Total No. of Questions – [3] Total No. of Printed Pages: 1

G.R. No.	

Paper Code- U18-104 NCB (T1)

OCTOBER 2018 / IN-SEM (T1)

F. Y. B.TECH. (NCB) (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 a system for the 11^{th} and 27^{th} cycle in free damped oscillations is 1 cm and 1 mm, respectively. Calculate the damping factor. **[4]**

c) A machine weighing 100 kg is mounted on a spring with stiffness 7.84×10^5 N/m and damper with damping factor 0.2. A harmonic force F = 392sin(314.15t) N acts on the machine. For steady state vibration of the machine, calculate the amplitude of vibration of the machine. **[4]**

Q 2) Attempt any **two**.

a) With the help of a diagram, define intensity of sound at a distance r from a point source with power P and hence write the expression for intensity level. **[4]**

b) A hall has dimensions of length × breadth × height = $20\times10\times7.5$ m^3. If the apparent absorption coefficients are: a(wall) = 0.3, a(ceiling) = 0.2 and a(floor) = 0.5, calculate the reverberation time. **[4]**

c) Calculate the thickness of a quartz plate required to produce ultrasonic waves of frequency 10 MHz. Given: Density of crystal = 2650 kg/m^3, B = 3.8×10^{10} N/m^2 and S = 4.4×10^{10} N/m^2. **[4]**

Q 3) Attempt any **one**.

a) Which techniques can be used to determine the size of a crystallite and a grain in a polycrystalline material and how? **[4]**

b) What is numerical aperture of a microscope and how does it determine the resolution? Explain with the help of a diagram. **[4]**