

PHYSICS

BOOKS - UNITED BOOK HOUSE

MODEL PAPER SET-03

Exercise

1. Q charge is distributed uniformly through the volume of a sphere of radius R, The energy of the system will be—

A. $\frac{1}{4\pi\epsilon_0} \frac{3Q^2}{R}$

B. $\frac{1}{4\pi\epsilon_0} \frac{3Q^2}{5R}$

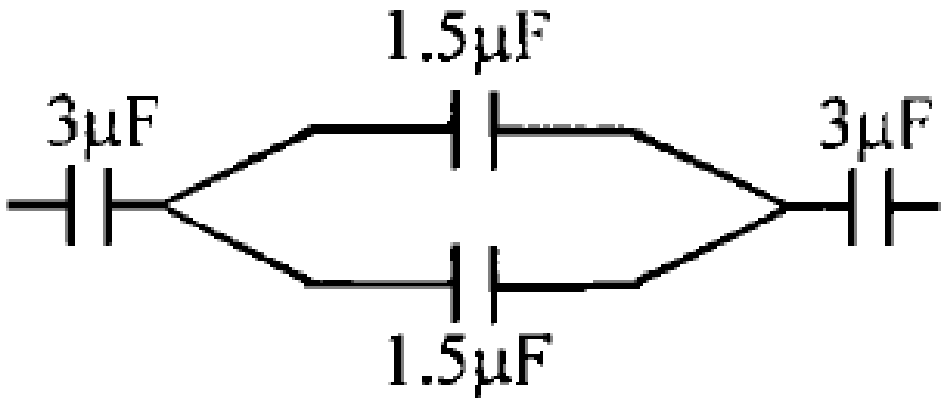
C. $\frac{1}{4\pi\epsilon_0} \frac{Q^2}{2R}$

D. $\frac{1}{4\pi\epsilon_0} \frac{2Q^2}{R}$

Answer:

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2. What is the equivalent capacitance for the given circuit?



- A. $1\mu\text{F}$
- B. $2\mu\text{F}$
- C. $1.5\mu\text{F}$
- D. $3\mu\text{F}$

Answer:

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3. The velocity of a charged particle moving in a magnetic field perpendicular to it is

A. $\propto \text{momentum}$

B. $\propto (\text{momentum})^2$

C. does not depend on its momentum

D. $\propto \frac{1}{\text{momentum}}$

Answer:

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4. Which is not the unit of magnetic permeability?

A. WbA^{-1}

B. Hm^{-1}

C. $T \cdot m \cdot A^{-1}$

D. $A \cdot m^{-1}$

Answer:



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5. Which is used in speedometer of a motor car?

A. displacement current

B. conduction

C. Eddy current

D. none of these

Answer:

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6. The self induction of an inductor $L = 2\text{mH}$, and the current through it follows the equation $i = e^{-t}t^2$, then the time at which emf becomes zero

A. 1s

B. 3s

C. 2s

D. 1 s

Answer:

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7. The wave function (in S.I. unit) for a light wave is $\Psi(x, t) = 10^3 \sin \pi(3 \times 10^6 x + 9 \times 10^{14} t)$. The frequency of the wave is—

- A. $4.5 \times 10^{14} Hz$
- B. $3.5 \times 10^{14} Hz$
- C. $3.0 \times 10^{10} Hz$
- D. $2.5 \times 10^{10} Hz$

Answer:



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8. A convex lens of focal lengths 30 cm produces 5 times magnified real image of an object What is the object distance ?

A. 0.36m

B. 0.25m

C. 0.30m

D. 1.50m

Answer:



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9. If the focal length of the eye piece of a telescope is doubled, its magnifying power (m) will be

A. $2m$

B. $3m$

C. $\frac{m}{2}$

D. $4m$

Answer:

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10. The de Broglie wave length of an electron of velocity 1.5×10^8 m/s is equal to that of photon. The ratio of the kinetic energy of electron and photon will be—

A. A. 1 : 4

B. B. 1 : 2

C. C. 1 : 1

D. D. 2 : 1

Answer:

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11. Write the variation of magnetic moment of an electron revolving in Bohr's orbit of atom with n , n being the principal quantum number

A. αn

B. αn^2

C. $\alpha n^{1/2}$

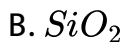
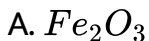
D. αn^3

Answer:



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12. Which of the following is not a semiconductor?



C. GaAs

D. CuO

Answer:



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13. The length of a dipole antenna for the carrier wave of frequency 3×10^8 Hz will be—

A. 5m

B. 50m

C. 0.5m

D. 500m

Answer:



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14. What is meant by the angle of dip $31^\circ N$ of Kolkata ?

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15. State Lenz's law.

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16. An alternating current having peak value 141 A is used to heat a metal wire. To produce the same rate of heating effect, another constant current I_A is used. What is the value of I ?

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17. What is dispersive power?



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18. A house hold circuit has a fuse of 5 A rating. Calculate the maximum number of bulbs rated 60 W —220 V each, which can be connected in- this household circuit?



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19. Write the Wheatstone bridge principle.



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20. Mention two differences Between magnetic lines of force and electric lines of force.

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21. A charged particle is found to move in a straight line through some region of space. Can we conclude that no magnetic field exists in that region?

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22. Mention two characteristics of electromagnetic waves.

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23. The radioactive decay constant is $4.28 \times 10^{-4} \text{ year}^{-1}$. What is the half life period of it?

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24. Explain why sky waves are suitable for long range communication.

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25. What is surface charge density?

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26. Two particles each carrying a charge of 2×10^{-8} C and connected by a silk thread of length 1 m, are placed on a frictionless horizontal insulated table. What is the tension in the string?

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27. The surface charge density of an infinite charged sheet is 10^{-7} C m^{-2} . If the potential difference between two equipotential surfaces be 5 V, then what is the distance between the surfaces?

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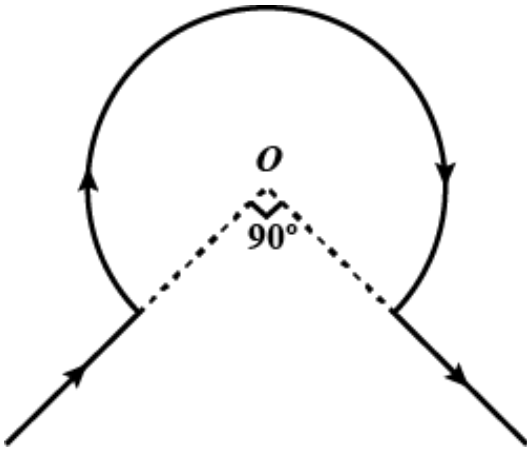
28. Show that the distribution of charge between two conductors connecting each other is proportional to its capacitance.

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29. The current through the wire is 10 A as shown in figure below.

Find magnetic field intensity at the point O of the circular part.

The radius of the circular part is 3 cm.



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30. A circular coil of radius 0.01 m has 100 turns and a current 7A.

It is suspended freely in a magnetic field 0.2 T. Which position of it

will be in stable equilibrium.

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31. A circular coil of radius 0.01 m has 100 turns and a current 7A. It is suspended freely in a magnetic field 0.2 T. Which position of it will be in unstable equilibrium? Find potential energy of the coil in both the cases.

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32. An air bubble in a glass sphere ($\mu = 1.5$) of radius 2 cm is 1 cm deep when viewed from one face across a diameter. Find the position of the air bubble.

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33. What is the significance of Plank's constant in quantum theory? The stopping-potential for photo electric emission from a metallic surface is $9V$, $\frac{e}{m} = 1.8 \times 10^{11} c/kg$. Calculate the maximum velocity of photo-electrons.

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34. Write two characteristics features of nuclear force which distinguish it from the coulomb force.

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35. What are p-type and n-type semiconductor? What is the resistance of a p-n junction diode when it is reverse biased?

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36. How NOR gate is formed? What is its symbol? Construct a truth table for it.

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37. In potentiometer method a cell can be balanced at 480cm. It is balanced at 400 cm when connected through a shunt 5Ω . Find the internal resistance of the cell.

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38. A conducting wire of length l is rotating with angular velocity ω in a magnetic field B perpendicular to it. Prove that the induced e.m.f. at the two ends of the conducting wire is $e = \frac{1}{2}B\omega l^2$.

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39. An aeroplane is travelling at the speed of 360km/hr along the horizontal to the earth surface'. What is the induced potential developed between the ends of the wing 5 m long, if the earth's magnetic field at the location has a magnitude of $4 \times 10^{-4}\text{wb/m}^2$ and dip angle is 30° ?

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40. The equation of an a.c. current $I = 50 \sin 100\pi t$. Find Frequency.

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41. The equation of an a.c. current $I = 50 \sin 100\pi t$. Find effective value of current.

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42. The equation of an a.c. current $I = 50 \sin 100\pi t$. Find the current $\frac{1}{300}$ sec after being zero.

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43. The equation of an a.c. current $I = 50 \sin 100\pi t$. Find the average value of current in positive half cycle.

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