PHYSICS

BOOKS - SUNSTAR PHYSICS (KANNADA ENGLISH)

P.U. BOARD LATEST MODEL QUESTION PAPER-3

Part A

1. Who discovered the fact that amber rubbed with wool or silk attracts light objects?

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2. Define current density.

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3. What should be the angle between the velocity vector of the charged particle and the

magnetic field to experience a maximum force, when a charged particle is moving in a uniform magnetic field?

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4. Write the relation between relative permeability and magnetic susceptibility of a magnetic material.

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5. State Lenz's law.

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6. An elderly person is facing difficulty while reading a book which is about 25cm distance from his eyes. Name the eye defect from which the person is suffering.

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7. Mention any three application of polaroids

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8. A graph of stopping potential of a photo sensitive metal with the frequency of incident radiation is plotted. What does the slope of this curve represent?

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9. How to get a steady d.c output from the pulsating d.c output of a full wave rectifier?

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10. Represent a typical analogue signal with a diagram

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Part B

1. Write Coulomb's law in vector form and explain the terms.

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2. Define relaxation time of conduction electrons. How it depends on the temperature of the conductor?

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3. State and explain Gauss's law in magnetism.

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4. A coil of self-inductance 2H is carrying a current of 2A. Calculate the energy stored in the coil.

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5. What was Marconi's invention in the field of electromagnetic waves? What for it is used now?

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6. Mention any two methods of increasing the resolving power of a microscope.

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7. What is an isotone? Give an example .

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8. A transistor is having a β equal to 80 has a change in base current of $250\mu A$. Calculate the change in the collector current.

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Part C

1. Derive an expression for the electric potential energy of a system of two point charges in the absence of an external electric field.

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2. What is a cyclotron? Give the expression for cyclotron frequency and explain the terms.

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3. Mention any three properties of diamagnetic substance.

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4. Derive the expression for emf induced in a straight conductor moving perpendicular to a uniform magnetic field.

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5. What is meant by resonance in a series LCR circuit? Write the expression for the current through LCR series circuit at resonance. Mention any one application of resonant circuits.

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6. Obtain the relation between radius of curvature and focal length of a concave mirror with necessary ray diagram.

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7. Draw the schematic diagram of a nuclear reactor and label its parts. What is the function of a moderator in a nuclear reactor?

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8. Mention the three important reasons which necessitate the process of modulation in communication.

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Part D

1. Write the expression for electric field intensity at any point outside and inside due to a charged spherical shell.

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2. Deduce the condition for balance of a wheatstone's bridge using Kirchoffs rules .

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3. Obtain an expression for the force between two straight parallel conductor carrying current. Hence define ampere.

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4. Give the theory of interference of light by considering waves of equal amplitude and hence arrive at the conditions for constructive

and destructive interference in terms of path difference.

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5. Obtain an expression for the total energy of an electron in the n^{th} orbit of hydrogen atom in terms of absolute constants.

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6. Explain the use Zener diode as a voltage regulator.

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7. A parallel plate capacitor has two plates of dimensions $10cm \times 7cm$ separated by a distance of 0.7 mm. A glass plate of thickness 0.4 mm (dielectric constant = 6) and another dielectric medium of thickness 0.3 mm (dielectric constant = 2.5) are placed between

the plates of the capacitor. Calculate the capacitance of the capacitor before and after introduction of the dielectric media.

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8. A silver wire has a resistance of 2.1 Ω at $27.5^{\circ}C$, and a resistance of 2.7 Ω at $100^{\circ}C$. Determine the temperature coefficient of resistivity of silver. Also find the resistance of the silver wire at $0^{\circ}C$.

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9. A resistor of 200 Ω, an inductor of 25 mH and a capacitor of 15.0 μF are connected in series to a 220 V, 50 Hz ac source. Calculate the current through the circuit. Also find the phase difference between the voltage across the source and the current.

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10. A ball is approaching a convex mirror of focal length 30 cm with speed 20 m/s.

Calculate the speed of its image when the ball was at 5 m from the mirror?

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11. The threshold wavelength of photo sensitive metal is 5000Å. Find the velocity of the photoelectrons emitted by it when radiation of wavelength 4000 Å is incident on it.

Given

$h = 6.625 \times 10^{-34} Js, e = 1.6 \times 10.^{-19} C$

and mass of electron = $9.1 \times 10^{-34} kg$.

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