TB222390W **Reg. No :.....**

Name :.....

B. Sc. DEGREE (C.B.C.S.) EXAMINATION, MARCH 2023

2022 Admissions Regular & 2021 Admissions Supplementary / Improvement And 2020, 2019 And 2018 Admissions Supplementary

SEMESTER II - COMPLEMENTARY COURSE 2 (PHYSICS) (For CHEMISTRY)

PH2C02B18 - MECHANICS AND CRYSTALLOGRAPHY

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

Part A

I. Answer any Ten questions. Each question carries 1 mark (10x1=10)

1. Can a particle possess zero velocity and non-zero acceleration? Explain.
2. If the mass of the object is doubled then what will be the effect of time period of the compound pendulum?
3. Define force and its SI unit.
4. Distinguish between longitudinal and transverse waves with one example for each.
5. List the factors on which moment of ineria of a body depends.
6. Write a short note on periodic motion. Give two examples.
7. Find the position of a particle executes SHM with amplitude 'a' and angular frequency 'ω' where the two energies are equal.
8. Due to damping effect the frequency of oscillations decreases. Comment.
9. Describe briefly the phase of a harmonic motion.
10. Name the seven crystal systems.
11. Define space lattice of a crystal.
12. Define rotation inversion axis.

Part B

II. Answer any Six questions. Each question carries 5 marks (6x5=30)

13. Define centre of suspension and centre of oscillation. Show that in compound pendulum they are interchangeable.
14. When two tuning forks P and Q are sounded together the frequency of the beats heard is 4.00Hz. P has a known frequency of 256Hz. When small loads are added to the prongs of Q, the beat frequency is reduced to 2.00Hz. Find the original frequency of Q.
15. Discuss the law of conservation of angular momentum.
16. A thin plane disc of mass M and Radius R , initially at rest, is set into rotation with angular velocity ω. Calculate the work done if the axis of rotation is through (i) its centre and perpendicular to its plane (ii) a point on its edge and perpendicular to its plane.
17. A flywheel in the form of a solid disc of mass 5000 kg and a radius 1 metre is rotating, making 120 revolutions/ minute. Compute the kinetic energy and the angular impulse, if the flywheel is brought to rest in 2 seconds: friction is to be neglected.
18. Explain briefly the resonance condition for damped oscillations.
19. A particle executes S.H.M of amplitude 25cm and time period 6s. What is the minimum time required for the particle to move between two points 12.5cm on either side of the mean position.
20. Explain spacing of planes in crystal lattice. Obtain an expression for the interplanar distance for a simple cubic structure of crystal.

21. Find the smallest glancing angle at which K_α radiation of copper of wavelength 1.5 Å will be reflected from calcium crystal of spacing 3.036 Å. At what angle will the third order reflection take place?

Part C

III. Answer any Two questions. Each question carries 10 marks (2x10=20)

22. Distinguish between simple pendulum and compound pendulum. Prove that the periodic time of a compound pendulum is maximum when the axis of rotation passes through the center of gravity.
23. Calculate the moment of inertia of a thin annular ring about (i) an axis passing through its centre and perpendicular to its plane (ii)a diameter.
24. Set up the differential equation for a forced harmonic oscillator. Explain the contribution of the various terms involved.
25. Give Bragg's explanation for the formation of Laue spots and hence derive Bragg's law in crystal diffraction.