Total No. of Questions – [03]

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Paper code - U119-104 NCB (T1)

OCTOBER 2019 / INSEM (T1)

F. Y. B.TECH. (COMMON) (SEMESTER - I)

COURSE NAME: Engineering Physics (NCB)

COURSE CODE: ES10184A-NCB

(PATTERN 2018)

Time: [1 Hour] [Max. Marks: 20]

Instructions to candidates:

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data where ever required.**

Q 1) Attempt any **two**.

a) Derive the expression for displacement of a free undamped oscillator. **[4]**

b) The amplitude of 1st and 5th maximum in the displacement of a system undergoing damped free oscillations is 10.7mm and 3.4mm, respectively. Calculate the damping ratio of the system. **[4]**

c) Write the expression for deformation response factor R_d and discuss its behaviour when (a) $\omega \ll \omega_n$ (b) $\omega \gg \omega_n$ and (c) $\omega \cong \omega_n$. **[4]**

Q 2) Attempt any **two**.

a) Discuss the importance of (a) echo, (b) focusing and defocusing, (c) echelon effect and (d) reverberation, arising due to reflection of sound, in the acoustics of an auditorium. **[4]**

b) With the help of a neat diagram, discuss how ultrasound is generated using inverse piezoelectric effect. **[4]**

c) Earthquake is produced due to relative shift of tectonic plates. The point where it produces seismic waves is called focus. A seismic station records a time difference of 1 minute between the arrival of primary and the secondary waves, which have a velocity of 6km/s and 3.5km/s, respectively. Find the distance of the focus from the seismic station. **[4]**

Q 3) Attempt any **one**.

a) With the help of a neat diagram, derive an expression for the inter-planar distance d for planes with Miller indices (hkl) in a cubic crystal structure. **[4]**

b) Calculate the lattice spacing a for a cubic crystal if the peak corresponding to (311) plane occurs at an angle $2\theta=64°$ in its X-ray diffraction pattern obtained using X-ray with a wavelength of $\lambda=1.54$Å. **[4]**