



QP CODE: 25022791



25022791

Reg No :

Name :

**B.Sc DEGREE (CBCS) IMPROVEMENT / REAPPEARANCE/ MERCY CHANCE
EXAMINATIONS, APRIL 2025**

Second Semester

Complementary Course - PH2CMT01 - PHYSICS-MECHANICS AND ASTROPHYSICS

(Common for B.Sc Mathematics Model I, B.Sc Statistics Model I)

2017 Admission Onwards

A8D4C3D9

Time: 3 Hours

Max. Marks : 60

Part A

Answer any ten questions.

Each question carries 1 mark.

1. What do you mean by the centre of suspension of a compound pendulum?
2. When a boy on a rotating table suddenly stretches his hands outwards, the speed of rotation decreases. Why?
3. What are the factors on which the moment of inertia of a body depends on?
4. Obtain the moment of Inertia of a ring about its tangent.
5. Give the expression for moment of inertia of a solid sphere about an axis through its tangent.
6. All periodic motions are not simple harmonic. Why?
7. What is the acceleration of a particle executing simple harmonic motion terms of displacement and frequency? What is its direction?
8. What do you mean by forced oscillations?
9. What is the condition for amplitude resonance?
10. Differentiate between progressive and stationary wave.
11. What is the main source of Sun's energy?
12. What is a neutron star?





(10×1=10)

Part B

Answer any *six* questions.

Each question carries **5** marks.

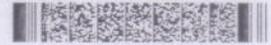
13. An object moves round a circular track of radius 4m. The object makes one revolution in 10s. Determine (i) the speed of the car and (ii) its centripetal acceleration.
14. A circular metal ring has a mass 1 kg and radius 30cm. It makes 10 revolutions per second about an axis passing through the centre and normal to its plane of the hoop. A.) Find the M.I about the axis B.) Angular momentum about the axis C) Torque required to increase the angular momentum by 25% in 10sec and D) The tangential force required to produce the above torque on the rim of the ring.
15. Two thin discs each of mass 0.1 kg and radius 0.05 m are placed at either end of a rod 0.2 m long and 0.01 m in diameter. What is the moment of inertia of the system about an axis passing through the centre of the rod and perpendicular to its length? Density of the material of the rod is 7800 kg/m³.
16. A flywheel of mass 200kg 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.
17. Calculate the kinetic energy at displacement one fourth to the amplitude in case of Simple Harmonic Motion.
18. A plane progressive wave is given by $y = 0.3 \sin(40t - 3x)$ m. Determine the wavelength of the wave and the phase difference between two points at $x = 2$ m and $x = 7.232$ m.
19. 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.
20. Calculate the magnitude difference between two celestial objects having their brightness in the ratio 100.
21. A star will appear blue or red, if the wavelength of maximum emission from it is in the range 450 to 490 nm or 620 to 770 nm, respectively. Calculate the range of temperature corresponding to the cases in which the star appears blue or red. Given the Wein's constant is 2898×10^{-6} mK.

(6×5=30)

Part C

Answer any *two* questions.

Each question carries **10** marks.



22. Discuss an experiment to determine the acceleration due to gravity using a symmetric compound pendulum.
23. Discuss how a Kater's pendulum can be used to determine the acceleration due to gravity at a place.
24. What is Doppler Effect in sound? Obtain an expression for the apparent frequency (a) when the source is moving and the observer is stationary and (b) when the source is stationary and the observer is moving.
25. Write short note on : (a) magnitude of stars (b) temperature and color of a star (c) stellar spectra (d) mass and luminosity of a star.

(2×10=20)

