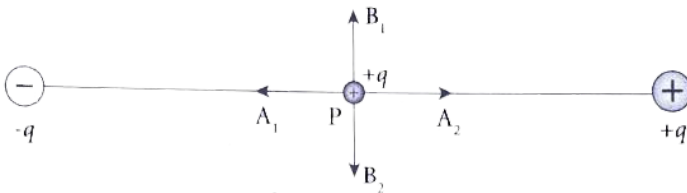# PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER - 18 (UNSOLVED)

Part I

1. Two identical point charges'of magnitude -q are fixed as shown in the figure below. A third

charge $+q$ is placed midway between the two charges at the point P. Suppose this charge is displaced a small distance from the point P in the directions indicated by the arrows, in which direction(s) will $+q$ be stable with respect to the displacement?

A. A_1 and A_2

B. B_2 and B_2

C. both drections

D. No stable

Answer: B

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2. Two identical point charges'of magnitude -q

are fixed as shown in the figure below. A third

charge $+q$ is placed midway between the two

charges at the point P. Suppose this charge is

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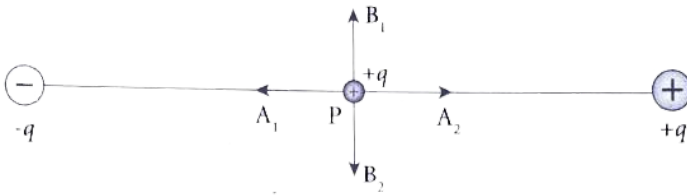
A. finite and positive

B. infinite

C. finite and negative

D. zero

Answer: D

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3. A carbon resistor of $(47 \pm 4.7)k\Omega$ to be marked with rings of different colours for its identification. The colour code sequence will be

    A. Yellow-Green- Violet Gold

    B. Yellow -Violet -Orange -Silver

    C. Violet-Yellow - Orange Silver

    D. Green-Orange- Violet Gold

Answer: B

4. A flat dielectric disc disc of radius R carries an excess charge on its surface. The surface charge density is σ. The disc rotates about an axis perpendicular to its plane passing through the center with angular velocity ω.

Find the magnitude of the torque on the disc if it is placed in a uniform magnetic field whose strength is B which is directed perpendicular to the axis of rotation

A. $\dfrac{1}{4}\sigma\omega\pi BR$

B. $\dfrac{1}{4}\sigma\omega\pi BR^2$

C. $\dfrac{1}{4}\sigma\omega\pi BR^3$

D. $\dfrac{1}{4}\sigma\omega\pi BR^4$

Answer: D

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5. When a charged particle enters a uniform magnetic field its kinetic energy

A. remains constant

B. increases

C. decreases

D. becomes zero

Answer: D

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6. When the current changes from + 2A to -2A

in 0.05 s, an emf of 8 V is induced in a coil is

co-efficient of self-induction of the coil is

A. 0.2 H

B. 0.4 H

C. 0.8 H

D. 0.1 H

Answer: D

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7. A coil area of cross section $0.5m^2$ with 10 turns is in a plane which is perpendicular to an

uniform magnetic field of $0.2Wb/m^2$. The flux through the coil is ....

A. 100 Wb

B. 10 Wb

C. 1 Wb

D. zero

Answer: C

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8. 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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9. When light is incident on a soap film of thickness 5×10^{-5} cm, the wavelength of light reflected maximum in the visible region is 5320 Å. Refractive index of the film will be,

A. 1.22

B. 1.33

C. 1.51

D. 1.83

Answer: B

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10. A setting sun appears to be at an altitude higher than it really is. This is because of

A. absorption of light

B. reflection of light

C. refraction of light

D. dispersion of light

Answer: C

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

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: D

13. The primary use of a zener diode is

A. Rectifier

B. Amplifier

C. Oscillator

D. Voltage regulator

Answer: D

14. The internationally accepted frequency deviation for the purpose of FM broadcasts.

A. 75 kHz

B. 68 kHz

C. 80 kHz

D. 70 kHz

Answer: A

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15. The technology used for stopping the brain from processing pain is

    A. Precision medicine

    B. Wireless brain sensor

    C. Virtual reality

    D. Radiology

Answer: C

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1. Define 'electrostatic potential".

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2. In a meter bridge, the value of resistance in the resistance box is 10Ω. The balancing length is $l_1 = 55cm$. Find the value of dunknown resistance.

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3. What is magnetic susceptibility ?

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4. What do you mean by self-induction?

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5. What is critical angle and total internal reflection?

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6. Why we do not see the wave properties of a baseball ?

7. Characol pieces of tree is found from an archeological site. The carbon - 14 content of this characol is only 17.5% that of equivalent sample of carbon from a living tree. What is the age of tree?

8. Define electron motion in a semiconductor.

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9. What is mean by fibre optic communication?

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Part Iii

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

2. If the resistance of coil is 3Ω at $20°C$ and $\alpha = 0.004/°C$ then determine its resistance t $100°C$.

3. Define magnetic field.

4. The magnetic flux passing through a coil perpendicular to is plane is a function of time and is given by $\Phi_B = \left(2t^3 + 4t^2 + 8t + 8\right)$ Wb. If he resistance of the coil is 5Ω, determine the induced current through the coil at a time t = 3 second.

5. Write down the concept of black body spectrum.

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6. Why do clouds appear white?

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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.
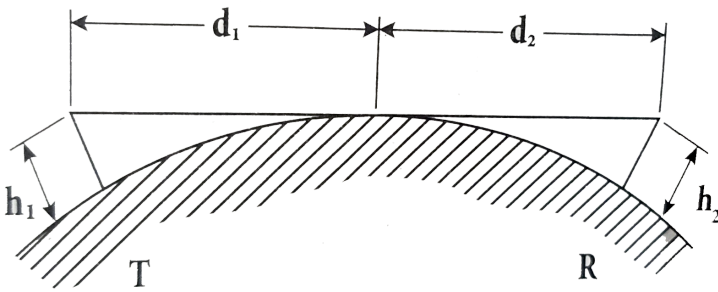
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8. Calculate the energy equivalent of 1 atomic mass unit.

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9. A transmitting antenna has a height of 40 m and the height of the receiving antenna is 30 m. What is the maximum distance between them for line-of-sight communication? The radius of the earth is $6.4 \times 10^6 m$

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Part Iv

1. Explain dielectrics in detail and how an electric field is induced inside a dielectric .

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2. Explain the equivalent resistance of a series and parallel resistor network.

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3. Show the time period of oscillation when a bar magnet is kept in a uniform magnetic field is T $= 2\pi\sqrt{\dfrac{l}{p_m B}}$. In second, where I represents moment of inertia of the bar magnet, p_m is the magnetic moment and is the magnetic field.

4. Find out the phase relationship between voltage and current in a pure inductive circuit.

5. Obtian the equation for lateral displacement of light passing through a glass slab.

6. Explain the quantum concept of light.

7. Discuss the spectral series of hydrogen atom.

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8. Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave form.

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9. Elaborate on the basic elements of communication system with the necessary block diagram.

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10. Comment on the recent advancement in medical diagnosis and therapy.

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