

Sylhet Board-2017

Physics Second Paper (Creative)

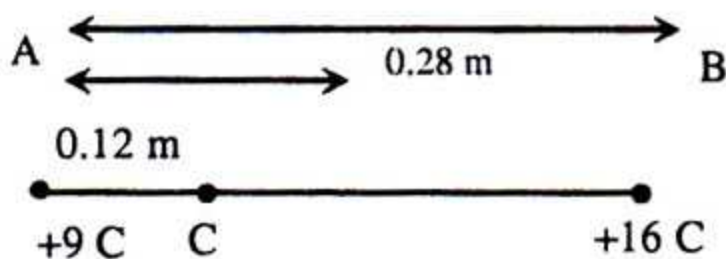
Sub Code : **1 7 5**

Time: 2Hrs 35 min

Full marks: 50

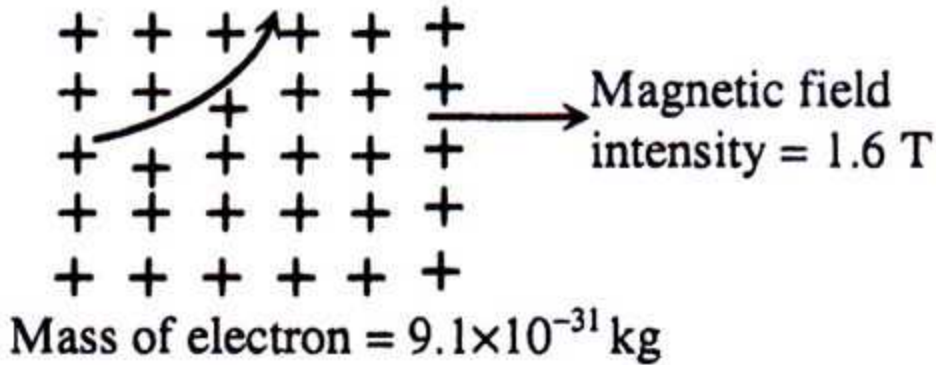
[Read the following stems and answer any five of the following questions:]

1. ► +9C and +16C are provided in two spheres. Their distance is 0.28m.



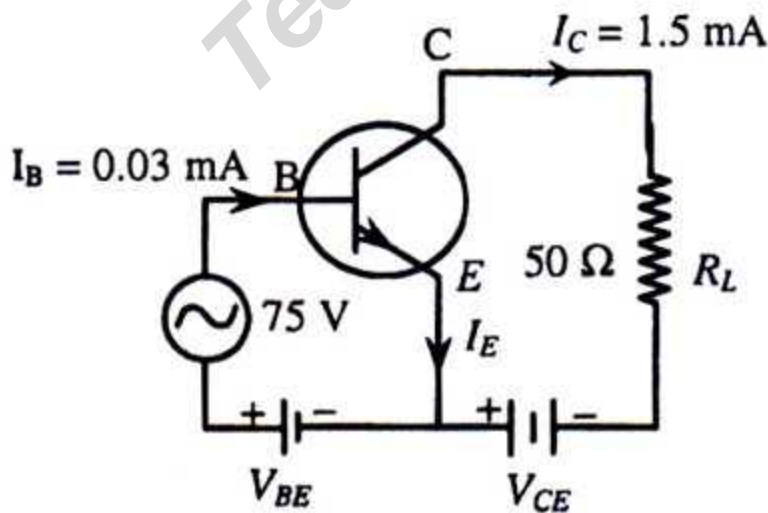
- What is dielectric constant? 1
 - 0.06 μF – 210 V is written on a capacitor. What does it mean? 2
 - What is the applied force on A from B? 3
 - If 1C charge is placed at C, will any force be applied on it? 4
2. ★ In a coffee pot, coffee is stirred really quickly. The volume of coffee is increased 50 cm^3 . At the same time, 40J heat leaves the pot. The atmospheric pressure is $1 \times 10^5 \text{ Nm}^{-2}$.
- What is heat system? 1
 - Why can the efficiency of engine never be 100%? 2
 - How much work was done on the coffee? 3
 - Does this support the first law of thermodynamics? Justify your answer. 4
3. ► In a lab, Rayhan inflicted 600nm light perpendicularly on a diffraction grating with $2 \mu\text{m}$ width. He assumed that he would see 9 points
- What is an electromagnetic wave? 1

- b. The power of a lens is -5 D - Explain. 2
- c. What is the angular distance between the points? 3
- d. Was his assumption correct? 4
4. ►



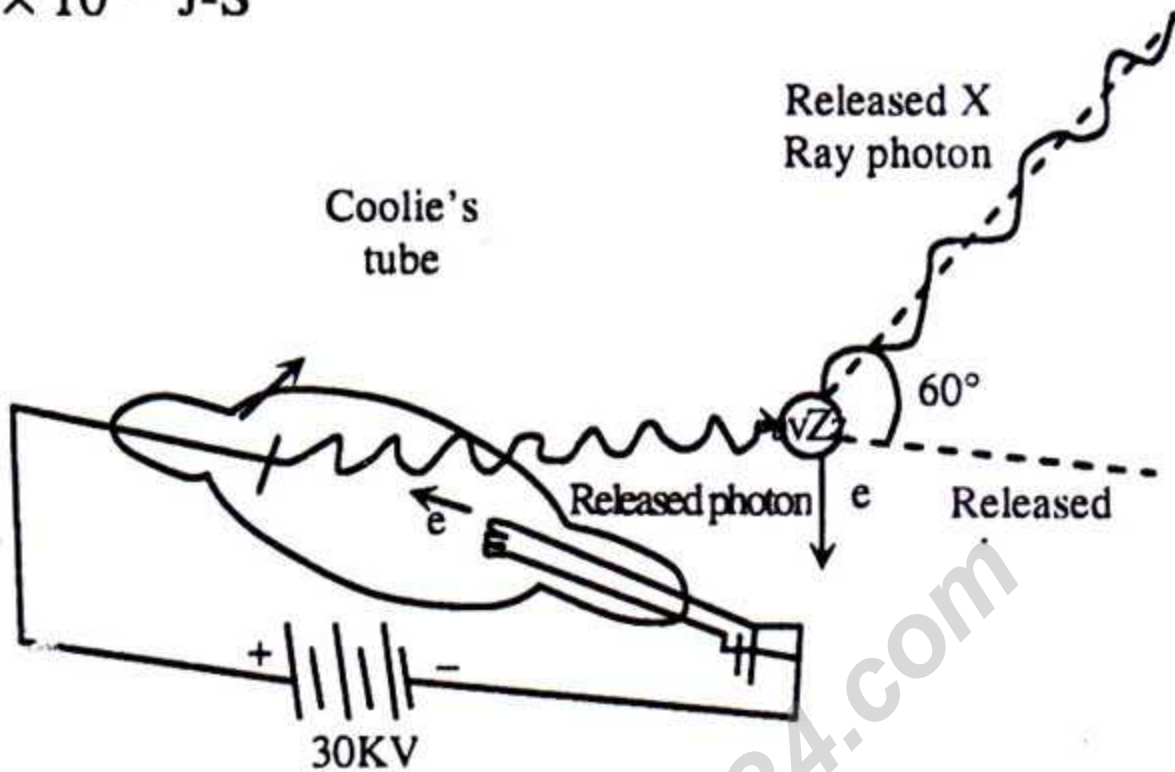
In the figure, a particle with $6.7 \times 10^{-27}\text{ kg}$ mass and $3.2 \times 10^{-19}\text{ C}$ charge enters the magnetic field with $2.5 \times 10^8\text{ ms}^{-1}$ velocity.

- a. What is self-magnetization? 1
- b. Why isn't there magnetic moment in diamagnetic matter? 2
- c. How much force is applied on the particle? 3
- d. If another electron enters the field with the same velocity, will the radius of the path of the first particle and this particle be the same? 4
5. ★ This is an n-p-n transistor circuit in a common ammeter—



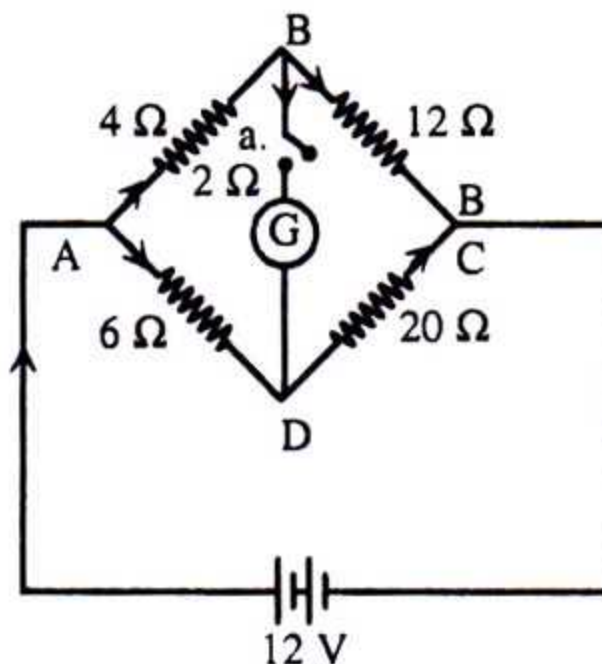
- a. What is the big bang? 1
- b. Why aren't black holes visible? 2
- c. What is the current gain α in the circuit? 3
- d. Can we use this circuit as an electric switch? 4

6. ► Here, X ray created from Coolie's tube is slanted 60° when it goes by metal. Here, $m_0 = 9.1 \times 10^{-31}$ kg, $h = 6.63 \times 10^{-34}$ J-S



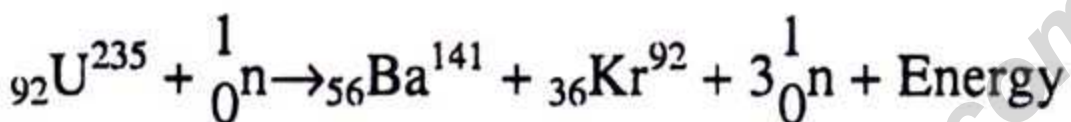
- What is the unit of molecular mass? 1
- If the length of an object is L_0 , how will it change when it is sent into space? 2
- Find the wavelength of the photon. 3
- Compare the momentum of the released photon and electron. 4

7. ★ Observe the circuit : -



- a. What is a dipole torque? 1
- b. Why is the charge of a conductor spread around rather than being accumulated in the centre? 2
- c. When the key is closed, how much and in which way can resistance be added to the fourth side, so that zero current flows? 3
- d. Does the current through BC changed when the key is open and when it is closed? 4

8. ► This is the fission reaction of Uranium:–



Here, γ ray hits a α particle. Of the total energy created in the reaction, γ bears one-tenth of it.

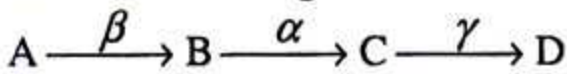
U^{235}	mass	is	=	235.0439	amu
${}_0^1\text{n}$	"	"	=	1.0087	amu
Ba^{141}	"	"	=	140.9139	amu
Kr^{92}	"	"	=	91.8973	amu
α particle	"	"	=	4.0012	amu
Proton	"	"	=	1.007276	amu

$$1 \text{ amu} = 1.6605 \times 10^{-27} \text{ kg}$$

- a. What is chain reaction? 1
- b. Even when a molecule has no electrons, how do electrons get released during β - decay? 2
- c. Find the energy dispelled during fission. 3
- d. Can γ ray break α particle? Calculate your answer. 4

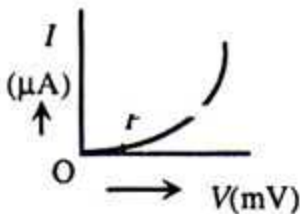
- The Compton wavelength is maximum when the angle of photon is –
 - 0°
 - 45°
 - 90°
 - 180°
- What is used for doping in P Type semiconductors?
 - Phosphorus
 - Arsenic
 - Aluminium
 - Carbon
- The stationary mass of a particle is m_0 whereas its kinetic mass is m . Its kinetic mass is 3 times its stationary mass. Which is correct?
 - $m = 4m_0$
 - $m = 3m_0$
 - $m = 2m_0$
 - $m = m_0$

Answer 4-5 using the stem:



The mass of D is 210 and atomic number is 82.

- What is the atomic number of B?
 - 84
 - 82
 - 80
 - 78
- A and B are—
 - Isomer
 - Isotope
 - Isotone
 - Isobar
- The graph was found when a PN diode made of Ge was in the forward biased region.

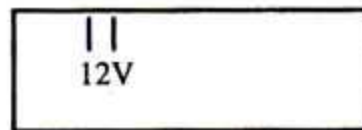
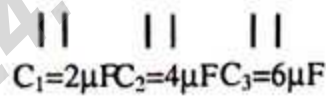


The potential energy indicated by OP is—

- Biassing voltage
 - Potential energy block voltage
 - Hall voltage
 - Square voltage
- ★ The spin of lepton is—
 - 0
 - $\frac{1}{2}$

- 1
 - $\frac{3}{2}$
- A natural change causes—
 - entropy and disorder decreases
 - entropy and order increases
 - entropy and order decrease
 - entropy and disorder increases
 - Magnetic field \vec{B} and magnetic intensity ratio \vec{H} is called —
 - Magnet flow
 - Magnet capacitance
 - Magnet emitting
 - Magnet permeability
 - Drops of oil in water look colourful- why?
 - Reflection
 - Interference
 - Refraction
 - Polarization

Answer 11-12 from the stem:



The three capacitors have been attached to 12V battery.

- If we attach 12V in parallel with C_2 —
 - 12 V
 - 6.57 V
 - 3.27 V
 - 2.16 V
- If they are connected in parallel with the same source—
 - The voltage difference of every capacitor increases
 - The charge of every capacitor decreases
 - The stored energy of total capacitance remains unchanged

Which is correct?

 - i and ii
 - ii and iii
 - i and iii
 - i, ii and iii

Note: The answer is just i.

13. ★ Which is correct?

- 1 Henry = $1 \text{ Vs}^{-1} \text{ A}^{-1}$
- 1 Henry = $1 \text{ Tm}^{-2} \text{ A}^{-1}$
- 1 Henry = 1 WbA^{-1}
- 1 Henry = 1 TmA^{-1}

14. The deviation of which color is called average deviation?

- (a) red (b) blue
(c) green (d) yellow

15. If the deviation of a place is 44°N , then a magnet hung from the centre is—

- i. Its north pole will point below horizontal plane
ii. The ratio of the intensity of the magnet and horizontal component is $\tan 44^\circ$
iii. The magnet will be 44° with the horizontal plane

Which is correct?

- (a) i and ii (b) i and iii
(c) ii and iii (d) i, ii and iii

16. Which is correct for isothermal expansion?

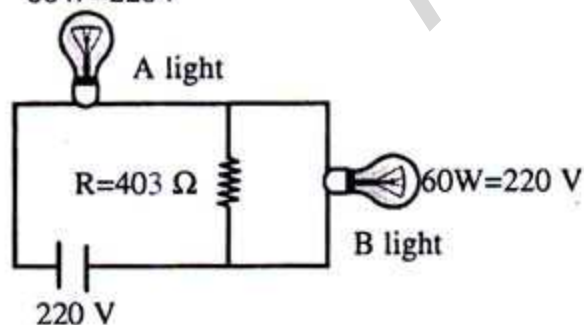
- (a) Work is done on system
(b) Temperature is unchanged
(c) Internal energy decreases
(d) Heat loss occurs

17. \star A coil of 1000 torsions and 1.57cm radius has 2A current flowing through it. The value of magnetic field is—

- (a) $1.275 \times 10^{-2}\text{T}$
(b) $2.55 \times 10^{-2}\text{T}$
(c) $4 \times 10^{-2}\text{T}$
(d) $8 \times 10^{-2}\text{T}$

Answer questions 18-19 using the stem:

$$60\text{W}=220\text{V}$$



A bulb with 60W-220V written on it is attached to the circuit along with a 220V battery.

18. What is the resistance of the filament of the bulb?

- (a) 3.67Ω (b) 16.36Ω
(c) 484.67Ω (d) 806.67Ω

19. If R is removed from the circuit-

(a) The brightness of A will increase and the brightness of B will decrease

(b) The brightness of B will increase and the brightness of A will decrease

(c) The brightness of A and B will increase

(d) The brightness of A and B will decrease

20. \star Which has the highest wavelength?

- (a) Red rays (b) Radio wave
(c) Visible ray (d) Ultraviolet ray

21. For electric dipoles—

- i. Dipole inertia is a vector
ii. The electric intensity is the highest at its axis
iii. The voltage is the highest at the axis

Which is correct?

- (a) i and ii (b) i and iii
(c) ii and iii (d) i, ii and iii

22. When the velocity of a coil placed in a magnetic field is increased, which is unchanged?

- (a) Peak of current flow
(b) Average value of current flow
(c) Root average of current flow
(d) Shape coefficient

23. If 1mole O_2 is slowly expanded at 40°C till the volume is doubled, the work done is-

- (a) 230.4J (b) 664.8J
(c) 1802.9J (d) 5202.1J

24. The focus distance of a telescope's objective and eye piece is 4m and 80cm. For focusing at infinity, the magnification is-

- (a) 4.8 (b) 5
(c) 6.56 (d) 20

25. Which is true for light polarization?

(a) Light intensity is greater than non-polarized light

(b) Its frequency plane is fixed

(c) For polarized light, $\vec{E} \parallel \vec{B}$

(d) The direction of its velocity and \vec{E} is the same

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