VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA

Mid Semester Examination November - 2019

COURSE NAME: B. Tech SEMESTER: 1st

BRANCH NAME: ALL

SUBJECT NAME: PHYSICS

FULL MARKS: 20 TIME: 2 Hours

Answer **All** Questions.

The figures in the right hand margin indicate Marks. *Symbols have their usual meaning.*

Q1. Answer all Questions. [1 ×5]

a) What do you mean by steady state condition of sustained forced vibration? - CO1

b) Write down the 2nd order differential equation of damped harmonic oscillation and explain each term. - CO1

c) State and explain sharpness of resonance. - CO2

d) Write down an expression for the time period of a compound pendulum and explain the term involved. - CO2

e) Why colour in thin film is not visible in two beam interference? - CO3

Q2. [5]

a) (i)Show that $\frac{9}{Y} = \frac{1}{B} + \frac{3}{\eta}$, where Y, B and η are Young's modulus of elasticity, bulk modulus and rigidity modulus respectively. - CO1

(ii) A wire of length 1m and radius 0.5 mm elongates by 0.32mm when stretched by a force of 49N and twist through 0.4 radian when equal and opposite force of $3x10^{-3}$ N-m are applied at its end. Calculate the elastic constants for iron.

OR

b) (i)What do you mean by a cantilever? Deduce an expression for the determination of Young's modulus of elasticity using a Canti lever loaded at one end with a mass of m gm. - CO1

(ii) Describe a Torsion pendulum. How it can be used to measure the torsional rigidity?

Q3. [5]

a) (i) Obtain an expression for the amplitude of a forced harmonically vibrating body under the application of an external force **F sin pt**. - CO2

(ii) A damped harmonic oscillator starts from rest has an initial amplitude of 10 cm, reduces to 1 cm after 50 complete oscillations each of period 1 sec. Find the logarithmic decrement and quality factor of the system.

OR

b) (i) Derive an expression for the amplitude of amplitude resonance and velocity resonance. - CO2

(ii) State and explain under damped oscillation with examples.

Q4. [5]

a) (i)Write a wave equation and establish the 2nd ODE of wave motion. - CO3

(ii) What do you mean by superposition? Obtain an expression the resultant intensity of n- harmonic waves when superposed.

OR

b) (i)Explain Interference in parallel thin film with a suitable diagram. Obtain an expression for the maxima and minima. - CO3

(ii)A soap film of refractive index 1.33 is illuminated with light of different wavelengths at an angle of 45°. There is complete destructive interference for λ=5890 A^0. Find the thickness of the film.