



PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER -4 (SOLVED)

Part 1

1. A parallel plate capacitor stores a charge Q at a voltage V . Suppose the area of the

parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change ?

- A. Capacitance
- B. Charge
- C. Voltage
- D. Energy density

Answer:



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2. A carbon resistance has colour bands in order yellow, brown, red. Its resistance is

A. 41Ω

B. $41 \times 10^2\Omega$

C. $4 \times 10^3\Omega$

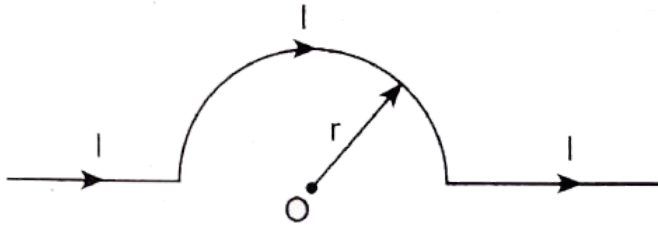
D. 4.2Ω

Answer:



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3. The magnetic field at the center O of the following current loop is



- A. $\frac{\mu_0 I}{4r} \odot$
- B. $\frac{\mu_0 I}{4r} \otimes$
- C. $\frac{\mu_0 I}{2r} \otimes$
- D. $\frac{\mu_0 I}{2r} \odot$

Answer:



4. The horizontal component of earth's magnetic field at a place is 3.6×10^{-5} T. if the angle of dip at this place is 60° , the vertical components of earth's field at this place is

A. $1.2 \times 10^{-5} T$

B. $2.4 \times 10^{-5} T$

C. $4 \times 10^{-5} T$

D. $6.2 \times 10^{-5} T$

Answer:



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

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. zero

Answer:



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6. alternating current can be measured by

A. moving coil galvanometer

B. hot wire ammeter

C. tangent galvanometer

D. none of the above

Answer:



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7. Let $E = E_0 \sin[10^6 x - \omega t]$ be the electric field of plane electromagnetic wave, the value of ω is

A. $0.3 \times 10^{-14} \text{rads}^{-1}$

B. $3 \times 10^{-14} \text{rads}^{-1}$

C. $0.3 \times 10^{14} \text{rads}^{-1}$

D. $3 \times 10^{14} \text{rads}^{-1}$

Answer:



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8. Two coherent monochromatic light beams of intensities I and $4I$ are superposed. The maximum and minimum possible intensities in the resulting beam are

A. $5I$ and I

B. $5I$ and $3I$

C. $9I$ and I

D. 9I and 3I

Answer:



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9. The transverse nature of light is shown in,

A. interference

B. diffraction

C. scattering

D. polarisation

Answer:



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10. Emission of electrons by the absorption of heat energy is called.....emission.

A. photoelectric

B. field

C. thermionic

D. secondary

Answer:



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11. Proton and α -particle have the same de-Broglie wavelength. What is same for both of them ?

A. Time period

B. Energy

C. Frequency

D. Momentum

Answer:



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12. The ratio of the wavelength 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

Answer:



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13. The principle in which a solar cell operates

- A. Diffusion
- B. Recombination
- C. Photovoltaic action
- D. Carrier flow

Answer:



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14. The output transducer of the communication system converts the radio signals into_____

A. Sound

B. Mechanical energy

C. Kinetic energy

D. none of the above

Answer:



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15. The alloys used for muscle wires in Robots are

A. Shape memory alloys

B. Gold copper alloys

C. gold silver alloys

D. Two dimensional alloys

Answer:



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Part II

1. What is polarisation?



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2. Why current is a scalar?



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3. The horizontal component and vertical components of Earth's magnetic field at a place are 0.15 G and 0.26 G respectively. Calculate the angle of dip and resultant magnetic field.



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4. State Fleming's right hand rule.



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5. The wavelength of a light is 450 nm. How phase it will differ for a path of 3 mm?



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6. How will you define threshold frequency ?



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7. Calculate the number of nuclei of carbon -14 undecayed after 22,920 years if the initial

number of carbon - 14 atoms is 10, 000. The half- life of carbon-14 is 5730 years.



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8. A diode is called as a unidirectional device. Explain.



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9. Give the factors that are responsible for transmission impairments.



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Part iii

1. A sample of HCl gas is placed in a uniform electric field of magnitude $3 \times 10^4 \text{ N} \cdot \text{C}^{-1}$. The dipole moment of each HCl molecule is $3.4 \times 10^{-39} \text{ Cm}$. Calculate the maximum torque experienced each HCl molecule.



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2. The resistance of a wire is 20Ω . What will be new resistance, if it is stretched uniformly 8 times its original length?



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3. State Biot-Savart's law.



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4. Give the principle of AC generator.



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5. A transformer is used to light a 140 W, 24 V bulb from a 240 V AC mains. The current in the main cable is 0.7 A. find the efficiency of the transformer.



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6. What are the Cartesian sign conventions for a spherical mirror?



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7. Write the relationship of de Broglie wavelength λ associated with a particle of mass m in terms of its kinetic energy K .



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8. What is binding energy of a nucleus? Give its expression.



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9. Distinguish between avalanche and zener breakdown.



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Part Iv

1. Calculate the electric field due to a dipole on its axial line and equatorial plane.



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2. Obtain the condition for bridge balance in Wheatstone's bridge.



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3. Show the time period of oscillation when a bar magnet is kept in a uniform magnetic field

is $T = 2\pi \sqrt{\frac{I}{p_m B}}$. In second, where I

represents moment of inertia of the bar magnet, p_m is the magnetic moment and B is the magnetic field.



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4. An inductor of inductance L carries an electric current i . How much energy is stored while establishing the current in it ?



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5. State Faraday's laws of electromagnetic induction.



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6. Obtain the equation for lateral magnification for thin lens.



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7. Obtain Einstein's photoelectric equation with necessary explanation.



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8. Derive the energy expression for hydrogen atom using Bohr atom model.



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9. Explain the construction and working of a full wave rectifier.



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10. Write the application of ICT ?



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