[6268]-264

S.E. (AUTOMOBILE & Mechanical) (Insem)
FLUID MECHANICS
(2019 Pattern) (Semester - IV) (202049)

*Time : 1 Hour]* [*Max. Marks : 30*

Instructions to the candidates:

    1) Answer Q.1 or Q.2, Q.3 or Q.4.

    2) Neat diagrams must be drawn wherever necessary.

    3) Figures to the right indicate full marks.

    4) Assume suitable data, if necessary.

Q1) a) Define the following properties of fluid with SI units, **[8]**

    i) Specific Gravity

    ii) Kinematic Viscosity

    iii) Specific Weight

    iv) Specific Volume

    b) The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. **[7]**

OR
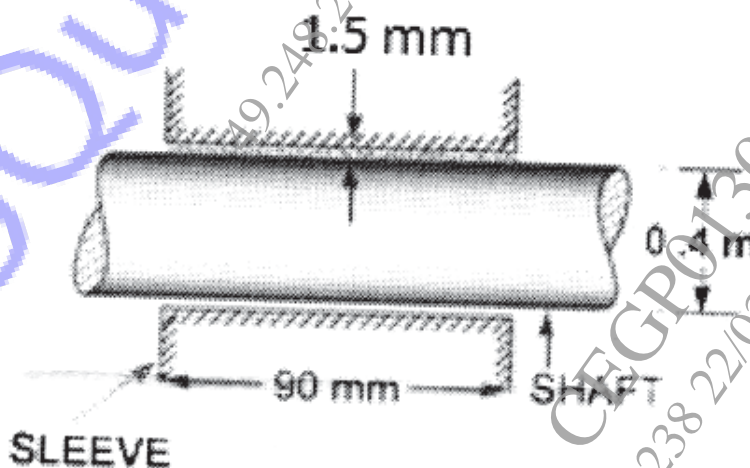
Q2) a) Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid. **[7]**

b) Explain in brief: **[8]**

   i) Surface tension

   ii) Vapour pressure

   iii) Compressibility

Q3) a) State and prove Hydrostatics law **[7]**

b) A differential manometer is connected at the two points A and B of two pipes as shown in below figure. The pipe A contains a liquid of specific gravity = 1.5 while pipe B contains a liquid of specific gravity = 0.9. The pressure at A and B are 1 kgf/cm² and 1.80 kgf/cm² respectively. Find the difference in mercury level in the differential manometer. (1kgf = 9.81 N) **[8]**

Sp. gr = 1.5
p_A = 1 kgf./cm²
A
3m
Sp. gr = 0.9
B
2.0 m
p_B = 1.80 kgf/cm²
h
X ───── X

OR

Q4) a) Show that the distance between the meta-centre and centre of buoyancy is given by. **[7]**

$$BM = \frac{I}{\forall}$$

Where,

I = Moment of inertia of the plan of the floating body at water surface about longitudinal axis.

$\forall$ = Volume of the body sub merged in liquid.

b) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4 m altitude 4m when it is immersed vertically in an oil specific gravity 0.9. The base of the plate coincides with the free surface of oil. **[8]**

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