HIGHER SECONDARY – FIRST YEAR

PHYSICS

MODEL QUESTION PAPER

TIME : 2 ½ hrs   **MAX MARKS: 70**

PART I

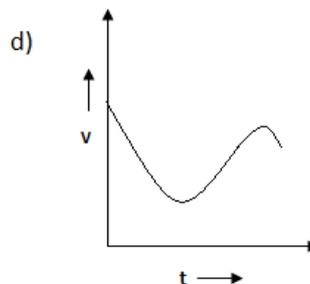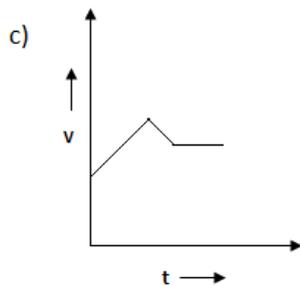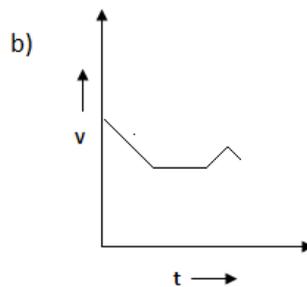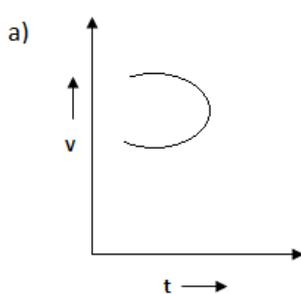**I. Answer all the questions**   **15X1=15**

1. **For a perfect rigid body the bulk modulus is**
   (a) **Zero**
   (b) **infinity**
   (c) **+1**
   (d) **-1**

2. **The number of degrees of freedom for a bird that flies in space**
   (a) **1**
   (b) **2**
   (c) **3**
   (d) **6**

3. **Which of the following velocity-time graph is not possible?**

4. **Which of the following object belongs to solar family**
   (a) **Comets**
   (b) **Asteroids**
   (c) **Planets**
   (d) **All the above**

5. If a force F is applied on a body and the body moves with velocity v then power will be
   (a) F. v

   (b) $\dfrac{F}{v}$

   (c) F.v^2

   (d) $\dfrac{F}{v^2}$

6. Red light has a wavelength of 7000 $\dot{A}$. In nm, it is
   (a) 700 nm
   (b) 7 nm
   (c) 70 nm
   (d) 0.7nm

7. The angular speed of minute arm in a watch is
   (a) $\dfrac{\pi}{21600}$ rad s^{-1}

   (b) $\dfrac{\pi}{12}$ rad s^{-1}

   (c) $\dfrac{\pi}{3600}$ rad s^{-1}

   (d) $\dfrac{\pi}{1800}$ rad s^{-1}

8. The direction of a magnet in tan A position of a deflection magnetometer is
   (a) North-South
   (b) East-West
   (c) North-West
   (d) South-West

9. For an equilateral prism, the angle of minimum deviation is 40 º at which the angle of refraction will be
   (a) 100°
   (b) 50°
   (c) 30°
   (d) 60°

10. If the temperature of the liquid is lowered , then its surface tension is
    (a) increased
    (b) decreased
    (c) remains unchanged

11. In a closed organ pipe, the frequencies of harmonics are in the ratio
    (a) 1:2:3
    (b) 1:3:5
    (c) 1:4:9
    (d) 1:1:1

12. The image of an object formed by a device is always virtual and small. The device may be
    (a) Convex lens
    (b) Concave mirror
    (c) Glass plate
    (d) Convex mirror

13. A Spring of force constant K is cut into n equal parts. The force constant of each part will be
    (a) nK
    (b) K/n
    (c) n/K
    (d) K

14. Which of the following physical quantity is conserved in both elastic and inelastic collision?
    (a) Kinetic energy
    (b) Momentum
    (c) Velocity
    (d) Moment of Inertia

15. Three point masses each of mass m are placed at the vertices of an equilateral triangle of side a. The gravitational potential due to these masses at the centroid of the triangle is

    (a) $\dfrac{-3GM}{a}$

    (b) $\dfrac{-\sqrt{3}GM}{a}$

    (c) $\dfrac{-3\sqrt{3}GM}{a}$

    (d) $\dfrac{-GM}{\sqrt{3}a}$

PART II

II   Answer any 6 questions in which Question No.23 is compulsory.   6X2=12

16. Write any four postulates of Kinetic theory of gases.

17. A Car starts to move from rest with uniform acceleration 10 ms^{-2} then after 2 sec, what is its velocity?

18. Define force constant. Give its unit.

19. The product of two vectors is not necessarily a vector. Substantiate your answer.

20. Calculate the viscous force on a ball of radius 1mm moving through a liquid of viscosity 0.2 Nsm^{-2} at a speed of 0.07 ms^{-1} .

21. At what height will a man's weight become half of his weight on the surface of the earth? (Given radius of earth = R)

22. Does a beam of white light disperse through a hollow prism? Give reason.

23. As you go up in the atmosphere, will the velocity of sound be the same? Why?

24 A copper vessel feel much cooler than a wooden table on winter days. Why?

PART III   6X3=18

III   Answer any 6 questions in which Question No.33 is compulsory

25. Determine analytically the magnitude of the resultant of the following four forces acting at a point.
    (i) 10 kN Pull N 30º E   (ii) 20 kN Push S 30º W
    (ii) 5 kN Push N 60º W   (iv) 15 kN Push S 60º E

26. Write any six rules and conventions followed while writing SI units.

27. State Parallelogram law of vectors.

28. What are the characteristics of wave motion?

29. Derive the relation between torque and angular momentum.

30. Compare streamline and turbulent flow of a liquid.

31. Calculate specific heat capacity for triatomic gases.

32. Draw Hysteresis loop for soft Iron. Why soft Iron is preferred for making electromagnets?

33 The ratio of diameter of two wires of same material is 1 : 2. If these wires are stretched by equal force, find the ratio of stresses produced in them.

PART IV

Answer all the questions   **5 x 5=25**

34. Obtain by dimensional analysis an expression for the surface tension of a liquid rising in a capillary tube. Assume that surface tension T depends on mass m of the liquid, Pressure P of the liquid and radius r of the capillary tube (Take the constant K=1/2)

(or)

Obtain an expression for position of centre of mass of a two particle system.

35. (i) Define gravitational field intensity. Give its expression.

(ii) The maximum height upto which astronaut can jump on the earth is 0.75 m with the same effort, to what height can he jump on the moon? The mean density of moon is (2/3) that of the earth and the radius of the moon is (1/4) that of the earth.

(or)

(i) What is meant by banking of tracks?

(ii) Obtain an expression for the angle of lean when a cyclist takes a curved path?

36. Derive an expression for total energy of the particle executing SHM.

(or)

Describe the construction and working of a pyrheliometer.

37. (i) What is Doppler effect?

(ii) A railway engine and a car moving parallel but in opposite direction with velocities 144 Km/hr and 72 Km/hr respectively. The frequency of engine's whistle is 500 Hz and the velocity of sound is 340 ms^{-1}. Calculate the frequency of sound heard in the car when

(a)   The car and engine are moving away from each other.
(b)   They are approaching each other.

(or)

Derive lens maker's formula for a thin bi convex lens.

38.

Prove that $\dfrac{P}{pg} + \dfrac{v^2}{2g} + h = a\ constant$

(or)

(i) Define magnetic moment of a magnet.

(ii) Obtain the expressions for the magnetic induction at a point on the equatorial line of a bar magnet.