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SIS-N-056 A-21
B.Sc. I Semester (CBCS) Degree Examination
PHYSICS
Mechanics
Paper - DSC 1 - PHY 104
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer **all** the questions.
2. Draw diagrams wherever necessary.

SECTION-A

- I. Answer any **ten** of the following in two or three sentences. **(10×2=20)**
- ✓1. Name the physical quantities which are invariant under Galilean transformation.
 - ✓2. What is inelastic collision. Give an example.
 - ✓3. Give the relation between Torque and angular momentum.
 - ✓4. Define moment of Inertia. Give its SI unit.
 - ✓5. Define orbital and escape velocity of satellite.
 - ✓6. State Kepler's second law.
 7. State and prove Hook's law.
 - ✓8. Define stress. Mention types of stress.
 - ✓9. Mention characteristics of SHM.
 - ✓10. State perpendicular axes theorem.
 - ✓11. Mention the postulates of special theory of relativity.
 - 12. What are transformation equations?

SECTION-B

(4×5=20)

II. Answer any four of the following.

- ✓13. Derive an expression for velocity and linear momentum of centre of mass of system of particles. (5)
- ✓14. State and prove work - energy theorem. (5)
- ✓15. State and prove parallel axes theorem. (5)
- ✓16. Derive an expression for M.I. of thin rod about an axis through its centre and perpendicular to its length. (5)
17. Explain Kepler's laws of planetary motion. (5)
18. What is Torsional pendulum? Derive an expression for time period of it. (5)

SECTION-C

(4×10=40)

III. Answer any four of the following.

- ✓19. ✓a) Write a note on Galilean transformation equation. (5)
- ✓b) Derive an expression for the angular momentum and Torque. (5)
20. a) Derive an expression for fictitious force. (5)
- b) Derive the differential equation of SHM. (5)
- 21. ✓a) Derive an expression for moment of inertia of a hollow cylinder about its own axis. (7)
- ✓b) Calculate the MI of a disc of mass 2 kg and radius $20 \times 10^{-2} \text{m}$ about an axis perpendicular to the disc and passing through its centre. (3)
- ✓22. a) Write a note on GPS. (5)
- b) Write a note on Weightlessness. (5)
- ✓23. Derive an expression for relation connecting between elastic constant (i.e. Y, k and n). (10)
- ✓24. Derive Lorentz transformation equations. (10)