**TB162510B** **Reg. No: ……**

**Name: ……**

**B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017**
**(2016 Admission - Regular & 2015 Admission – Supplementary/Improvement)**
**SEMESTER II - CORE COURSE (PHYSICS)**
**PH2B02TB – MECHANICS AND PROPERTIES OF MATTER**

**Time: Three Hours** **Maximum Marks: 60**

## PART A

**I. Answer all questions. Each question carries 1 mark.**

1. Define angular momentum.
2. Give the equation of a plane progressive wave.
3. Give Sabine's formula for reverberation.
4. Give the limiting values of Poisson's ratio.
5. Give the unit and dimension of surface tension.

**(5x1=5)**

## PART B

**II. Answer any five questions. Each question carries 2 marks.**

6. Obtain the relation connecting angular momentum and torque.
7. Give the Osborne-Reynolds formula for critical velocity.
8. Give the differential equation for wave motion.
9. Give any two characteristics of plane progression wave.
10. What are the acoustic requirements of a hall?
11. Explain bulk modulus.
12. What is flexural rigidity?
13. Camphor particles sprinkled on water move haphazardly. Why?

**(5x2=10)**

## PART C

**III. Answer any five questions. Each question carries 5 marks.**

14. A solid sphere of mass M and radius R rolls on a surface with a linear velocity v. Show that its total energy is $0.7Mv^2$.
15. A capillary tube 0.2m in length and $0.5x10^{-3}$m in diameter is fitted horizontally to the bottom of a large vessel filled with alcohol to a steady height of 0.3m above the axis of the tube. The density of alcohol is 800 $kg/m^3$ and its viscosity is $1.2x10^{-3}$ $Nsm^{-2}$. Find the volume of alcohol flowing out through the capillary tube in two minutes.
16. The wavelength of sound in air is 0.25 m. Find its wavelength in water. Velocity of sound in air is 340m/s. Velocity of sound in water = 1400m/s.
17. A train stands at a platform, blowing a whistle of frequency 400 Hz. What is the frequency of the whistle heard by a man running towards the engine at 10m/s? Velocity of sound = 350 m/s.

18. The frequency range of given ultrasonic sound is 20 kHz to 30 kHz. Find the wavelength range. Velocity of sound = 350 m/s.
19. A rectangular bar 2cm breadth, 1cm depth and 100 cm length is supported at its ends and a load of 2kg is applied at its middle point. Calculate the depression at the middle point if Y = 200 GPa.
20. What couple must be applied to a wire 1m long and $5 \times 10^{-4}$ m in radius in order to twist one of its ends through $45^0$, the other end being fixed? Rigidity modulus = $3.5 \times 10^{10}$ $N/m^2$.
21. Calculate the work done if the radius of a bubble is increased from 3cm to 4cm. (ST = 0.025 N/m)

**(5x5=25)**

## PART D

**IV. Answer any two questions. Each question carries 10 marks.**

22. Derive the expression for moment of inertia of a circular disc about an axis through centre and perpendicular to plane.
23. Derive Poiseuille's formula in viscosity for flow of liquid through a capillary pipe.
24. What is particle velocity and wave velocity? Obtain a relation between the two.
25. What is neutral surface? Derive expression for the depression at the mid-point of a non-uniformly bent bar.

**(2x10=20)**