QP CODE: 19101728

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Reg No : 18DA21D4041

Name : Anil Benny

# B.Sc. DEGREE (CBCS) EXAMINATION, MAY 2019

## Second Semester

Core Course - **PH2CRT02 - MECHANICS AND PROPERTIES OF MATTER**

(Common for B.Sc Physics Model I ,B.Sc Physics Model II Applied Electronics ,B.Sc Physics Model II Computer Applications ,B.Sc Physics Model III Electronic Equipment Maintenance)

2017 ADMISSION ONWARDS

327A46C5

**Maximum Marks: 60** **Time: 3 Hours**

### Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. Define a longitudinal wave with an example.
2. Write down the expression for the energy density of a plane progressive harmonic wavetravelling along the positive x-direction and explain each term.
3. Two adjacent piano keys are struck simultaneously. The notes emitted by them have frequencies 412 Hz and 417 Hz. Write down the number of beats heard per second.
4. When a simple pendulum is kept on the moon , what is the difference seen on its speed of oscillation and time period?
5. State parallel axes theorem.
6. State perpendicular axes theorem.
7. Write down the expression for work done in deforming a body under volume strain.
8. Graphically represent the relation between the distance between the knife edges l and elevation $\delta$ at the middle of a beam supported by two knife edges and symmetrically loaded.
9. In the torsion pendulum experiment, error in the measurement of which quantity can lead to large error in the answer?
10. Distinguish between streamline and turbulent flow.
11. Give any four factors affecting surface tension.
12. Define surface energy of a liquid film.

(10×1=10)

## Part B

Answer any **six** questions.

Each question carries **5** marks.

13. A wire gives a fundamental frequency of 256 Hz when it is under a tension of 25 kg-wt. Under what tension will the string emit a frequency of 768 Hz

14. A body of mass 2 kg suspended through a vertical spring executes simple harmonic motion of period 6 s. Find the potential energy and kinetic energy at 2cm if the maximum amplitude is 5cm

15. Find the wavelength and the phase difference between two points at x = 2m and x = 7.232 m of the plane progressive wave given by y = 0.3 sin (40t - 3x). Find the damping constant and the damping coefficient.

16. Find the moment of inertia of a solid cylinder of mass 1 kg, length 24 cm with a diameter 20 cm about an axis perpendicular to its length and passing through one of its ends.

17. A flywheel of mass200kg and radius of gyration 0.6m is given an angular speed of 150rpm in 90 rotations starting from rest. Determine the torque acting on it.

18. The diameter of brass rod is 4mm.Young's modulus of brass is $9.9 \times 10^{10} N/m^2$.Calculate the force required to stretch by 0.1% of its length.

19. A rod having a diameter of 1.26cm is placed on two knife edges separated by a distance of 0.7m. A load of 0.9kg is hanged on the road at its midpoint and the corresponding depression is 0.025cm. Calculate the Young's modulus of the material of the rod.

20. A metal plate$100cm^2$ in area rests on a layer of castor oil 2mm thick whose coefficient of viscosity is 1.55 $Nsm^{-2}$. Calculate the horizontal force required to move the plate with a speed of $0.03ms^{-1}$.

21. Assuming that the surface tension of rain water is 0.072N/m. Find the difference of pressure between inside and outside of a rain drop of diameter 0.02cm.

(6×5=30)

## Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Setup the differential equation for a simple harmonic motion and obtain the velocity and acceleration of the particle. Also graphically show the different positions of the particle at intervals of T/4, T/2, 3T/4 and T for displacement, velocity and acceleration.

23. Obtain an expression for Moment of inertia of an annular ring (i) about an axis passing through its centre of mass and perpendicular to its plane (ii) about its diameter.

24. Derive Poiseuille's equation in hydrodynamics.

25. Derive the Bernoulli's equation for a liquid flowing through a pipe held horizontally.

(2×10=2