GRAND TEST	HSC EXAMINATION SET - A PHYSICS	M. Marks : 70 Duration:3hrs

Q.1   Multiple choice questions   **[7]**

1. In uniform circular motion a body moves with
   (a) Constant velocity   (b) Constant speed
   (c) Constant impulse   (d) None of these

2. The value of G on Mars is
   (a) Different from that on earth (b) Same as that on earth
   (c) Greater than that on earth   (d) Less than that on earth

3. The centre of mass of a rigid body may lie
   (a) On its surface   (b) Inside the body
   (c) Outside the body   (d) Any of these

4. The velocity of a particle performing S.H.M. at mean position is
   (a) Maximum   (b) Gradually increases
   (c) Minimum   (d) Gradually decreases

5. With rise in temperature the Young's modulus of elasticity
   (a) Increases   (b) Decreases
   (c) Remains same   (d) None of these

6. Which of the following is the example of plasticity
   (a) Dough   (b) Gum

(c) Clay   (d) All of these

7. When mercury is in contact with glass, the angle of contact is

(a) Acute   (b) Obtuse

(c) Zero   (d) Infinite

8. The distance between successive nodes is

(a) λ (b) $\dfrac{\lambda}{2}$ (c) $\dfrac{\lambda}{4}$ (d) 2λ

Q.2 Answer the following questions (Any 6)   [12]

1. Define : Athermanous substance, diathermanous substance

2. An observer standing at the sea coast observes 54 waves reaching the coast per minute. If the wave length of the wave is 10 mts, find the velocity

3. Define : Range of molecular force, Surface film

4. A steel wire of length 20 cms and uniform cross section 1mm^2 is tied rigidly at both ends. If the temperature of the wire is altered from $40^0 \, C \, to \, 20^0 \, C$. Claculate the change in tension

(Given co-efficient of linear expansion of steel $\alpha = 1.15 \times 10^{-5} \, /^0C$, $Y_{steel} = 2 \times 10^{11} N/m^2$)

5. What do you mean by an ideal simple pendulum and Practical simple pendulum

6. The radius of gyration of a body about an axis at a distance of 6 cms from its centre of mass is 10 cms. Find its radius of gyration about an axis passing through its centre of mass

7. Define gravitational field, Intensity of gravitational field

8. An object of mass 0.4 kg is whirled in a horizontal circle of radius 2 meters. If it performs 60 rev/min. calculate the centripetal force acting on it.

Q.3 Answer the following questions (Any 3)   [9]

1. A particle executing S.H.M. has velocities $v_1 \, and \, v_2$ when at distances of $x_1 \, and \, x_2$ from the centre of the path. Show that the time period is given by

$$T = 2\pi \sqrt{\frac{x_2{}^2 - x_1{}^2}{v_1{}^2 - v_2{}^2}}$$

2. An organ pipe P_1 closed at one end vibrating in its first overtone and another pipe P_2 open at both ends vibrating in its third overtone are in resonance with a given tuning fork. What is the ratio of the length of P_1 to that of P_2

3. Explain Maxwell distribution

4. Find the moment of inertia of a ring about its diameter

Q.4 Answer the following (Any 1) [7]

1. (a) With a neat diagram derive the equation for periodic time of conical pendulum [4]

   (b) Find the acceleration due to gravity at a depth of 2000 km from the earth's surface; assuming that the earth has uniform density (R = 6400 km). [3]

   OR

2. (a) Explain the formation of stationary wave on string by analytical method the separation between node and antinode is $\lambda / 4$. [4]

   (b) Calculate the temperature at which perfectly black body radiates energy at the rate $5.67 \times 10^4 watt/m^2$.
   $(\sigma = 5.67 \times 10^{-8} watt/m^2 K^4)$ [3]

PAPER II

Q.5 Multiple choice questions [7]

1. Oscillator is an electrical device which converts
   (a) D.C. to A.C.　　　　　　　(b) A.C. to A.C.
   (c) A.C. to D.C.　　　　　　　(d) D.C. to D.C.

2. The work that must be done to remove an electron from an atom is called its
   (a) Electron infinity　　　　　(b) Ionization energy
   (c) Energy band　　　　　　　(d) Binding energy

3. An electron behaves as a
   (a) Particle　　　　　　　　　(b) Wave
   (c) Both a and b　　　　　　　(d) None of these

4. Magnetic flux
   (a) Is always positive　　　　(b) Is always negative
   (c) Is a vector quantity　　　(d) Can be positive or negative

5. Permeability of diamagnetic substances is
   (a) Zero   (b) Less than zero
   (c) Less than one   (d) More than one

6. Ampere second stands for the unit of
   (a) Power   (b)Energy
   (c) E.m.f.   (4) Charge

7. For steady interference, the two sources of light must be
   (a) Coherent   (b) Monochromatic
   (c) Equally bright   (d) All of these

Q.6 Answer the following questions (Any 6)   [12]

1. Light reflected from the surface of a glass slab is completely plane polarized when the angle of incidence is $56^0 40'$. Find the value of $_a\mu_g$

2. Which are the various energy losses in a transfromer?

3. Define half life period. Derive expression for it.

4. What is solar cell ? Write its advantages

5. Find out the magnitude of resistance X in the circuit shown below, when no current flows through 5Ω resistor
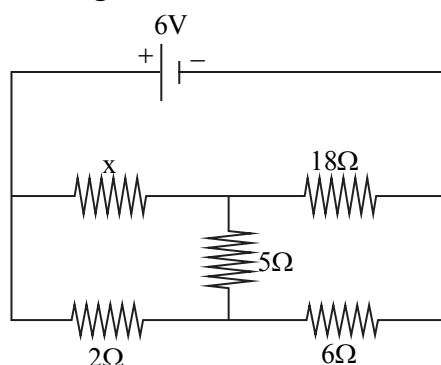
6. An electron in an atom revolves around the nucleus in an orbit of radius 0.53 Å. Calculate the equivalent magnetic moment, if the frequency of revolution of electron is 10^{10} MHz.

7. Derive an expression for capacity of a parallel plate capacitor filled with dielectric.

8. Two sources of light of wavelengths $2500^0 A \ and \ 3500^0 A$ are used in Young's double slit experiment simultaneously. Find out at which order of the two wavelengths patterns the fringe coincide.

Q.7 Answer the following questions (Any 3)   [9]

1. Write a short note on resolving power of a microscope

2. A Bakelite cube having each side of length 1 cm is kept in an electro static field of intensity 500 V /m. Calculate the energy contained in the Bakelite cube (dielectric constant of Bakelite is 5)

3. Explain in detail resonant frequency

4. Calculate the radius of the first Bohr orbit from the given data and hence find the radius of the third Bohr orbit

    Data $m = 9 \times 10^{-31} \, kg$, $e = 1.6 \times 10^{-19} C$, $h = 6.63 \times 10^{-34} Js$, $\epsilon_0 = 8.85 \times 10^{-12} C^2 / Nm^2$

Q.8 Answer the following questions (Any 1)   **[7]**

1. (a) Write a short note on space communications   [3]

    (b) Explain Inductive reactance (X_L) [4]
         Capacitive reactance (X_C)

<div align="center">OR</div>

2. (a) Draw energy level diagram of Bohr's orbit. Explain any two series in Bohr's orbit.   [3]

    (b) What is diffraction of light. Also explain Frensel's diffractions and Fraunhofer diffraction   [4]