# HISSAN CENTRAL EXAMINATION - 2079 (2022)

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

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

## GROUP B

**Attempt all questions.** **[8×5=40]**

**Short Answers Question:**

1. (i) What is simple harmonic motion? How it is different than linear motion? [2]

(ii) Figure shows the mass spring system of spring constant k, e is the extension produced due to the load and y is the displacement produced in the system due to external force. Find the time period of the system. [2]


(iii) What happens to the time period if mass is doubled? [1]

2. (i) State Bernoulli's Theorem. How this principle is used in the lifting of airplane. [2]

(ii) Water flows horizontally through a pipe of varying cross-section. If the pressure of water is 20Pa at a point where the velocity is $0.35ms^{-1}$. What is the pressure at a point where the velocity is $0.25m\ s^{-1}$? (Density of water = $1000Kg/m^3$) [3]

**OR**

(i) State and prove principle of conservation of angular momentum [2]

(ii) A ballet dancer spins with 2.4rev/s with her arms outstretched, when the M.I. about the axis of rotation is I. With her arms folded, the M.I. about the same axis becomes 0.6I, calculate the new rate of spin. [3]

3. (i) Discuss the assumption made by Laplace for the velocity of sound in gaseous medium. [2]

(ii) A source of sound of frequency 512 Hz emits waves of wavelength 670mm in air at $20^0$ C. What is the velocity of sound in air at this temperature? What would be the wavelength of sound from the source in air at $0^0$ C? [3]

4. (i) What are the limitations of first law of thermodynamics? [2]

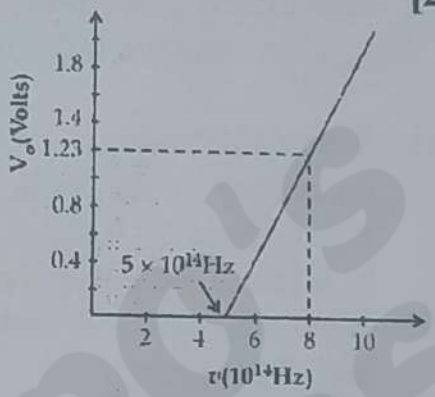
(ii) Draw the block diagram of heat engine. [1]

(iii) Discuss the essential part of heat engine and find the efficiency of heat engine. [2]

5. (i) State and explain Biot and Savart law. [2]
(ii) Discuss the magnetic field produced due to straight current carrying conductor. [ 2]
(iii) Which law gives the direction of magnetic field due to straight conductor? [1]

6. (i) What is magnetic flux? [1]
(ii) State the law which is used to design AC generator in a hydropower. [2]
(iii) If magnetic flux linked with the coil is $\Phi = 5t^3 + 4t^2 + 3t$. Find the induced emf in time 2 second. [2]

7. (i) What is work function of metal? [1]
(ii) Discuss Einstein photoelectric equation. [2]
(iii) How the value of Planck's constant be determined from the graph given. [2]




8. (i) Describe Millikan's oil drop experiment. In which principle it works? [2]
(ii) How can one estimate charge of electron using result of Millikan's oil drop experiment? [1]
(iii) What is the function of X-ray in the experiment? Can we use γ-ray instead of X-ray? [2]

**OR**

(i) What is forward and reverse biasing of a junction diode? [2]
(ii) Draw i-v graph of junction diode in forward biasing and hence find forward resistance of junction diode using graph [2]
(iii) Give two applications of junction diode [1]

## GROUP C

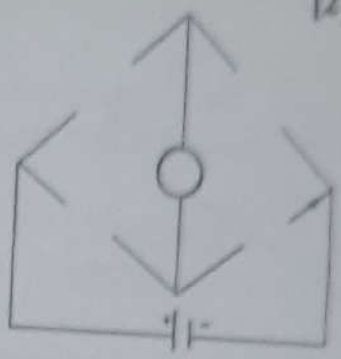
**ng Answer Questions:** [3×8=24]

(i) A student wants to study interference pattern using two identical candle light. Explain why he can't produce interference pattern using identical candle. [2]
(ii) How can he produce sustainable interference pattern? Give two conditions of it. [2]
(iv) Discuss the Young's double slit experiment for the determination of fringe width. [3]

(v) Can you use white light in Young's experiment? [1]

10.(i) A student wants to design Wheatstone bridge in physics laboratory. What are the minimum requirement to design Wheatstone bridge circuit? [2]

(ii) Complete a circuit diagram of Wheatstone bridge using resistances 10Ω, 8Ω, 5Ω and 16Ω for the balance condition. [1]



(iii) How can you increase the sensitivity of Wheatstone bridge? [2]

(iv) Using the concept of Wheatstone bridge, construct a meter bridge and discuss how it is used to measure unknown resistance. [3]

**OR**

(i) When alternating current is passed through a circuit voltage leads the current by phase angle $\pi/2$.
a. Is the circuit inductive or capacitive?
b. What is the power consumed in such circuit? [2]

(ii) What are inductive and capacitive reactances? Discuss their value at high frequency. [1]

(iii). A 50 V, 50 Hz a.c supply is connected to a resistor of resistance 40Ω in series with a solenoid whose inductance is 0.2H. The p.d. between the ends of the resistor is found to be 20 V. What is the resistance of the wire of the solenoid? [2]

(i) What are X-rays? Give their properties. [2]

(ii) A student wants to use Aluminum target in Coolidge tube for the production of X-ray. What suggestion do you want to give him? [1]

(iii) A X-ray tube works at dc potential difference of 50kV and current through the tube is 0.5mA.
a. Find the numbers of electron hitting the target per second. [1]
b. Energy falling on the target per second. [2]

**OR**

i) A physics professor explains about the formation of nitrogen $_7N^{14}$ from radioactive carbon $_6C^{14}$. Is it possible? Give the suitable nuclear reaction. [2]

i) How can we estimate the age of archeological sample using carbon dating? Give concept only. [1]

i) Radioactive carbon disintegrates according to certain laws of radioactive disintegration. What are the laws of radioactive disintegration? [2]

(iv) A radioactive source which has the half-life of 130 days, contains initially $1\times10^{20}$ radioactive atoms, and the energy released per disintegration is $8\times10^{-13}$J, calculate the activity of the source after 260 days have elapsed and total energy released during this period. [3]