PHYSICS

BOOKS - SUNSTAR PHYSICS (KANNADA ENGLISH)

ANNUAL EXAM QUESTION PAPER MARCH-2020

Part A

1. Write the SI unit of electric flux

2. Draw a plot showing the variation of resistivity of a (i) conductor and (ii) semiconductor, with the increse in temperature.

3. Give any one use of electromagnet

4. What is the significance of Lenz's law ?

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5. How does capacitive reactance vary with frequency ?

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6. Arrange the following electronmagnetic waves in ascending order of their wavelength: Radio waves, Gamman rays, Infrared waves, X-rays

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7. Sky seen from earth appears blue because of

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

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9. Write the nuclear reaction equation-for alpha decay of $^{238}_{92}U$

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10. Give the logic symbol, Boolean expression and truth table of a NOR gate.

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Part B

1. State Coulomb.s law

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2. A parallel plate capacitor with air between the plates has capacitance C. What will be the capacitance if

(a) the distance between the plates is doubled?

(b) the space between the plates is filled with a substance of dielectric constant 5?

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3. Give any two practical limitations of Ohm's law.

4. In a region, an electric field $\vec{E} = 5 \times 10^3 \hat{j} NC^{-1}$ and a magnetic field of $\vec{B} = 0.1 \widehat{K} T$ are applied. A beam of charged particles are projected along X-direction. Find the velocity of charged particles which move an deflected in this crossed fields.

5. What is hysterisis? Define the terms 'coercivity' and 'retentivity' of a ferromagnetic material.

6. What is a transformer ? Mention two sources of energy loss in a transformer

7. What is displacement current? Give the expression for it

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8. An alpha particle, a proton and an electron are moving with equal kinetic energy. Which one of these particles has the longest de Broglie wavelength? Give reason.

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1. Derive a relation between electric field and potential

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2. Derive the expression for energy stored in a charged capacitor.

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3. Give the principle of cyclotron and draw the neat labelled schematic diagram of cyclotron.

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4. Mention any three properties of diamagnetic substance.

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5. Define focal length of a mirror and hence relate focal length and radius of curvature of a

mirror.

6. Using Huygens principle, show that the angle of incidence is equal to angle of reflection during a plane wave front reflected by a plane surface.

7. Define work function. Write Einstein's photoelectric equation and explain the terms.

8. Give three differences between intrinsic and extrinsic semiconductors

Part D

1. Derive $\sigma = \dfrac{ne^2\tau}{m}$

where the symbols have their usual meaning.

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

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3. Derive an Expression for instantaneous induced emf in an A.C generator

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4. Obtain the expression for fringe width in the case of interference of light waves.

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5. Derive an expression for the radius of nth Bohr's orbit of hydrogen atom hence write the expression for the radius of first orbit of hydrogen atom.

6. What is Rectification? Describe with a circuit diagram the working of a p-n junction diode as half wave rectifier with input and output waveforms.

7. Two point charges

$q_A = 5\mu C$ and $q_B = -5\mu C$ are located at A

and B separated by 0.2m vacuum.

What is the electric field at the midpoint O of

the line joining the charges? If a negative test

charges of magnitude 2mC is placed at O, what

is the force experienced by the test charge?

8. (a) Three resistors $3\Omega, 4\Omega,$ and 12Ω are connected in parallel. What is the effective resistance of the combination?

(b) If the combination is connected to a battery of emf 6V and internal resistance 0.5Ω, find the current drawn from the battery and terminal potential difference across the battery.

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9. A series LCR circuit contains a pure inductor of inductance 5.0H, a capacitor of capacitance $20\mu F$ and a resistor 40Ω. Find the resonant frequency of the circuit. Calculate the quality factor (Q- factor) of the circuit. What is the impedance at resonant condition?

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10. At what angle should a ray of light be incident on the face of a prism of refracting

angle $60°$ so that it just suffers total internal reflection at the other face? The refractive index of the material of the prism is 1.524.

11. A copper coin has a mass of 63.0g. Calculate the nuclear energy that would be required to separate all the neutrons and protons form each other. The coin is entirely made of $_{29}^{63}Cu$ atoms.

Mass of $_{29}^{63}Cu$ atom = 62.92960u

mass of proton = 1.00727u

Mass of neutron = 1.00866u

Avogadro's number = 6.022×10^{23}

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