodies undergoing elastic collisions.
 - (2) What do you mean by conservative force? Explain giving two examples.
 - (3) State and prove the theorem of perpendicular axis.
 - (4) Derive an equation for escape velocity for a body when it is projected from the surface of the earth.
 - (5) Prove that shear is equivalent to an elongation strain and compression strain at right angles to each other.
- 3** (a) Answer the following questions : (any **three**) **6**
- (1) Discuss resonance in parallel L-C-R circuit.
 - (2) Explain the use of multimeter as ammeter.
 - (3) List the limitations of Bohr's atomic model.
 - (4) Explain in brief Spatial quantization.
 - (5) Derive de Broglie wave equation.
 - (6) Define magnetic orbital quantum number and magnetic spin quantum number.
- (b) Answer the following questions : (any **three**) **9**
- (1) Derive an equation for rms value of an alternating current.
 - (2) What is atomic excitation? Discuss two main methods to excite an atom.
 - (3) Discuss the main features of the vector atom model.
 - (4) Write a short note on wave mechanical atom model.
 - (5) Derive the relation between phase velocity and group velocity.
 - (6) Define the four quantum numbers by which the state of an electron in an atom is characterized.

(c) Answer the following questions : (any **two**) **10**

- (1) Derive an equation for growth of charge in an R-C circuit.
- (2) State and prove correspondence principle.
- (3) State and prove Thevenin's theorem.
- (4) What is the effect of nuclear motion on atomic spectra? Explain.
- (5) Discuss the failures of classical mechanics to explain the photoelectric effect and the Compton Effect.
