QP CODE: 19101725

19101725

Reg No : .....

Name : .....

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

Second Semester

Complementary Course - **PH2CMT02 - PHYSICS - MECHANICS AND SUPERCONDUCTIVITY**

(Common for B.Sc Chemistry Model I ,B.Sc Geology Model I)

2017 ADMISSION ONWARDS

D4ADA8B3

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

Part A

Answer any **ten** questions.

Each question carries **1** mark.

1. What is force? How is it related to the acceleration of a body?
2. Give the expression for the time period of a compound pendulum
3. What is meant by centripetal acceleration? Give an expression for the same?
4. Find the angular velocity of a wheel making 240 rpm ?
5. If the diameter of a flywheel was increased by 2%, then discuss if any changes occur in its M.I about the axis of symmetry.
6. What are the conditions for an oscillatory motion to be simple harmonic?
7. Plot the velocity verses time graph of a simple harmonic oscillator?
8. What do you mean by frequency and wavelength of the wave?
9. State the differential equation of a progressive wave.
10. Draw the resistance – temperature graph of transition from superconductor to normal material.
11. Explain Meissner effect.
12. What is Josephson Effect?

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Find the radius of gyration of a disc of mass 100 gm and radius 5 cm about an axis passing through its centre of gravity and perpendicular to its plane?

14. Calculate the moment of inertia of an annular disc of mass 200g, about an axis passing through the center and perpendicular to its plane. Given that outer radius = 15cm and inner radius = 10cm.

15. Two identical spheres each of mass 1.2 Kg and radius 10 cm are fixed at the ends of a light rod so that the separation between the centers is 50 cm. Find the moment of inertia of the system about an axis perpendicular to the rod passing through its middle point.

16. Show that for a harmonic oscillator the average potential energy is equal to the average kinetic energy?

17. Derive the differential equation of a damped harmonic oscillator and obtain the condition for under damped case?

18. A tuning fork of unknown frequency gives 5 beats when sounded with another tuning fork of frequency 384 Hz. When the tuning fork is loaded with a little wax, only 3 beats are heard. Determine the frequency of the fork.

19. A car moving at a speed of 90 km/hr sounds its horn which has a frequency 500Hz. Find the frequency heard by a stationary observer when (i) the car approaches and (ii) When the car recedes the observer. Given, the velocity of sound in air = 340 m/s.

20. Explain the BCS theory of superconductivity.

21. What are the applications of superconductivity? Write a note on high temperature superconductivity.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. State and prove parallel and perpendicular axes theorems of moment of inertia. Determine the moment of inertia of a rod about an axis perpendicular to its length if the axes pass through the (i) centre of mass and (ii) at one end.

23. Derive an expression for the M.I of a cylinder passing through its centre and perpendicular to its axis.

24. Set up differential equation for a forced harmonic oscillator. Explain the contribution of the various terms involved. Obtain the condition for resonance.

25. Discuss the effect of magnetic field in superconductors. Distinguish between type I and type II superconductors. Draw the magnetization curves of type I and type II semiconductors.

(2×10=20)