BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

B. Tech. Sem - II Computer Science & Engineering : WINTER : 2023

SUBJECT : PHYSICS FOR COMPUTING SYSTEMS

Day : Tuesday

Time : 10:00 AM-01:00 PM

Date : 21-11-2023

W-24026-2023

Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Use of non-programmable calculator is **allowed**.
4) Assume suitable data **WHEREVER** necessary.
5) Draw neat labeled diagrams **WHEREVER** necessary.

Constants :

$e = 1.6 \times 10^{-19} C$
$m_e = 9.1 \times 10^{-31}$ kg
$h = 6.63 \times 10^{-34}$ J–s
$m_p = 1.66 \times 10^{-27}$ kg
$N_a = 6.025 \times 10^{23}$ atoms / gm-mole

Q.1 Why the resolving power of transmission electron microscope is higher than optical microscope? Explain the construction and working of TEM. **(10)**

OR

Q.1 Derive the formula for final velocity for a charged particle when accelerated by voltage V. **(10)**
If the electron is accelerated by voltage of 300 kV, calculated its final velocity and energy in eV.

Q.2 Derive the formula for intensity of light which is diffracted by single slit. **(10)**
For the slit width 5×10^{-4} cm, at what angle the first diffraction minima will fall.

OR

Q.2 With experimental set-up explain the formation of Newton's rings. Also prove that the diameter of dark ring is proportional to square root of an integer. **(10)**

Q.3 With energy level diagram, explain the construction and working of Ruby laser. **(10)**

OR

Q.3 State and explain the applications of lasers in i) medicine ii) computers. **(10)**

Q.4 In an optical fibre, derive the formula for numerical aperture and acceptance angle. **(10)**

OR

Q.4 State and explain the advantages and disadvantages of optical fibre. **(10)**

Q.5 Deduce the Schroedinger's time dependent wave equation. **(10)**

OR

Q.5 State and explain the Heisenberg's uncertainty principle. Prove that an electron cannot exist inside the nucleus. **(10)**

Q.6 Explain the working of diode on the basis of band theory. **(10)**

OR

Q.6 Derive the formula for conductivity in n-type semiconductors. **(10)**
Calculate the conductivity in semiconductor, if the donor atoms added are 1 per 10^6 of pure semiconductor.
(Given $n_i = 1.6 \times 10^{10} / cm^3$ and $\mu_e = 1500\ cm^2 / V\text{-sec}$)

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