**Civil Branch (1st Semester)**

1) i) The curl of a conservative force is

1. 1 (b) -1 (c) infinity (d) Zero

ii) The conservation of linear momentum is equivalent to

1. Newtons’s First Law (b) Newton’s second’s law (c) Newton’s third law

(d) None of this

iii) The total momentum of the particle remain conserved is

1. Law of conservation of force (b) Law of conservation of linear momentum (c) Law of conservation of angular momentum (d) None

iv) A reference frame attached to the earth

1. is an inertial frame by definition (b) cannot be an inertial frame because the earth is revolving around the sun (c) is an inertial frame because Newton’s laws are applicable in this frame (d) cannot be an inertial frame because the earth is rotating about its own axis

v) Consider the following statements for a particle moving in an elliptic orbit under the

Influence of a central force

1. The radius vector covers equal area in equal time. 2) The motion takes place in a plane. 3) The angular momentum is a constant of motion.

Which of the statements given above are correct?

a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only d) 1, 2 and 3

vi) In a uniform circular motion

1. Velocity and acceleration both are constant b) Acceleration and speed are constant but velocity changes c) Acceleration and velocity both change d) Acceleration and speed both are constant

vii) The equation, x = a cos (ωt + ϕ) represents

1. Acceleration due to gravity b) Uniform straight line motion c) dc current d) Simple harmonic motion

viii) For an object moving in uniform circular motion with constant speed. The direction of the instantaneous acceleration vector is

1. tangent to the path of motion b) equal to zero c) directed radially outward d) directed radially, inward

2) Given two vectors, A = (2i – 3j + 7k) and B = (5i + j + 2k) find

1. a) A+B b) A – B c) A.B d) AxB
2. Find the cosine of the angle between

A = (3i + j + k), B = (– 2i – 3j – K)

3) How did Foucault’s pendulum demonstrate the rotation of earth? A Foucault’s pendulum plane at some place on the surface of the earth rotates completely by 36 h. The latitude of the place is?

4) i) Explain energy equation and energy diagram?

ii) What is geostationary satellite?

5) What are forced harmonic oscillator?

Define the term i) amplitude ii) angular frequency and iii) frequency of the Harmonic Oscillator?

6) What are centrifugal and Coroilis forces? Under what conditions do they come into picture? Why these forces are called fictious forces?

7) i) A particle is under the influence of central force F. Show that the Force F is the negative gradient of potential energy U?

ii) Check if the force F = 3xy i – y j is conservative or not?

8) Differentiate among free, damped and forced harmonic oscillation?

9) i) Differentiate inertial and non-inertial frame with examples.

ii) What are conservative and non-conservative forces? Explain with examples.