PHYSICS

BOOKS - OSWAAL PUBLICATION PHYSICS (KANNADA ENGLISH)

2020 Solved Paper I

Exercise

1. Write the SI unit of electric flux

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2. Plot a graph of resistivity of a semiconductor as a function of absolute temperature.

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3. Give any one use of electromagnet

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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. Why does the sky appear dark instead of blue to an astronaut?

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

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

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

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10. State Coulomb.s law

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11. 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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13. What are the limitatons of ohm.s law?

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14. In a region, an electric field $\overrightarrow{E} = 5 \times 10^3 \hat{j} NC^{-1}$ and a magnetic field of

$\vec{B} = 0.1\hat{K}T$ 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.

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

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16. Mention energy losses in a transformer .

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

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18. 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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19. Derive the relation between electric field and electric potential.

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

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

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22. Mention any three properties of diamagnetic substance.

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

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24. 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.

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

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26. Give three differences between intrinsic and extrinsic semiconductors

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27. Derive $\sigma = \frac{ne^2\tau}{m}$

where the symbols have their usual meaning.

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

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

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

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31. Derive an expression for the radius of n^{th} Bohr's orbit of hydrogen atom hence write the expression for the radius of first orbit of hydrogen atom.

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32. 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.

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33. 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?

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35. (a) Three resistors $3\Omega, 4\Omega, \text{ and } 12\Omega$ 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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37. 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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40. 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.

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41. 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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