



PHYSICS

BOOKS - D MUKHERJEE PHYSICS (HINGLISH)

MISCELLANEOUS QUESTION 4

Missellaneous Qns 4 Matrix Matching Type

1. Columns A and B describe some definitions, descriptions and symbolic representations

used in current electricity.

Column A

- (i) The reading of a voltmeter of finite resistance connected directly to a cell
- (ii) The line integral of the electric intensity (\vec{E}) over a closed path, i.e., $\int \vec{E} \cdot d\vec{l}$, in a circuit which does not have a cell
- (iii) The potential difference between the terminals of a cell in which current flows in a direction opposite to its emf
- (iv) Current flowing through a cell whose emf is being measured by a potentiometer, in the position of balance

Column B

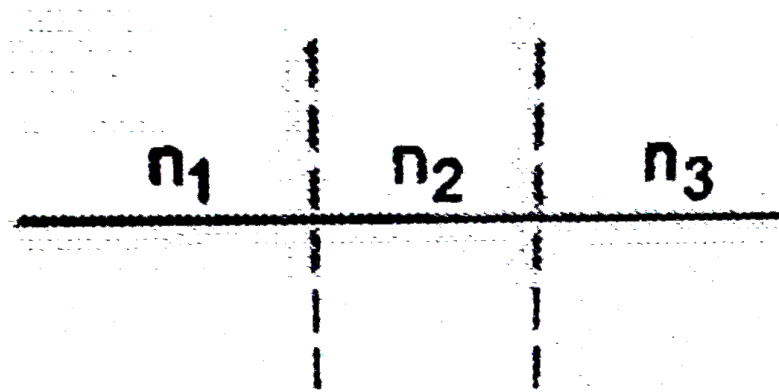
- (a) Less than the emf of the cell
- (b) Greater than the emf of the cell
- (c) Zero
- (d) Its emf divided by its internal resistance



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2. All questions refer to the diagram given below. The denoted lines represent the two

surfaces of a lens that may be plane or curved. R_1 and R_2 are the radii of curvature of the surfaces on the left and right respectively. The refractive index of the medium to the left of the lens is n_1 , that of the material of the lens itself is n_2 , and that of the medium to the lens is n_3 . The first and second focal lengths of the lens are f_1 and f_2 respectively.



Column A contains certain conditions and

column B contains some results which may follow from such conditions.

Column A

- (i) $n_1 = n_3$
- (ii) $R_1 > 0$, $R_2 < 0$, with $n_2 < n_1, n_3$
- (iii) R_1 and R_2 have opposite signs, with $n_2 > n_1, n_3$
- (iv) R_1 and R_2 are both negative, with $|R_1| < |R_2|$ and $n_2 > n_1 = n_3$

Column B

- (a) Both f_1 and f_2 are either positive or negative
- (b) f_1 is positive but f_2 is negative
- (c) $f_1 = f_2$
- (d) Both f_1 and f_2 are negative



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3. Interference can be observed in wave motions under suitable conditions. Consider only interference in light and sound waves,

between two waves at a time.

Column A

- (i) Requires coherent sources
- (ii) Intensity may increase and decrease periodically
- (iii) Only one real source can be used at a time
- (iv) Two different real sources may be used at a time

Column B

- (a) Interference in light and sound
- (b) Interference in light only
- (c) Interference in sound only
- (d) Neither in sound nor in light



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4. We identify and understand a sound on the basis of certain characteristics, given in column A. These characteristics depend on certain measurable parameters of the sound. These parameters and related units are given

in column B.

Column A

- (i) Loudness
- (ii) Pitch
- (iii) Tone
- (iv) Intensity

Column B

- (a) Waveform
- (b) Decibel
- (c) Frequency
- (d) Watt/metre²



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5. In the production of X-rays by a Coolidge tube, the changes which can be made in its operation are listed in column A. The possible

effects of such changes are listed in column B.

Column A

- (i) Change in the current flowing through the filament (emitter or cathode)
- (ii) Change in the potential difference applied across the tube
- (iii) Change in the metal used as the target
- (iv) Rotating the tube from a horizontal position to a vertical position

Column B

- (a) Harder or softer X-rays are produced
- (b) Wavelengths of the characteristic X-rays change
- (c) Intensity of the X-rays change
- (d) cut of wavelengths changes



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6. In the Young's double-slit experiment, some variations which can be made are listed in column A. The possible effects of such changes are listed in column B.

Column A

- (i) Lights of two different wavelengths are incident on the double slits

- (ii) White light is incident on the slits

- (iii) The two slits are of unequal width

- (iv) A thin film is placed in front of one of the slits

Column B

- (a) Completely dark fringes are not formed on the screen

- (b) The entire visible spectrum is formed on both sides of the centre of the screen

- (c) Two fringe patterns overlap on the screen

- (d) Bright white fringe is formed at the centre of the screen



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7. Some properties and observations related to sound are given in column A, while the processes, physical quantities and units

related to them are given in column B.

Column A

- (i) Loudness
- (ii) Identifying the source of a sound
- (iii) Beats
- (iv) Coherent sources

Column B

- (a) Interference
- (b) Decibel
- (c) Waveform
- (d) Energy crossing unit area normally per unit time



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8. Some relations and laws related to fluids are given in column A, while the physical reasons

behind them are given in column B.

Column A

- (i) Stokes' law
- (ii) Equation of continuity
- (iii) Bernoulli's theorem
- (iv) Velocity of efflux

Column B

- (a) Surface potential energy
- (b) Force of viscosity
- (c) Conservation of mass
- (d) Conservation of energy



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9. In the motion of charged particles through a region containing either only uniform electric field \vec{E} or only uniform magnetic field \vec{B}_0 or both, certain properties are listed in column A and their possible reasons or explanations are given in column B and their

possible reasons or explanations are given in column B. (Here, \vec{v} denotes the velocity of the particle and force means the force acting on the particle.)

Column A

- (i) \vec{v} cannot remain constant in \vec{E} only
- (ii) \vec{v} may remain constant if only \vec{B} is present
- (iii) \vec{v} must remain constant in if only \vec{B} is present
- (iv) \vec{v} may remain constant if both \vec{E} and \vec{B} are present

Column B

- (a) $\vec{v} = \vec{E}/\vec{B}$
- (b) The force acting on the particle must always be normal to its velocity
- (c) The force acting on the particle is of constant magnitude
- (d) There must be some component of the force acting on the particle in the direction of its motion at some time



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