[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 6169 **D** **Your Roll No.....**

Unique Paper Code : 222353

Name of the Course : **B.Sc. (Hons.) Geology**

Name of the Paper : Physics – II [GEHT-304]

Semester : III

Time : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.

1. (a) Differentiate between dia-, para- and ferro-magnetic substances. (3)
   (b) Define microstate, macro state and thermo dynamical probability. (3)
   (c) Define Bernoulli's Theorem. (3)
   (d) Explain Dielectric Polarization. (3)
   (e) What do you mean by Earth's gravitational field. (3)

2. (a) State and explain the Newton's Laws of motion. (6)
   (b) A projectile is thrown with the speed of 40 m/s and the angle of 30 degree w.r. to the horizontal. Find
      (i) The Time of Flight, T.
      (ii) The range R,
      (iii) The Maximum height H of the projectile. (9)

3. (a) State and prove the Work-Energy Theorem. (5)
   (b) Does the force field $F = yzi - xzj + xy\,k$ is conservative or non-conservative. (5)
   (c) A particle have position vector given by $r = 2x\,i + 3y\,j + 4z\,k$, Calculate the work done by the particle, if the applied force is $F = yzi - xzj + xy\,k$. (5)

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4. (a) What are Forced harmonic oscillation ? Solve its differential equation for resultant amplitude and phase. Also explain the term Amplitude resonance. (10)

   (b) In an experiment on forced oscillations, the frequency of sinusoidal driving force is changed while its amplitude is kept constant, it is found that the amplitude of vibration is 0.01 mm at a very low frequency of the driver and goes up to 5.0 m at driving frequency of $20sec^{-1}$. Calculate the Relaxation time(τ) and Quality factor (Q) of the system. (5)

5. (a) What is Moment of Inertia ? Explain the concept of the Radius of gyration. Derive the expression for the Moment of Inertia of a cylinder around an axis passing through its center and perpendicular to the axis of the cylinder. (6)

   (b) Derive the expression for the Moment of Inertia of a cylinder around an axis passing through its center and perpendicular to the axis of the cylinder. (9)

6. (a) What are Synchronous satellites ? Explain the concept of artificial gravity. (6)

   (b) A satellite revolves in a circular orbit at a height of 100 Km from the surface of the earth. If the period of revolution of the satellite is 100 minutes, calculate the average density of the earth. (5)

   (c) The earth's mass is around 80 times that of the moon and their diameters are 12800 km and 3200 km resp. What is the value of g on the moon ? g on earth is 10 ms^{-2}. (4)

7. (a) Derive an expression for the magnetic field along the equatorial line of a magnetic dipole. (8)

   (b) State and explain Biot-Savart law using example. (7)

8. Explain any **three** of the following :

   (a) Explain Doppler's effect in sound. Also derive the expression for apparent frequency when

      (i) source is moving towards the observer

      (ii) observer is moving towards the source. (5)

   (b) Archimedes Principle. (5)

   (c) Normal modes and Normal co-ordinates. (5)

   (d) Maxwell Boltzmann distribution. (5)

(100)