Model Question of HSC Examination 2020 (All Board)

Physics Second Paper (Creative)

Sub Code : 1 7 5

Time: 2Hrs 35 min **Full marks: 50**

*[Read the following stems and answer **any five** of the following questions:]*

1. ▶ 1 mole gas is enclosed in two similar cylinders fitted with piston at 1atm pressure and 25°C. Suddenly by pressing the piston the volume of the gas of first cylinder is made half. The volume of the gas of second cylinder is also made half but very slowly. [$R = .34 Jmol^{-1}K^{-1}$, $\gamma = 1.4$]

a. What is thermal equilibrium? 1

b. Why are there two specific heat in case of gas? 2

c. Calculate the final pressure of the gas of first cylinder. 3

d. Between the two process, in which process the amount of work will be more? Give mathematical logic in favour of your answer. 4

2. ★ In a Physics laboratory for explaining electromagnetic induction, teacher kept three coils each of 500 turns perpendicularly in a magnetic fields of 5 Tesla. Of the three coils, the first one is circular with diameter 10cm, second one is rectangular with $10cm^2$ area of cross section, third one is square with area of cross section $45cm^2$. The second and third one are removed from the field in 0.5 second.

a. What is mutual inductance? 1

b. 0.06F–210V is written on a capacitor. What does it mean? 2

c. Calculate the flux linked with the first coil. 3

d. Give comparative mathematical analysis of the induced electromagnetic forces of three coils. 4

3. ▶ The electromagnetic wave of 2800 Å and 3800 Å are incident on a metal plate. The threshold frequency of the metal is 5.5×10^{14}Hz.

[Planck constant, $h = 6.63\times10^{-34}$Js]

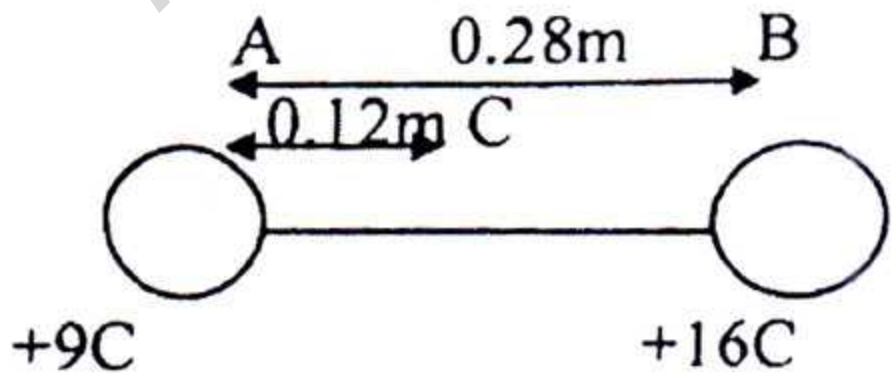
a. What is time dilation? 1

b. With the increase of speed of a body its mass increases. Explain. 2

c. Calculate the value of work function. 3

d. Electron will emit or not from the metal for both electromagnetic wave? 4

4. ✪



a. What is electric dipole? 1

b. Why is the electric intensity at a point inside a uniformly charged spherical shell is zero. 2

c. Calculate the force on A due to B. 3

d. If 1C charge is kept at point C, will the charge experience any force? Explain mathematically. 4

5. ▶ In a Young's double silt experiment, a light of wavelength 4000Å is incident from a slit. The distance of the screen from the slit is 1.5m and fringe is formed on it. The width of 4 fringes is 3cm.

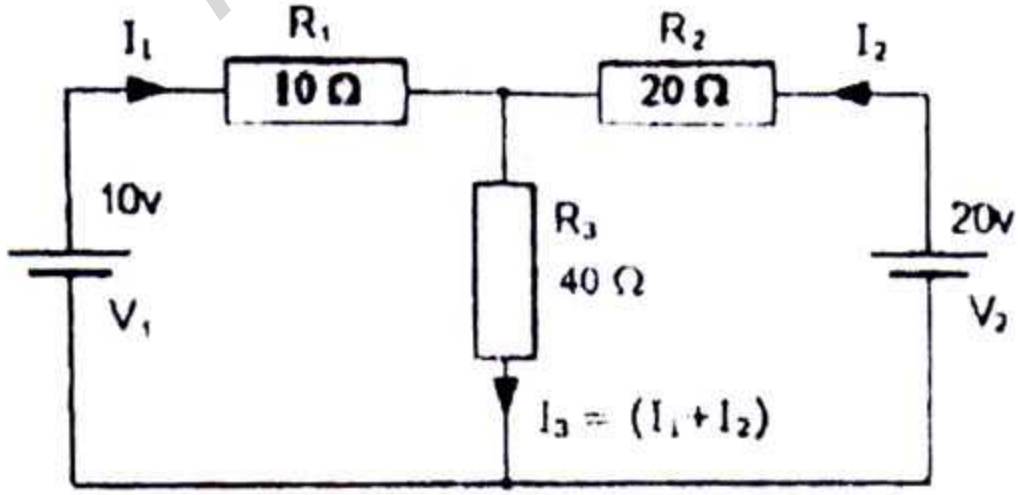
a. What is wave front? 1

b. Without two coherent sources, it is possible to have interference of light. Explain. 2

c. calculate the width of the slit. 3

d. If the distance of the screen from the slit becomes double, and the width of the slit becomes half, will the distance of the 4 fringes remain same? Explain mathematically. 4

6. ★



a. What is Hall voltage? 1

b. How does Lenz's law follow conservation of energy? Explain. 2

c. Calculate the value of I_1, I_2 and I_3. 3

d. If the electromotive forces are interchanges, then is there any change of the three current? Explain mathematically. 4

7. ▶ A and B are two radio active elements. Their half life are respectively 6 day and 9 day.

a. Define mass defect. 1

b. Why is Fe one of the most stable nuclei? 2

c. Calculate the average life of element A and B. 3

d. Which element will take longer time to decay 70%? Give mathematical logic in favour of your answer. 4

8. ✪ From the analysis of Astronomy it is observed that, the radius of two stars are 5.93km and 14.83km respectively. Mass of the Sun = 2×10^{30} Kg and Radius of the Sun = 7×10^{8}m.

a. What is Schwarzchild radius? 1

b. "Seeing is believing" is not applicable in Astro Physics. Explain. 2

c. Calculate the average density of the Sun. 3

d. Will the two stars be black holes? Give your opinion by mathematical analysis. 4

Physics Second Paper (MCQ)

Sub Code : 175

Time : 25 Minutes

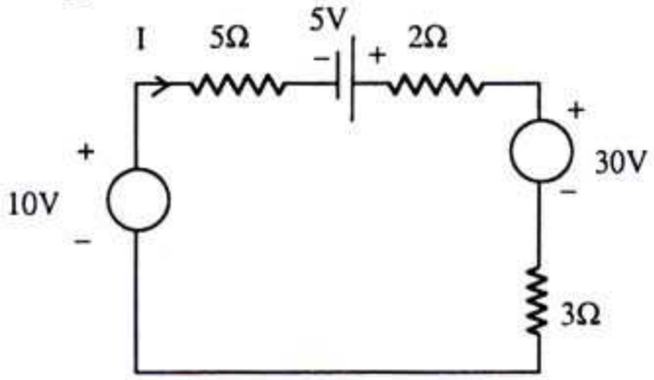
Full Marks : 25

[N.B. Fill the circle of the correct answer with a black ball point pen. Each question bears 1 mark.]

1. Which one of the following is ferromagnetic material?
ⓐ Copper ⓑ Silver
ⓒ Zinc ⓓ Iron

2. Which one of the following is an example of extensive property?
ⓐ Temperature ⓑ Density
ⓒ Internal energy ⓓ Surface tension

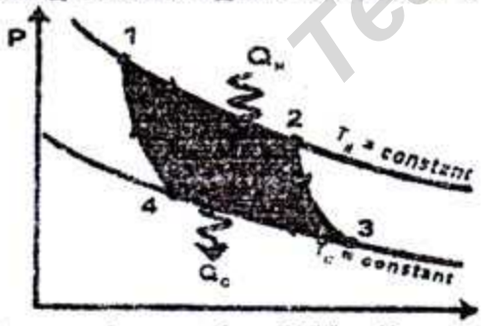
According to the below stem answer the questoin no. 3 & 4:



3. What will be the value of 'I'?
ⓐ –0.5A ⓑ 0.5A
ⓒ –0.2A ⓓ 0.2A

4. If all resistance is 5Ω then which one will be changes current?
ⓐ 1.33A ⓑ 0.17A
ⓒ 3.33A ⓓ 4.33A

Answer the questions (5 & 6) according to the figure in below :



The figure shows the P.V. diagram of a Carnot Engine. Here, Q_H =3500; and Q_0 = 2300 J

5. What is the efficiency of the engine?
ⓐ 25.87% ⓑ 28.57%
ⓒ 34.28% ⓓ 87.52%

6. According to above figure which curves indicate the work done (W) by the gas in cylinder of engine?
ⓐ $W_{1\text{ to }2}$ and $W_{2\text{ to }3}$
ⓑ $W_{2\text{ to }3}$ and $W_{3\text{ to }4}$
ⓒ $W_{3\text{ to }4}$ and $W_{4\text{ to }1}$
ⓓ $W_{4\text{ to }1}$ and $W_{1\text{ to }2}$

A prism of angle 60° when set in a position of angle of minimum deviation for a ray of angle of inculence is 45°.

Answer the following questions from the above information (7–8)

7. The angle of minimum deviation for the prism—
ⓐ 40° ⓑ 50°
ⓒ 30° ⓓ 35°

8. The refractive index of the prism is—
ⓐ 1.51 ⓑ 1
ⓒ 1.2 ⓓ 1.25

9. Current amplification factor α is—
ⓐ $\frac{I_C}{I_E}$ ⓑ $\frac{I_E}{I_C}$
ⓒ $\frac{I_B}{I_E}$ ⓓ $\frac{I_B}{I_C}$

10. 1 Fermi is equal to—
ⓐ 10^{-14}m ⓑ 10^{-12}m
ⓒ 10^{-16}m ⓓ 10^{-17}m

11. What is the equivalent energy of 1gram mass?
ⓐ $10 \times 10^{13} ms^{-1}$ ⓑ $9 \times 10^{13} ms^{-1}$
ⓒ $8 \times 10^{13} ms^{-1}$ ⓓ $7 \times 10^{13} ms^{-1}$

12. Binary addition satisfies—
ⓐ 1 + 1 = 0 with 1 in hand
ⓑ 1 + 1 = 1
ⓒ 1 + 1 = 0
ⓓ 1 + 1 = 1 with in hand 1

13. Thermodynamics is applicable to
ⓐ only microscopic systems
ⓑ only macroscopic systems
ⓒ only homogenous systems
ⓓ only heterogenous systems

14. Select the correct image of the electric field between two unlike charges.

ⓐ 
ⓑ 
ⓒ 
ⓓ 

15. Thomson atom model–

i. is known as plum pudding model
ii. can be compared as watermelon
iii. is proved from alpha particle scattering experiment

Which one is correct?

ⓐ i & ii ⓑ ii & iii
ⓒ i & iii ⓓ i, ii & iii

16. What are the factors an internal energy of the system depend upon?

i. quantity of the gas
ii. it's chemical nature
iii. temperature, pressure & volume

Which one is correct?

ⓐ i & ii ⓑ ii & iii
ⓒ i & iii ⓓ i, ii & iii

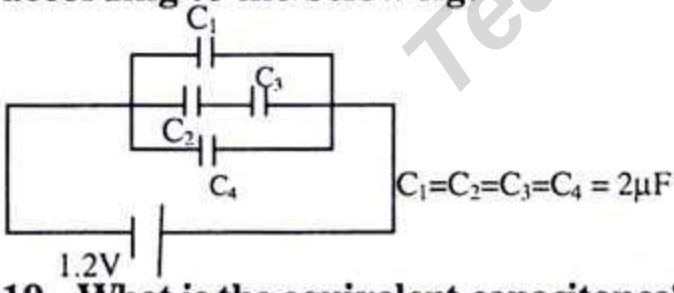
17. According to Bohr's Atomic model what is happened when an electron moves from higher energy state to lower one?

ⓐ Absorb senergy
ⓑ Emits photon
ⓒ increases angular momentum
ⓓ Reaches groundstate

18. In a semiconductor, the energy gap between valence and conduction bonds is about–

ⓐ 0.0 eV ⓑ 0.7 eV
ⓒ 1 eV ⓓ 1.5 eV

Answer the next two questions 19 & 20 according to the below fig.



19. What is the equivalent capacitance?

ⓐ 8μF ⓑ 1.25μF
ⓒ 5μF ⓓ .5μF

20. What is the total amount of charge of this circuit?

ⓐ 11μC ⓑ 2C
ⓒ 6μC ⓓ 6C

21. A galvanometer of resistance 100Ω can take 10mA current safely. How much shunt is required to measure 10A current?

ⓐ 0.5Ω ⓑ 0.3Ω
ⓒ 0.2Ω ⓓ 0.1Ω

22. The root mean square value of A.C. is—

ⓐ $I_{rms} = I_0\sqrt{2}$ ⓑ $I_{rms} = \frac{I_0}{\sqrt{2}}$
ⓒ $I\,rms = 2I_0$ ⓓ $I_{rms} = \frac{I_0\sqrt{3}}{2}$

23. Frame S_2 is moving away from the stationary Frame S_1 with a constant speed $\frac{c}{3}ms^{-1}$. If the observer of S_1 emits a flash of light and measures its speed as Cms^{-1}, then what will the observer of S_2 measure the speed of this light according to the Galilean transformation?

ⓐ $\frac{c}{3}ms^{-1}$ ⓑ $\left(C-\frac{c}{3}\right)ms^{-1}$
ⓒ $\left(C+\frac{c}{3}\right)ms^{-1}$ ⓓ Cms^{-1}

24. The expression for the magnification of a vapoured microscope is–

i. $M = \left(1-\frac{v_1}{f_0}\right)\left(1-\frac{v_2}{f_e}\right)$

ii. $M = -\left(1+\frac{D}{f_e}\right)$

iii. $M = -\frac{v_1}{u_1}\left(1+\frac{D}{f_e}\right)$

Which one is correct?

ⓐ ii & iii ⓑ i & iii
ⓒ i & ii ⓓ i, ii & iii

25. Shunt is—

i. Small value of resistance which is used parallel to a galvanometer
ii. High value of resistance which is used series to a galvanometer
iii. Small of value of resistance which is used series to a galvanometer

Which one is correct?

ⓐ i ⓑ ii
ⓒ iii ⓓ i, ii & iii

Ans.																									
	1	ⓓ	2	ⓐ	3	ⓐ	4	ⓑ	5	ⓒ	6	ⓒ	7	ⓒ	8	ⓑ	9	ⓐ	10	ⓓ	11	ⓑ	12	ⓐ	13	ⓒ
	14	ⓑ	15	ⓐ	16	ⓓ	17	ⓑ	18	ⓒ	19	ⓒ	20	ⓐ	21	ⓓ	22	ⓑ	23	ⓓ	24	ⓑ	25	ⓐ		