BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
Computer Science & Engineering-AI&ML
B. Tech. Sem - I :SUMMER : 2023
SUBJECT : PHYSICS FOR COMPUTING SYSTEMS

Day : Thursday | Time : 10:00 AM-01:00 PM

Date : 11-05-2023 | S-23924-2023 | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicates **FULL** marks.
3) Use to the non-programmable **CALCULATOR** is allowed.
4) Assume suitable data **WHEREVER** necessary.

Constants:
$e=1.6 \times 10^{-19}C$
$m_e=9.1x10^{-31}kg$
$h=6.63x10^{-34}js$
$mp=1.66x10^{-27}$ kg
$Na=6.025x10^{23}$ atoms/gm-mole

Q.1 **a)** Explain motion of an electron in transverse uniform Magnetic field and explain electrostatic focusing. **(06)**

b) An electron moves at right angle to a field of a magnetic intensity 3.20 Wb/m^2 with velocity of $1.6x10^{12}$ cm/s calculate radius of circular path. Given $e/m=1.76x10^{11}$ C/kg **(04)**

OR

Q.1 **a)** Explain the principle construction and working of scanning electron microscope (SEM) with a neat diagram. **(06)**

b) Calculate the velocity of proton and electron accelerated through a potential difference of 20 kV. **(04)**

Q.2 **a)** What is polarization? Explain principle and working of Nicol prism. Distinguish between positive and negative crystal. **(06)**

b) White light falls normally on a soap film of thickness $4.5x10^{-5}$ cm and of refractive index 1.26. Which wavelength in the visible region will be reflected most strongly? **(04)**

OR

Q.2 **a)** With suitable diagram explain the formation of Newton's rings in reflected light prove that reflected light the diameter of n^{th} dark ring is proportional to the square root of natural number. **(06)**

b) A plane transmission grating having 6000 lines per centimeter gives an angle of diffraction of a 30^0 in 2^{nd} order find the wavelength of the line. **(04)**

Q.3 **a)** With neat energy level diagram explain the construction and working of He-Ne Laser. **(06)**

b) Distinguish between spontaneous and stimulated emission. **(04)**

OR

Q.3 **a)** With neat energy level diagram explain the construction and working of semiconductor Laser. **(06)**

b) Explain metastable state. Principle of Laser and write the Einstein's Coefficient. **(04)**

(PTO)

Q.4 a) Draw a suitable diagram and derive an expression for numerical aperture of a step index fiber. **(06)**

b) If refractive index of a core of an optical fiber is 1.57 and a fractional index difference Δ is 0.0003, find the refractive index of cladding and numerical aperture. **(04)**

OR

Q.4 a) Draw a neat diagram of fiber optic communication system .write the advantage and disadvantage of optical fiber. **(06)**

b) Step index fiber has a core diameter 29×10^{-6} meter refractive index of core and cladding is 1.52 and 1.5189 if the light of wavelength is 1.3 micrometer is transmitted through the fiber. Determine normalized frequency of the fiber **(04)**

Q.5 a) Derive schrodinger's time independent wave equation in one dimension. **(06)**

b) Calculate the energy of neutron in units of electron volt whose de Broglie wavelength is 0.1 A^0. **(04)**

OR

Q.5 a) State Heisenberg's uncertainty principle. Prove the electron cannot pre-exist in free state in nucleus. **(06)**

b) Lowest energy of an electron trapped in a potential well is 20 eV. Calculate the width of the well. **(04)**

Q.6 a) What is a Hall Effect? State its significance. How can mobility be determined by using Hall effect? **(06)**

b) The resistivity of Cu is 1.72×10^{-8} ohm-m. Calculate the mobility of electron in Cu. Given that number of electron per unit volume is $10.41 \times 10^{28}/m^3$ **(04)**

OR

Q.6 a) Explain Fermi level in intrinsic semiconductor and explain free electron theory. **(06)**

b) State Bloch theorem and explain energy band in solid **(04)**

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