C. ABDUL HAKEEM COLLEGE (AUTONOMOUS), MELVISHARAM - 632 509. SEMESTER EXAMINATIONS, NOVEMBER - 2018

B.Sc., PHYSICS U18MPH101 - PROPERTIES OF MATTER AND ACOUSTICS

Time: Three Hours Maximum: 75 Marks

SECTION - A $(10 \times 2 = 20 \text{ Marks})$

Answer ALL Questions.

- State and explain Hooke's law.
- 2. Calculate the work done in stretching a uniform metal wire of area of cross section 10^{-6} m² and length 1.5 m through 4 x 10^{-3} m, given $E= 2 \times 10^{11}$ Nm⁻².
- 3. What is meant by a beam? Explain the terms neutral axis and bending moment of a beam.
- 4. Calculate the depression at the free end of a rectangular cantilever of length 0.6m loaded with 0.2 kg; breadth = 0.02 m; Young's modulus of the material of the beam = $1 \times 10^{10} \text{ Nm}^{-2}$.
- 5. Define surface tension of a liquid. What are its dimensions?
- 6. Explain the principle of molecular pump.
- 7. What are longitudinal waves?
- 8. With one example, state what is called resonance.
- 9. A source of sound has a frequency of 512 Hz and an amplitude of 0.25 cm. what is the flow of energy across a square metre per second, if the velocity of sound in air is 340 ms⁻¹ and density of air is 1.29 kg m⁻³?
- 10. Define reverberation.

SECTION - B (5 X 5 = 25 Marks)

Answer ALL Questions.

a) Explain stress – strain diagram.

(Or

- b) Calculate the work done in twisting a wire.
- 12. a) Derive an expression for an internal bending moment of a bar.

(Or

- b) State the basic assumption for theory of bending of beams.
- 13. a) Obtain an expression for the excess of pressure inside (i) a spherical soap bubble and (ii) a spherical liquid drop.

(Or)

- b) Explain the variation of viscosity with temperature and pressure.
- 14. a) Explain in brief about the superposition of waves

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- b) Describe the average kinetic energy of vibrating particle.
- 15. a) Define Intensity and Loudness of sound and write down distinctions between them.

(Or.)

b) Explain how ultrasonic waves are produced in a magnetostriction oscillator.

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SECTION - C (3 X10 = 30 Marks) Answer **ANY THREE** Questions.

- 16. Derive the relation between elastic constants.
- 17. Describe with relevant theory, an experiment to determine Young's modulus of a bar by cantilever depression method.
- Describe Jaegar's method of studying the variation of Surface tension of water with temperature.
- 19. What are damped oscillations? Discuss analytically the motion of a particle executing damped simple harmonic oscillation.
- Define the reverberation time. Derive Sabine's formula for reverberation time. Explain its significance.
