# BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
## B. Tech. Sem - II Electronic & Communication : WINTER- 2022
## SUBJECT : WAVE THEORY & PHOTONICS

Day : Friday
Time : 10:00 AM-01:00 PM

Date : 25-11-2022
**W-24089-2022**
Max. Marks : 60

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**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.

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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** What are the properties of ultrasonic waves which make them different? State and explain use of ultrasonics in medicine. **(10)**

**OR**

**Q.1** Give the difference between sound intensity and sound intensity level. Two sound sources a producing sound intensity 60 dB and 80 dB. What will be the resultant sound intensity level? **(10)**

**Q.2** What is skin effect? Derive the formula for skin depth. **(10)**

**OR**

**Q.2** Prove that the velocity of electromagnetic wave in free space is $2.99784 \times 10^8$ m/s. **(10)**

**Q.3** What is Einstein's A and B coefficients? Derive the relation between them. **(10)**

**OR**

**Q.3** What are the properties which makes laser special? Explain the use of laser in remote sensing. **(10)**

**Q.4** What is miller indices. Explain the method for determining miller indices for a plane. **(10)**
Draw the planes for : i) 111 ii) 101

**OR**

**Q.4** Derive the Schroedinger's time independent and time dependent wave equation. **(10)**

**Q.5** Explain Fraunhofer's diffraction. What are the features of Fraunhofer's diffraction which makes it better than Fresnel's diffraction? **(10)**

**OR**

**Q.5** Explain in brief, **(10)**
i) LED and ii) Photodiode

**Q.6** What are the different sources of geothermal energy? Explain the mechanism to harness the geothermal energy. **(10)**

**OR**

**Q.6** What is biomass? How the biomass can be effectively used as source of energy? **(10)**

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