

F.Y.B.SC. SEM – I (2014 COURSE) : SUMMER - 2018
SUBJECT: PHYSICS: MECHANICS AND PROPERTIES OF MATTER

Day : **Monday**
Date : **16/04/2018**

S-2018-0677

Time : **12.00 NOON TO 02.00 PM**
Max. Marks : **40**

N.B.:

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the **RIGHT** indicate full marks.
 - 3) Use of electronic calculator/ log table is allowed
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Q.1 Attempt any **TWO** of the following: **(10)**

- a) Describe an experiment of M.I. of a flywheel.
- b) Describe in details the motion of a particle under constant and resistive force. Obtain necessary expression.
- c) Diameter of the rod is 1.26 cm and the distance between the knife-edges is 60 cm. The load of 900 gm is applied at the middle point, the depression was 0.025 cm. Calculate the Young's modulus of the material of the rod.

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Define Young's modulus. Show that Young's modulus Y , modulus of rigidity and Poisson's ratio are related by equation $Y=2\eta(1+\sigma)$
- b) Obtain Jaeger's formula used to determine surface tension of a liquid.
- c) A flat plate of area 10 cm^2 is separated from a large plate by a layer of glycerin 0.1 cm thick. What force is required to keep the plate moving with a velocity of 1 cm/ sec.? (Given $\eta=20 \text{ gm/cm-sec}$).

Q.3 Attempt any **TWO** of the following: **(10)**

- a) How will you compare the moment of inertia of two bodies using a Torsion pendulum? Derive the necessary formula.
- b) Distinguish between streamline flow and turbulent flow of a liquid with examples.
- c) A ring, a disc and a solid sphere start rolling down simultaneously from the top of an inclined plane. Determine the sequence in which they reach the bottom of the plane.

Q.4 Attempt any **FIVE** of the following: **(10)**

- a) A bullet of 10 gm fired from gun attains a velocity 500 cm/s in 10 sec. Calculate force required to fire it.
- b) Explain in brief Kepler's first law of planetary motion.
- c) State CGS and SI unit of the surface tension. Write its dimensions.
- d) Explain briefly: water wet glass but mercury does not.
- e) Define coefficient of viscosity. Write its CGS and SI units.
- f) Young's modulus for steel is $20 \times 10^{10} \text{ N/m}^2$ and its rigidity modulus is $8 \times 10^{10} \text{ N/m}^2$. Calculate Poisson's ratio.
- g) Water flows through a horizontal pipe of varying cross section at the rate of $0.5 \text{ m}^3/\text{sec}$. Determine the velocity of water at a point where the cross area of pipe is 0.1 m^2 .

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