



22103113

QP CODE: 22103113

Reg No :

Name :

**B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE
EXAMINATIONS, OCTOBER 2022**

Second Semester

Complementary Course - PH2CMT01 - PHYSICS-MECHANICS AND ASTROPHYSICS

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

2017 ADMISSION ONWARDS

331ACDC3

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What do you mean by uniform circular motion?
2. What do you mean by a rigid body?
3. If the radius of earth become half of its present value keeping mass as constant, what will be the length of a day ?
4. Give the expression for moment of inertia of a rod about an axis at one end and perpendicular to its length.
5. Obtain the moment of Inertia of a ring about its tangent.
6. Define period and frequency. How are they related?
7. In the case of simple harmonic motion for what value of displacement from the mean position, its kinetic energy become equal to potential energy?
8. What do you mean by damped oscillations?
9. A transverse wave motion can occur only in solids and liquids and not in gaseous media. Why?
10. What do you mean by energy density of a wave?





11. What is supernova?
12. What is a neutron star?

(10×1=10)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Show that the centre of suspension and centre of oscillation of a compound pendulum are interchangeable.
14. A small disc of 2cm radius is removed from a large disc of radius 8cm. The centre of the hole so formed is at a distance of 2cm from the centre of the large disc. The mass of the remaining disc is 180gm. Calculate its M.I about an axis passing through the two centers.
15. A sphere of uniform density 5520 kg/m³ and radius 6400 km, calculate the moment of inertia about its axis through its diameter.
16. Calculate the torque applied to a flywheel having M.I about its axis of rotation as 200 kgm², to increase the angular velocity by 10 rad/s in 2s from its rest position.
17. A particle in simple harmonic motion has velocity 10m/s and 7m/s when displacement from mean position are 3cm and 4cm respectively. What is the length of the path?
18. A particle executes a simple harmonic motion of time period T. Find the time taken by the particle to go directly from its mean position to half the amplitude.
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. Write short note on apparent and absolute magnitude of stars.
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. Prove that there are four points in a compound pendulum about which the time periods are same. Obtain the conditions for the minimum and maximum time periods of a compound pendulum.
23. Derive an expression for the M.I of a solid cylinder about an axis perpendicular to its length and passing through its centre.
24. What do you mean by beats? Discuss the mathematical treatment of beats formation.
25. Discuss briefly the evolution processes of stars.

(2×10=20)

