917505

No. of Printed Pages: 4

Register Number

12

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.   Q factor is equal to _____.

(a) $\dfrac{\omega_r L}{R}$ (b) $\dfrac{1}{R}\sqrt{\dfrac{L}{C}}$ (c) $\dfrac{X_L}{R}$ (d) All the above

2.   Which of the following ray penetrating power is high?

(a) x-ray   (b) UV ray   (c) gamma ray   (d) IR ray

3.   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) $\dfrac{D}{2}$ (c) $\sqrt{2D}$ (d) $\dfrac{D}{\sqrt{2}}$

4.   The flux linked with a coil at any instant t is given by $\Phi_B = 10t^2 - 50t + 250$. The induced emf at t = 12s is

(a) −190 V   (b) −10 V   (c) 10 V   (d) 190 V

5.   An electric dipole is placed at an alignment angle of 30^0 with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is

(a) 4 mC   (b) 8 mC   (c) 5 mC   (d) 7 Mc

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6.   The unit of power is diopter. One diopter is

(a) m^{-1} (b) m^2 (c) m^{-2} (d) m^{-3}

7.   A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere.
The magnetic dipole moment of the coil is

(a) 1.0 A m^2 (b) 1.2 A m^2 (c) 0.5 A m^2 (d) 0.8 A m^2

8.   Which one of them is used to produce a propagating electromagnetic wave?

(a) an accelerating charge   (b) an uncharged particle

(c) a charge moving at constant velocity   (d) a stationary charge

9.   In an electromagnetic wave travelling in free space the rms value of the
electric field is 3 Vm^{-1}. The peak value of the magnetic field is

(a) 1.414×10^{-8} T   (b) 1.0×10^{-8} T

(c) 2.828×10^{-8} T   (d) 2.0×10^{-8} T

10.   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

11.   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

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

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

13. $\frac{20}{\pi^2}$ H inductor is connected to a capacitor of capacitance C. The value of C in order
to impart maximum power at 50 Hz is

(a) 50 µF   (b) 0.5 µF   (c) 500 µF   (d) 5 µF

14.   For light incident from air on a slab of refractive index 2, the maximum possible
angle of refraction is,

(a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0

15.   As distance increases, the electric field is

(a) decreases   (b) increases   (c) constant   (d) None of these

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PART – II

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

16.   Define displacement current.

17.   Why does sky appear blue colour?

18.   What the methods of producing induced emf?

19.   Define the efficiency of the transformer.

20.   What are called non-polar molecules? Give examples.

21.   Define current density with SI Unit.

22.   How galvanometer can be converted in to ammeter?

23.   What is bandwidth of interference pattern?

24.   A potential difference across 24 Ω resistor is 12 V. What is the current through the resistor?
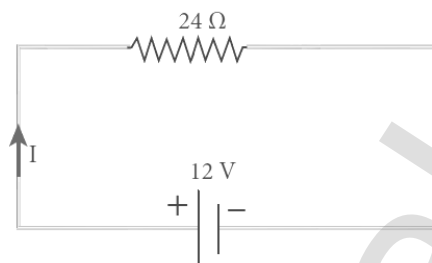
PART – III

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

26.   Give the properties of Lorentz magnetic force.

27.   How will you induce an emf by changing the area enclosed by the coil?

28.   List the properties of electric field lines.

29.   Find the heat energy produced in a resistance of 10 Ω when 5 A current flow through it for 5 minutes.

30.   Derive an expression for capacitance of parallel plate capacitor.

31.   Give any three uses of each of IR Radiation and Microwaves.

32.   Define total internal reflection and What are the conditions to achieve total internal reflection?

33.   An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.80 mm. What is the speed of electron?

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PART – IV

Note :   Answer **all** the questions.   **5x5=25**

34.   Explain in detail the construction and working of Van de Graff generator.

(OR)

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

35.   Define spectrum and explain in detail the emission spectra.

(OR)

Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.

36.   How the emf of two cells are compared using potentiometer?

(OR)

Deduce the relation for magnetic induction at a point due to an infinitely long straight conductor carrying current.

37.   Derive an expression for electro static potential due to electric dipole.

(OR)

Describe the Fizeau's method to determine speed of light.

38.   Describe the principle, construction and working of Cyclotron.

(OR)

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

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