HISSAN CENTRAL EXAMINATION - 2079 (2022)

Class: XII **PHYSICS (1021 - M2)**

F.M : 75 **(11 Marks Obj+ 64 Marks Sub)** **Time: 3hrs**

GROUP A

Multiple Choice Question **Time:25 Minutes**

Attempts all questions.

Tick the correct answer. **[11 × 1 = 11]**

Write the correct option in your answer sheet.

1. A body of moment of inertia I rotating about an axis has angular momentum L, the rotational kinetic energy of the body is
   a. $^1/_2\,LI$ b. $^1/_2\,LI^2$ c. $\frac{L^2}{2I}$ d. $2\,LI$

2. The time period of a spring consisting of a body of mass m and spring constant k is
   a. $T = 2\pi\sqrt{^m/_k}$ b. $2\pi\sqrt{\frac{2m}{k}}$ c. $2\pi\sqrt{\frac{k}{m}}$ d. $2\pi\sqrt{km}$

3. 1 torr equal to
   a. 1 mm of Hg b. 760 mm of Hg c. 1 atm d. 1 bar

4. An ideal gas is compressed from 6 litres to 4 litres by a constant external pressure of 5 atm, how much work is done on the gas?
   a. +10 litres atm b. -10 litre atm
   c. +30 litres atm d. -30 litre atm

5. Refrigerator works on
   a. zeroth law of thermodynamic b. first law of thermodynamics
   c. second law of thermodynamic d. third law of thermodynamics

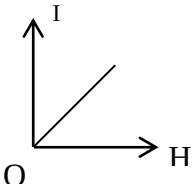
6. The ratio of speed of sound in hydrogen gas (γ = 7/5) to that in helium gas (γ = 5/3) at the same temperature is,
   a. 1:1 b. $\sqrt{2}$: 1 c. $\sqrt{42}$: 5 d. 5: $\sqrt{42}$

7. Which of the parameter is most fundamental in light wave?
   a. wavelength b. velocity c. frequency d. intensity

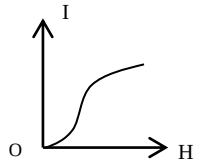
8. The value of mechanical equivalent of heat is
   a. 4.2 cal/J b. 4.2 J c. 4.2 calorie d. 4.2 J/cal

9. Which of the following best represents the ferromagnetic substance, where I is intensity of magnetisation and H is magnetising field intensity.

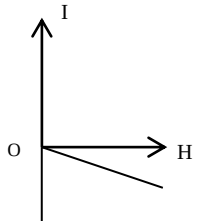
   a.



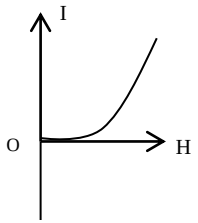
   b.



   c.



   d.



10. In our country, the supply of a.c. voltage is 220v. The peak voltage is,
    a. 311 V b. 221 V c. 111 V d. 351V

11. An X-ray is operated at 60KV. The minimum wavelength of X-ray is
    a. 0.21Å b. 2.1Å c.0.51Å d.0.3Å

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GROUP B

Attempt all questions.

Short Answers Question: **[8 × 5=40]**

1. In the absence of external torque, angular momentum of rotating body remains constant.
   a. Define moment of inertia and angular momentum. [2]
   b. A constant torque of 200 Nm turns a wheel about its center. The moment of inertia about the axis is 100 kgm^2. Find the angular velocity gained in 4 seconds. [3]

2. Time period of simple pendulum and acceleration due to gravity are closely related.
   a. A pendulum clock is taken to the moon, will it gain or lose the time? Why? [2]
   b. What is the time period of simple pendulum in the space? [1]
   c. A body of mass 200 gram is executing SHM with amplitude of 20 mm. The magnitude of maximum force which acts upon it is 0.6 N. Calculate its maximum velocity. [2]

   OR
   a. Define angle of contact. [1]
   b. Write value of angle of contact for pure water and mercury. [1]
   c. Deduce expression for rise of liquid in capillary tube. [3]

3. Adiabatic process is a thermodynamicl process.
   a. Define adiabatic process. [1]
   b. Derive expression for adiabatic equation. [3]
   c. Write formula to calculate work done during adiabatic process. [1]

4. a. Discuss the effect of pressure, temperature and humidity of elastic medium on the speed of sound. [3]
   b. At what temperature the velocity of sound is double than at the temperature 27°C? [2]

   OR

   Many people confuse on change of pitch and change of intensity of sound.
   a. Draw the waveforms that best represent the increase in intensity and increase in pitch of sound. [2]
   b. What is Doppler's effect? [1]
   c. Find the intensity of the sound wave in air whose maximum pressure variation is 3×10^{-2} pa,the density of air is $\rho = 1.20$ kg/m^3 and the speed of sound is 340 m/s. [2]

5. Thermoelectric effect is the mechanism of production of electricity without external driving source.
   a. Explain the mechanism of generation of thermo emf from thermocouple. [2]
   b. How does thermo electric emf vary with temperature? Explain with necessary graph. [3]

6. When a current carrying conductor is moved in a magnetic field, it experiences the force,
   a. What is the force called? [1]
   b. Find the magnitude and direction of force that a current carrying conductor experiences. [3]
   c. Write formula for maximum torque experienced by a rectangular coil. [1]

7. There are several terms associated with photo - electric emission.
   a. Define threshold frequency and threshold energy. [2]
   b. Sodium has a work function of 2 eV. Calculate the maximum energy and speed of the emitted electrons when sodium is illuminated by a radiation of 150 nm. (Where, $c = 3 \times 10^8$ m/s , $h = 6.62 \times 10^{-34}$ Js and $me = 9.1 \times 10^{-31}$ kg) [3]

8. A junction diode is a semiconductor diode which has the special mechanism during its operation.

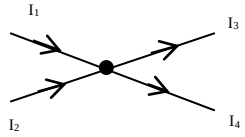
a. How do free electrons and holes flow in P-N junction diode? Explain with suitable diagram. [2]
b. Explain the working mechanism of full wave ractifire. [3]

GROUP C

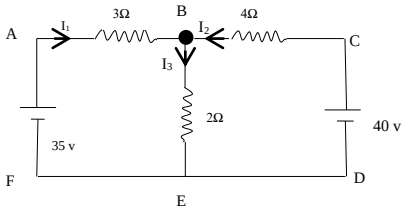
Long Answers Question: **[8 × 3=24]**

9. When two or more light waves overlap to each other, the intensity of light waves is in accordance with the phase.
   a. What is the relation of intensity and amplitude of a wave? [1]
   b. Discuss the conditions for sustainable interference of light. [2]
   c. Does the intereference of light voilate the law of conservation of energy. [2]
   d. In a Young double slit experiment, the separation between the first and the fifth bright fringes is 2.5 mm when the wavelength of light used is 6.2×10^{-4} mm. Calculate the separation of the two slits when the distance between slit and screen is 80cm. [3]

10.



   a. Which law is indicated in the figure. [1]
   b. State this law. [1]
   c. Applied this law to calculate unknown value of resistance. [3]
   d. Find the current in 2 Ω resistor in the given circuit. [3]

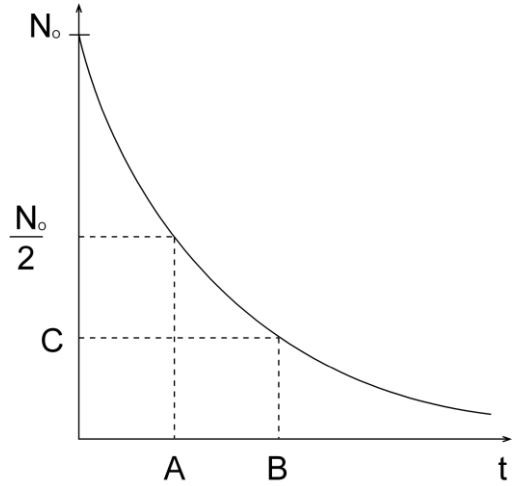


OR

Biot-Savart law have several applications:
   a. State Biot- Savart law. [1]
   b. Derive the formula for the magnetic field at a point on the axis of current carrying circular coil. [3]
   c. Express the formula at the center of the circular coil derived from (b) [1]
   d. A coil consisting of 100 circular loop with radius 60 cm carries a current of 5A. Find the magnetic field at a point along the axis of the coil, 80 cm from the center. [3]
   Where $\mu_0 = 4\pi \times 10^{-7} Hm^{-1}$.

11. Bohr's combined the classical and quantum concept in his theory.
   a. State Bohr's postulates. [2]
   b. Derive expression for Bohr's radius of n^{th} orbit. [3]
   c. Show that velocity of electron $= {}^{1}/_{137}$ times the speed of light in vaccum. [2]
   d. Write expression of total energy of an electron in n^{th} orbit of H - atom. [1]

OR



   a. Write down the algebraic equation that represent the given curve. [1]
   b. What does A represent ? [1]
   c. What is the value of C if B is second half life? [1]
   d. Derive the decay equation. [3]
   e. Define mean life and decay constant. [1+1=2]

THE END