QP CODE: 21103145

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, DECEMBER 2021

Second Semester

Complementary Course - PH2CMT02 - PHYSICS - MECHANICS AND SUPERCONDUCTIVITY

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

2017 ADMISSION ONWARDS

AEA0CD5C

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What is meant by acceleration? Give its unit.
2. What do you mean by the term centre of oscillation of a compound pendulum?
3. Mention any two applications of the concept of centrifugal force in every day life.
4. What are the factors on which the moment of inertia of a body depends on?
5. Give the moment of inertia of a thin rod about an axis passing through one end and perpendicular to its length.
6. Define Simple harmonic motion.
7. What are forced oscillations?
8. Give two examples for one dimensional wave motion.
9. Explain superposition of waves.
10. What are Cooper pairs?
11. What is ac Josephson effect?
12. What are high temperature superconductors? Give examples.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A uniform sphere of radius 25 cm and mass 2kg rotates about its diameter. What is the angular momentum when angular speed is 5 rad/s?

14. A circular ring has mass 120g, and radius 10cm. Determine its moment of inertia (a) about a diameter and (b) about an axis passing through its centre and perpendicular to its plane.

15. A thin cord is wound 3 times on the axle of a flywheel. A mass of 2kg is suspended from its free end which is at a height of 25cm from the ground. The flywheel makes 20 revolutions in 4 sec after the chord slips from the peg. If the radius of the axle is 1.0cm. Find the M.I of the wheel about its axle.

16. A body of mass 4 gm executes SHM. The force acting on the body when the displacement is 8cm is 24 gm wt. Find the period. If the maximum velocity is 500 cm/s find the amplitude and maximum acceleration?

17. Calculate the kinetic energy at displacement one fourth to the amplitude in case of Simple Harmonic Motion.

18. Consider a wave of frequency 500 Hz travelling with a velocity 200 m/s. Find the phase change in a time interval 10^{-3}s. Also find the path difference between two points that differ by $\pi/2$ radian.

19. A boy standing by the road side blows a whistle of frequency 500 Hz. A cyclist passes the boy at a speed of 5 m/s. Calculate the apparent pitch of the sound heard by the cyclist before and after crossing the boy.

20. A superconducting lead has a critical temperature of 7.26 K at zero magnetic field and a critical field of 8×10^5 A/m at 0 K. Find the critical field at 5 K?

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 axis theorm? Find the moment of inertia of a cylinder about a line

parallel to its axis and touching its surface?

23. Explain moment of inertia. Calculate moment of inertia of a uniform sphere (i) about a diameter and (ii) about a tangent.

24. Discuss the origin of damping. Set up the differential equation for a damped harmonic oscillator. Discuss the different terms involved. Obtain the condition for critically damped, over damped and under damped cases.

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)