

Roll No. \_\_\_\_\_

[Total No. of Pages : 3

**SIS-N 056 B-15**  
**B.Sc. Ist Semester Degree Examination**  
**Physics**  
**(Mechanics and Properties Of Matter)**  
**Paper - 1**  
**(New)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates :** Answer **all** questions from Section - A. Answer any **five** questions from Section - B. Answer any **four** from Section - C

**Section - A**

**I. Answer All questions.**

**(15×1=15)**

- 1) Define Non-inertial frame of reference.
- 2) What is Fictitious force.
- 3) Write the inverse Galilean transformation equations.
- 4) Define Law of conservation of energy in collision of two particles.
- 5) Write the expression for relation between torque and angular momentum.
- 6) Write an example for Nuclear fission.
- 7) What is Capillarity?
- 8) Write two factors which effect surface tension.
- 9) Write the equation of continuity.
- 10) What is escape velocity?
- 11) Define turbulent flow.

- 12) Write the relation between elastic constants.
- 13) What are Girders?
- 14) A particle is moving in a circular path of radius 500cm with angular velocity 50 rad/sec. Calculate linear velocity of the particle.
- 15) Define Stress and Strain.

**Section - B**

**II.** Answer any **Five** of the following questions. **(5×5=25)**

- 16) Prove that the distance or length is invariant to Galilean transformation equation.
- 17) Write the difference between centripetal force and centrifugal force.
- 18) What is escape velocity? Derive expression for it.
- 19) Derive the relation between angular momentum and torque.
- 20) Write a note on excess pressure inside the spherical liquid drop.
- 21) Obtain expression for modulus of rigidity in torsional pendulum
- 22) Derive the relation between surface tension and surface energy.

**Section - C**

**III.** Answer any **Four** of the following questions. **(4×10=40)**

- 23) Prove that rotating frame of reference is non-inertial frame. **(10)**
- 24) a) Derive an expression for velocity for multistage rocket. **(7+3)**  
b) How energy is conserved in nuclear fusion and nuclear fission
- 25) Derive expression for radial and transverse components of velocity and acceleration. **(10)**

- 26) a) Write Kepler's Laws of planetary motion and prove that angular momentum is conserved in second law (6+4)
- b) Escape velocity of earth is 11.2 km/sec. Calculate the escape velocity on planet whose radius is twice of the earth and mass is four times of the earth.
- 27) a) With Usual notations prove that  $Y = 3K(1 - 2\sigma)$  (7+3)
- b) Poisson's ratio of material is 0.9 and modulus of rigidity is  $0.7 \times 10^{15} \text{N/m}^2$ . Calculate the Young's Modulus.
- 28) a) Derive the expression for final velocities of particles in one-dimensional perfectly elastic collision. (7+3)
- b) Prove that acceleration is invariant to Galilean transformation equation.
-