## PHY110 (MDC)

# Student's Copy

## 2024

(NEP-2020)

(2nd Semester)

#### PHYSICS

(Multi-disciplinary Course)

( Physics for All )

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

## (SECTION : A-OBJECTIVE)

(Marks: 10)

Tick ( $\checkmark$ ) the correct answer in the brackets provided :

1×10=10

1. What causes the motion of the body which is initially in the state of rest?

- (a) Displacement ()
- (b) Acceleration ( )
- (c) Velocity ( )
- (d) Force ()

- People sitting on a moving bus experience a jerk when the bus stops suddenly. This is due to
  - (a) inertia of turning ()
  - (b) inertia of acceleration ( )
  - (c) inertia of motion ( )
  - (d) inertia of rest ()
- 3. If the force acting on a body causes no displacement, the work done is
  - (a) 0 ( )
  - (b) 1 ()
  - (c) -1 ( )
  - (d) infinity ()
- 4. Objects in motion possess energy and can do work. This energy is
  - (a) solar energy ()
  - (b) kinetic energy ( )
  - (c) potential energy ()
  - (d) thermal energy ()

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[ Contd.

- 5. Balloons rise until
  - (a) the surrounding air becomes too dense ( )
  - (b) the surrounding air becomes too thin ()
  - (c) the surrounding air becomes too cold ( )
  - (d) they reach space ()
- 6. At high velocities, most of the fuel used in an automobile is used to overcome
  - (a) gravity ()
  - (b) momentum ( )
  - (c) air resistance ()
  - (d) buoyancy ()
- 7. Airplanes fly (maintaining their altitude) by
  - (a) pushing fuel downward ()
  - (b) pushing fuel backward ()
  - (c) pushing fuel upward ()
  - (d) pushing air downward ()

- The atom of an element having the same atomic number but different mass numbers is
  - (a) isobar ()
  - (b) isotope ( )
  - () (c) isotone
  - (d) isomer ( )
- 9. Which of the following problems may occur during the production of nuclear energy?
  - (a) Accidental leakage ()
  - (b) Formation of compost ( )
  - (c) Formation of gobar gas ( )
  - (d) Generation of electricity ( )

10. The atomic number does not change in which type of radioactive decay?

- (a) Gamma ( )
- (b) Beta ()
- (c) Alpha ( )
- (d) Neutron ()

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[ Contd.

## (SECTION : B-SHORT ANSWERS)

### (Marks: 25)

Answer five of the following, taking at least one from each Unit : 5×5=25

## Unit—I

- 1. Clarify the difference between distance and displacement, uniform and non-uniform motion along with suitable example.
- 2. Mention the basic procedure for calculating monthly electric bill.
- 3. What physical quantities are measured using the following basic SI units?

Meter ; Kilogram ; Second ; Ampere ; Kelvin ; Mole ; Candela

#### UNIT-II

- State Kepler's law of orbit and the law of periods.
   2+3=5
- 5. State Newton's universal law of gravitation. Calculate the value of g. Given  $M = 5.97 \times 10^{24}$  kg (Mass of the Earth)  $G = 6.673 \times 10^{-11}$  N-m<sup>2</sup> / kg<sup>2</sup>,  $r = 6.38 \times 10^{6}$  m (radius of the earth) 2+3=5
- 6. What is escape velocity? Determine the escape velocity of the Jupiter if its radius is 7149 km and mass is 1.898×10<sup>27</sup> kg. 2+3=5

### UNIT-III

- 7. Mention the use of nuclear energy. How important is nuclear power and nuclear waste?
- 8. Define radioactivity. Mention the different types of radioactivity. 2+3=5
- 9. What are the risks associated with nuclear power plants? Write any three 2+3=5

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Contd.

## ( SECTION : C-DESCRIPTIVE )

## ( Marks : 40 )

Answer four of the following, taking at least one from each Unit : 10×4=40

UNIT-I

- Elaborate in detail the various power sources that we need in our daily living.
   10
- 2. State Newton's first and second laws of motion. What are the conditions on which the first law depends? What is the difference between acceleration and velocity? If the mass of the bus is 2000 kg, what will the force require to speed up a bus at 6 ms<sup>-2</sup>?
  2+3+2+3=10
- 3. What is inertia? Explain in detail the two types of inertia. Describe the concept of reference frame along with suitable example including figures and mention the two types of reference frame. 2+2+3+3=10

#### UNIT-II

- State Kepler's laws of equal areas. Apply Kepler's second law to describe planetary motion. 3+7=10
- What is weightlessness? Explain weightlessness in orbit. Give the examples of weightlessness. 3+4+3=10
- 6. What is a satellite? Explain the different types of satellites. Describe the projectile nature of satellite. 2+3+5=10

#### UNIT-III

- Define chain reaction. What are the important steps in a chain reaction? Explain in detail how nuclear energy is produced. 2+3+5=10
- 8. (a) What is an isotope? Give example. How are isotopes useful? 1+1+2=4
  - (b) Write any three man-made sources of radioactivity. What are the main sources of radioactive waste? 3+3=6
- Define radiation. Mention the five main types of radiation and four harmful effects.

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- 9. What are the risks associated with nuclear power plants? Write any three 2+3=5uses of nuclear reactor.

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