A

COMMON HALF YEARLY EXAMINATION - 2023

Standard XII

Reg No

PHYSICS

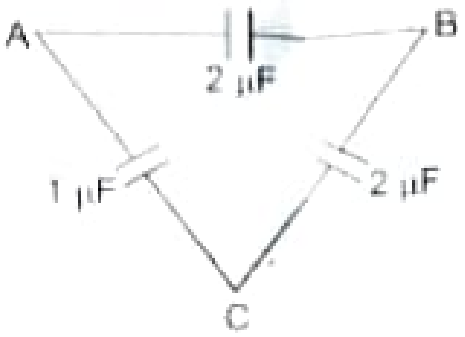
Time : 3.00 hrs *Marks : 70*

Part - I

15 x 1 = 15

I. **Choose the correct answer:**

1 Three capacitors are connected in triangle as shown in the figure. The equivalent capacitance between points A and C is



a) 1 μF b) 2 μF c) 3 μF d) $\frac{1}{4}$ μF

2 In Joule's heating law, when R and t are constant, if the H is taken along the y-axis and I^2 along the x-axis, the graph is

a) straight line b) parabola c) circle d) ellipse

3 The potential energy of magnetic dipole whose dipole moment is $\vec{P_m} = (-0.5\hat{i} + 0.4\hat{j})$ Am^2 kept in uniform magnetic field $\vec{B} = 0.2\hat{i}$ T

a) −0.1 J b) −0.8 J c) 0.1 J d) 0.8 J

4 In a series RL circuit, the resistance and inductive reactance are same. Then the phase difference between the voltage and current in the circuit is

a) $\pi/4$ b) $\pi/2$ c) $\pi/6$ d) zero

5 Which of the following electromagnetic radiations used for viewing objects through fog

a) microwave b) gamma rays c) X-rays d) infrared

6 The particle which gives mass two protons and neutrons are

a) Higgs particle b) Einstein particle c) Nano particle d) Bulk particle

7 The principle based on which a solar cell operates is

a) diffusion b) recombination c) photovoltaic action d) carrier flow

8 The mass of a $^{7}_{3}Li$ nucleus is 0.042 u less than the sum of the masses of all its nucleons. The average binding energy per nucleon of $^{7}_{3}Li$ nucleus is nearby

a) 46 Mev b) 5.6 Mev c) 3.9 Mev d) 23 Mev

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

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

10 Light transmitted by Nicol prism is

a) partially polarized b) unpolarized c) plane polarized d) elliptically polarized

11 The focal length of a lens is 1.5 m, its power of the lens is

a) 1.5 D b) 3.0 D c) 0.75 D d) 0.67 D

12 When the battery remains connected to a capacitor, a dielectric is inserted into the capacitor, the charge will be

a) a constant b) decreases c) increases d) becomes zero

13. V_{RMS} value of the domestic AC supply is 230 V, its peak value will be
a) 230 V b) 460 V c) 115 V d) 325 V
14. If the input to the NOT gate is A = 1011, its output is
a) 0100 b) 1000 c) 1100 d) 0011
15. In a nuclear reactor, _____ is used as a control rod.
a) graphite b) cadmium c) heavy water d) liquid sodium

Part - II

II. Answer any 6 questions. (Q.No.24 is compulsory) **6 x 2 = 12**

16. Mention the ways of producing induced emf.
17. What are the uses of X-rays?
18. State Gauss law.
19. What are the constituent particles of neutron and proton?
20. Define ampere in terms of force.
21. What is Rayleigh's scattering?
22. State Malus' Law.
23. Why steel is preferred in making Robots?
24. A copper wire of 10^{-6} m^2 area of cross section, carries a current of 2A. Calculate the current density.

Part - III

III. Answer any 6 questions. (Q.No.33 is compulsory) **6 x 3 = 18**

25. Obtain the expression for energy stored in the parallel plate capacitor.
26. Obtain the macroscopic form of Ohm's Law from its microscopic form.
27. List out salient features of magnetic Lorentz Force.
28. Obtain an expression for average power of AC over a cycle.
29. Write down the properties of electromagnetic waves.
30. Differentiate between polarised and unpolarised light.
31. List out the laws of Photoelectric effect.
32. State and prove De Morgan's first and second theorem.
33. Show that the moss of radium $\left(^{226}_{88}Ra\right)$ with an activity of 1 curie is almost a gram.

Given $T_{1/2}$ = 1600 years.

Part - IV

IV. Answer all the questions. **5 x 5 = 25**

34. a) Derive an expression for electrostatic potential due to an electric dipole. ***(OR)***
b) Derive the mirror equation for spherical mirror.
35. a) Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current using Biot-Savart law. ***(OR)***
b) Explain about compound microscope and obtain the equation for magnification.
36. a) Explain the principle, construction and working of a transformer. ***(OR)***
b) What is photoemissive cell? Gve the construction and working of photoemissive cell.
37. a) How the emf of two cells are compared using potentiometer. ***(OR)***
b) Explain J.J.Thomson experiment to determine the specific charge of electron.
38. a) What is emission spectrum? Explain the types of emission spectrum? ***(OR)***
b) Explain the construction and working of a full wave rectifier.

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