PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER-16 (UNSOLVED)

Part I

1. What is the ratio of the charges $\left|\frac{q_1}{q_2}\right|$ for the following electric field line pattern ?

- $\frac{1}{5}$
- $\frac{25}{11}$
- 5
- $\frac{11}{25}$

Answer: D

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2. The unit of permitivity of free space ε_0 is

A. coulomb/newton-metre

B. newton-metre^2/coulomb

C. $\text{coulomb}^2//\text{newton-metre}^2$

D. $\text{coulomb}/(\text{newton-metre}^2$

Answer: C

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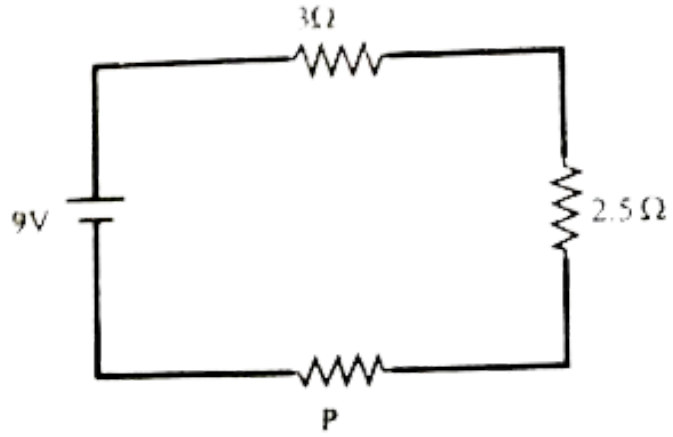
3. There is a current of 1.0A in the circuit shown below. What is the resistance of P?



A. 1.5Ω

B. 2.5Ω

C. 3.5Ω

D. 4.5Ω

Answer: C

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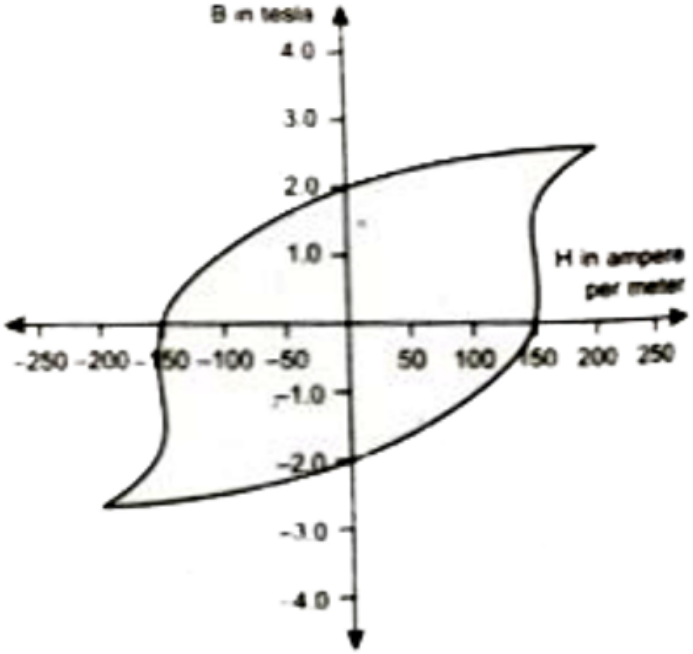
4. The B_H curve for a ferromagnetic material is shown in the figure. The material is placed inside a long solenoid which contains 1000 turns/cm. the current that should be passed in the solenoid to demagnetize the ferromagnet

completely is



A. 1.00 mA (mill ampere)

B. 1.25 mA

C. 1.50 mA

D. 1.75 mA

Answer: B

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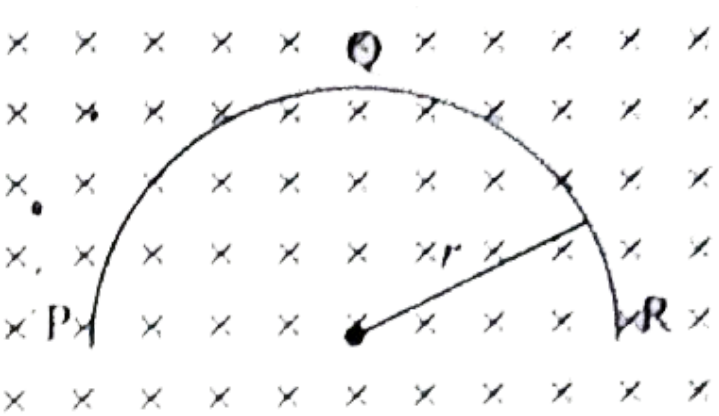
5. A thin semi-circular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic field B, as shown in the figure. The potential difference developed

across the ring when its speed v, is



A. Zero

B. $\frac{Bv\pi r^2}{2}$ and P is at higher potential

C. πrBV and R is at higher potential

D. 2rBv and R is at higher potential

Answer: D

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6. A power transmission line feeds input power at 2300 V to a stepdown transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary in order to get output power at 230 V?

A. the rate of transmission is faster at high voltages

B. it is more economical due to less power loss

C. power cannot be transmitted at low voltages

D. a precaution against theft of transmission lines

Answer: B

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7. Which of the following are false for electromagnetic waves

A. transverse

B. mechanical waves

C. longitudinal

D. produced by accelerating charges

Answer: C

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8. The energy in an electromagnetic wave is .....

A. Wholly shared only by electric field vector

B. Wholly shared only by magnetic field vector

C. Equally divided between electric and magnetic field

D. Zero

Answer: C

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9. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index,

A. less than one

B. less than that of glass

C. greater than that of glass

D. equal to that of glass

Answer: D

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10. If a light of wavelength 330nm is incident on a metal with word function 3.55eV, the electrons are emitted. Then the wavelength of the emitted electron is (Taken $h = 6.6 \times 10^{-34} Js$)

A. $< 2.75 \times 10^{-9} m$

B. $\geq 2.75 \times 10^{-9} m$

C. $\leq 2.75 \times 10^{-12} m$

D. $< 2.5 \times 10^{-10} m$

Answer: A

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11. Number of ejected photoelectrons increases with increases

A. in intensity of light

B. in wavelength of light

C. in frequency of light

D. never

Answer: A

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12. A radioactive nucleus (initial mass number A and atomic number Z) emits 2α and 2 positrons. The ratio of number of neutrons to that of proton in the final nucleus will be

A. $\frac{A-Z-4}{Z-2}$

B. $\frac{A-Z-2}{Z-6}$

C. $\frac{A-Z-4}{Z-6}$

D. $\frac{A-Z-12}{Z-4}$

Answer: B

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13. To obtain sustained oscillation in an oscillator

A. Feedback should be positive

B. Feedback factor must be unity

C. Phase shift must be 0 or 2π

D. All the above

Answer: D

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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: A

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15. The gravitational waves were theoretically proposed by ..... .

A. Conrad Rontgen

B. Marie Curie

C. Albert Einstein

D. Edward Purcell

Answer: C

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Part Ii

1. What are polar molecules ? Give examples.

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2. What is superconductivity ?

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3. The repulsive force between two magnetic poles in air is 9×10^{-3} N. if the two poles are equal in strength and are separated by a

distance of 10 cm , calculate the pole strength of each pole .

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4. What is meant by mutual induction ?

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5. What is the reason for reddish appearance of sky during sunset and sunrise?

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6. Give some important uses of photo-cells.

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7. What is half-life of nucleus? Give the expression.

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8. Draw the output waveform of a full wave rectifier.

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9. Define Bandwidth.

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Part Iii

1. Give the relation between electric field and electric potential .

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2. Calculate the equivalent resistance for the circuit which is connected to 24V battery and also find the poetntial differnce across 4Ω and 6Ω resistor in the circuit .

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3. Define Voltage sensitivity ?

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4. Define efficiency of transformer .

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5. If the relative permeability and relative permitivitty of the medium is 1.0 and 2.25,

respectively. Find the speed of the electromagnetic wave in this medium.

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6. What are resolution and resolving power?

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7. UV light of wavelength 1800Å is incident on a lithium surface whose threshold wavelength

4965Å. Determine the maximum energy of the electron emitted.

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

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9. What are sub atomic particles?

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Part Iv

1. Derive an expression for electrostatic potential energy of the dipole in a uniform electric field .

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2. Two cells each of 5V are connected in series across a 8Ω resistor and three parallel

resistors of $4\Omega, 6\Omega$ and 12Ω. Draw a circuit diagram for the above arrangement. Calculate (i) the current drawn fron the cell (ii) current through each resistor.

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3. calculate the magnetic field inside and outside of the long solenoid using ampere's circuital law.

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

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5. Derive the equation for acceptanc angle and numerical aperture, of optical fiber. Acceptance angle in optical fibre:

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

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7. Discuss the Millikan's oil drop experiment to determine the charge of an electron.

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8. State De Morgan's first and second theorems.

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9. Give the applications of ICT in mining and agriculture sectors.

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10. What are the possible harmful effects of usage of Nanoparticles? Why? Possible harmful effects of usage of Nanoparticles:

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