



ST. FRANCIS DE SALES COLLEGE

A FRANSALIAN INSTITUTE OF HIGHER EDUCATION **AUTONOMOUS**

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END SEMESTER EXAMINATION – NOV/DEC 2025

PHYSICS - I SEMESTER BSC (Repeaters)

24BSC14B - MECHANICS AND PROPERTIES OF MATTER

Time: 3 Hours

Max. Marks: 80

Instruction: Answer should be written completely in English.

SECTION – A

Answer any **TEN** questions. Each question carries **TWO** marks.

(10X2=20)

1. Define the coefficients of static friction and kinetic friction.
2. What is meant by angular acceleration?
3. What is meant by inertia of rest?
4. What is meant by gravitational intensity at a point?
5. Define the terms impulse and impulsive force.
6. Define amplitude and period of SHM.
7. What is simple pendulum?
8. What is meant by centre of mass of the system of particles?
9. What is meant by radius of gyration?
10. Differentiate streamline flow and turbulent flow?
11. What is a conservative force? Write two examples.
12. What is surface tension?

SECTION – B

Answer any **FOUR** questions. Each question carries **FIVE** marks.

(4X5=20)

13. Two masses 7 kg and 12 kg are connected at the two ends of a light inextensible string that goes over a frictionless pulley. Find the acceleration of the masses and the tension in the string when the masses are released.
14. Calculate the longest length of steel wire that can hang vertically without breaking. (Breaking stress for steel = $8 \times 10^8 \text{ N m}^{-2}$, density of steel = $8 \times 10^3 \text{ kg m}^{-3}$).
15. At what height from the surface of the Earth the gravitational force will be reduced by 12%, if the radius of the Earth is 6370 km.
16. Find the vector cross product of A and B. Given $A = 5i+2j+3k$ and $B = 3i+2j+1k$.
17. A particle executes SHM of period 1.2 s and amplitude 8 cm. Find the time it takes to travel 3 cm from the positive extremity of its oscillation.
18. Calculate the work done in blowing a spherical soap bubble of diameter 2 cm, if the surface tension of the soap solution is $2 \times 10^{-2} \text{ N/m}$.



SECTION – C

Answer any **FOUR** questions. Each question carries **TEN** marks.

(4X10=40)

19. Explain Newton's laws of motion with examples.
20. Derive an expression for the gravitational field and potential due to a solid sphere.
21. Derive the expression for acceleration and velocity of a body moving along an inclined plane with friction and without friction.
22. Derive an expression for work done by gravitational force.
23. Define three elastic constants and obtain the relation between them.
24. Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube.

