

B.Sc. DEGREE (C.B.C.S.) EXAMINATION, JUNE 2018**Second Semester**

Core Course—PH2 CRT 02—MECHANICS AND PROPERTIES OF MATTER

(Common to Physics M I, Physics M II Applied Electronics/Computer Applications and Model III Physics-EEM)

[2017 Admissions only]

Time : Three Hours

Maximum : 60 Marks

Part A

*Answer any ten questions.
Each question carries 1 mark.*

1. What is a wave function ?
2. Distinguish between longitudinal and transverse waves.
3. What are standing waves ?
4. What do you mean by beats ?
5. State parallel axes theorem.
6. State the law of conservation of angular momentum.
7. What is a flywheel ? What are the uses of a flywheel ?
8. Define the term radius of gyration.
9. What is mean by flexural rigidity ?
10. Which is more elastic-air or water ? Explain the reason.
11. What is the use of heating while washing clothes ?
12. Explain the term viscosity. Give its unit.

(10 × 1 = 10 marks)

Part B

*Answer any six questions.
Each question carries 5 marks.*

13. In an experiment a string is found to vibrate in 4 loops when it is stretched with a tension of 3N. How much tension is required to be applied so as to make it vibrate in 6 loops.

Turn over

14. Two tuning forks A and B produce 4 beats per second. On loading B with wax 6 beats are heard per second. If the quality of wax is reduced the number of beats heard per second becomes 4. Find the frequency of B if A's frequency is 480 Hz.
15. A particle executes SHM of period 1.2 sec and amplitude 8 cm. Find the time it takes to travel 5 cm from the mean position.
16. A circular ring has a mass 120 gm and radius 10 cm. Determine its moment of inertia (a) about a diameter and (b) about an axis passing through its centre and perpendicular to its plane.
17. A stone is tied to the end of a string of length 25 cm and makes 5 rps. If the length of the thread is reduced by 5 cm, find the number of revolutions it will make in a second.
18. Calculate the MI of a uniform disc of mass 0.4 kg and radius 10 cm about an axis passing through its edge and perpendicular to the plane of the disc.
19. A copper wire of length 3 m and 1 mm diameter is subjected to a tension of 5 N. Calculate the elongation produced, if the Young's modulus of copper is 120 GPa.
20. The diameter of a brass rod is 4 mm. Young's modulus of brass is $9 \times 10^9 \text{ N/m}^2$. Calculate the force required to stretch 0.1% of its length.
21. A sphere of water of radius 0.1 mm is sprayed into a million drops, all of the same size. Find the energy expended in doing so. Surface tension of water is 0.072 N/m.

(6 × 5 = 30 marks)

Part C

Answer any two questions.

Each question carries 10 marks.

22. Obtain an expression for the velocity of transverse waves in a string. Give expression for the frequencies of vibration.
23. Derive the expression for a simple harmonic oscillator and obtain its velocity and displacement. Also explain the theory of damped harmonic oscillators.
24. Derive the expression for the moment of inertia of a solid cylinder about an axis passing through the centre of mass and perpendicular to the length.
25. Discuss the Poiseuille's method of determining the viscosity of liquid.

(2 × 10 = 20 marks)