

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)

B. Tech. Sem - II E&C :SUMMER- 2022

SUBJECT : WAVE THEORY & PHOTONICS

Day : Thursday

Time : 10:00 AM-01:00 PM

Date : 28-07-2022

S-24089-2022

Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) draw neat and labelled diagram **WHEREVER** necessary.
- 4) Use of non – programmable **CALCULATOR** is allowed.
- 5) Assume suitable data wherever necessary.

Constants:

$$e = 1.6 \times 10^{-19} \text{C}$$

$$m_e = 9.1 \times 10^{-31} \text{kg}$$

$$h = 6.63 \times 10^{-34} \text{J-s}$$

$$m_p = 1.66 \times 10^{-27} \text{kg}$$

$$N_a = 6.025 \times 10^{23} \text{atoms / gm -mole}$$

Q.1 What is noise? How the noise pollution can be controlled? **(10)**

OR

Q.1 What is piezoelectric effect? How it can be used for generating ultrasonic waves? **(10)**

Find the echo time of ultrasonic pulse which is travelling with velocity 3.1×10^3 m/s in mild street. The correct thickness of slab measured is 9 mm.

Q.2 State and explain Maxwell's equation. Give the limitation with the Ampere's law and therefore derive the formula for correction. **(10)**

OR

Q.2 Derive the formula for plane electric and magnetic wave in conducting media. **(10)**

Q.3 With the energy level diagram, explain construction and working of CO₂ laser. What are the advantages of CO₂ laser? **(10)**

OR

Q.3 What is principle used in optical fiber? Explain the construction and working of optical fiber. **(10)**

Q.4 State and explain Heisenberg's uncertainty principle. Prove that an electron can not exist inside the nucleus. **(10)**

OR

Q.4 What is packing factor? Calculate the packing factor for
i) BCC ii) FCC **(10)**

Q.5 What do you mean by dual nature of light? What is the parameter controlling the dual nature? Explain. **(10)**

OR

Q.5 Give differences between Fraunhofer's and Fresnel's diffraction. **(10)**

Q.6 What is green energy? How they are better than conventional energy sources. **(10)**

OR

Q.6 State and explain photovoltaic effect. How it is used in solar cells for energy conversion. **(10)**