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12505

No. of Printed Pages: 4

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12 **SECOND REVISION EXAMINATION – FEBRUARY 2023**

PART – III

PHYSICS

Time Allowed : 3.00 Hours] [Maximum Marks : 70

Instructions : (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART – I

Note : (i) Answer **all** the questions. **15x1=15**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to,

(a) 2D (b) $\frac{D}{2}$ (c) $\sqrt{2D}$ (d) $\frac{D}{\sqrt{2}}$

2. If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.

(a) Q remains the same, C is doubled (b) Q is doubled, C doubled

(c) C remains same, Q doubled (d) Both Q and C remain same

3. ..... person cannot see in all the directions equally well

(a) Astigmatic (b) Hypermetropia (c) myopia (d) hyperopia

4. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w , then the refractive index of water is,

(a) $\frac{V_w}{V_a}$ (b) $\frac{V_a}{V_w}$ (c) $\frac{\lambda_w}{\lambda_a}$ (d) $\frac{V_a\lambda_a}{V_w\lambda_w}$

5. Rotor contains ..... windings.

(a) magnetic field (b) electric field

(c) electromagnetic (d) circular coil field

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6. A wire of length *l* carries a current I along the Y direction and magnetic field is given by $\vec{B} = \frac{\beta}{\sqrt{3}}(\vec{i} + \vec{j} + \vec{k})T$. The magnitude of Lorentz force acting on the wire is

(a) $\sqrt{\frac{2}{\sqrt{3}}}\beta I l$ (b) $\sqrt{\frac{1}{\sqrt{3}}}\beta I l$ (c) $\sqrt{2}\beta I l$ (d) $\sqrt{\frac{1}{\sqrt{2}}}\beta I l$

7. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is

(a) 4125Å (b) 3750Å (c) 6000Å (d) 2062.5Å

8. First excitation potential for hydrogen atom is

(a) 10.2 volt (b) 12.1 volt (c) 10.3 volt (d) 13.6 volt

9. A toaster operating at 240V has a resistance of 120 Ω. The power is

(a) 240W (b) 400W (c) 2W (d) 480W

10. The ratio of the wavelengths radiation emitted for the transition from n =2 to n = 1 in Li^{++}, He^{+} and H is

(a)1: 2: 3 (b) 1: 4: 9 (c) 3:2:1 (d) 4:9:36

11. Transistor oscillators is / are used to generate

(a) audio tones (b) Video tones (c) AF carriers (d) audio signal

12. "Ski wax" is an application of nano product in the field of

(a) Medicine (b) Textile (c) Sports (d) Automotive industry

13. The principle based on which a solar cell operates is

(a) Diffusion (b) Recombination

(c) Photovoltaic action (d) Carrier flow

14. A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is

(a) 1.2 (b) 0.83 (c) 0.12 (d) 0.9

15. The dimension of $\frac{1}{\mu_0 \varepsilon_0}$ is

(a) $[L\ T^{-1}]$ (b) $[L^2\ T^{-2}]$ (c) $[L^{-1}\ T]$ (d) $[L^{-2}\ T^2]$

PART – II

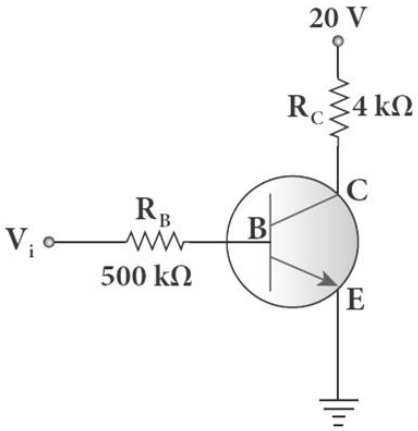
Note : Answer **any six** questions. Question No. **24** is **compulsory.** **6x2=12**

16. Define Q - factor
17. Define impact parameter.
18. What are called non-polar molecules? Give examples.
19. Give the Barkhausen conditions for sustained oscillations.
20. Define paraxial rays and marginal rays.
21. State tangent law.
22. What are the properties of the substance used as heating element?
23. Distinguish between Fresnel and Fraunhofer diffraction.
24. Calculate the cut-off wavelength and cutoff frequency of x-rays from an X –ray tube of accelerating potential 20,000 V.

PART – III

Note : Answer **any six** questions. Question No. **33** is **compulsory.** **6x3=18**

25. Give the properties of Lorentz magnetic force.
26. Mention the disadvantages of Robotics.
27. Derive an expression for energy stored in capacitor.
28. Obtain the reason for glittering of diamond.
29. Write a note on proton - proton cycle.
30. Derive the relation between the drift velocity and the current.
31. Write the uses of ultra violet rays and infra-red rays.
32. How will you induce an emf by changing the area enclosed by the coil?
33. In the circuit shown in the figure, the input voltage V_i is 20 V, V_{BE} = 0 V and V_{CE} = 0 V. What are the values of I_B, I_C, β?



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PART – IV

Note : Answer all the questions. 5x5=25

34. Derive the mirror equation and the equation for lateral magnification.

(OR)

Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

35. Obtain the equation for resultant intensity due to interference of light.

(OR)

Describe the principle, construction and working of Cyclotron.

36. Briefly explain the principle and working of electron microscope.

(OR)

How the emf of two cells are compared using potentiometer?

37. Obtain the law of radioactivity (radioactive decay).

(OR)

Write down Maxwell equations in integral form.

38. Draw the circuit diagram of a half wave rectifier and explain its working.

(OR)

Calculate the electric field due to a dipole on its axial line.

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