

Five-Year integrated M.Sc. Examination 2021
Semester - I
Paper: PH-1-1-1
Mechanics, Waves and Oscillations

Time: Three hours

Full marks: 60

Questions are of value as indicated in the margin.

Answer question number 1 and any five from the rest.

1. Answer any five from the following: 5x2 = 10
 - (a) Define the three coefficients of elasticity.
 - (b) Explain Reynolds number.
 - (c) Define simple harmonic motion.
 - (d) Find the time period of SHM of a simple pendulum for small oscillations.
 - (e) What do you mean by progressive waves and stationary waves?
 - (f) Define phase velocity and group velocity.

2. Derive and explain centrifugal force due to the rotation of earth about its own axis. 10
3. What do you mean by internal bending moment of a beam? Derive an expression for it. 10
4. A light uniform beam of length L is horizontally clamped at one end and loaded at the other end with a weight W . Calculate the downward displacement of the beam at the loaded end. 10
5. Establish Bernoulli's equation for an incompressible fluid, when the flow is streamline and irrotational and the external force is gravitational force. 10
6. Explain the normal modes and normal coordinates for free oscillation of a system of two coupled pendulums. 10
7. State and explain Fourier's theorem. Explain how the coefficients of the Fourier series of a periodic function are evaluated. 10