**4TH SEM./MECH(SAND)/MECH(PROD)/MECH(IND.INT)/
MECH(MAINT)AERO/DME/MECHANICAL/ 2022(S)
TH-03   FLUID MECHANICS**

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

2 x 10

1.   Answer **All** questions

a.   Define Impact of jet.

b.   What is the difference between Poise and stoke?

c.   Explain Archimedes principle?

d.   What is the difference between Notch and Weir?

e.   Define discharge and its unit in S.I system.

f.   State Darcy Weisbach and Chezy's formula.

g.   What is the statement of Pascal's law?

h.   Write down the relationship between Atmospheric pressure, Gauge pressure and Absolute pressure.

i.   Define Density and its unit.

j.   Write down the discharge formula for rectangular weir.

6 x 5

2.   Answer **Any SIX** Questions

a.   State and derive the Continuity equation.

b.   Define three Orifice coefficient and also derive the expression:
$C_d = C_v \times C_c$

c.   Describe Hydraulic Gradient Line and Total Energy Line.

d.   Calculate the Specific weight, Specific mass, Specific volume and Specific gravity of a liquid having a volume of $6m^3$ and weight of 44kN.

e.   Derive an expressions for Total Pressure and Centre of Pressure for a vertically immersed surface.

f.   Describe properties of fluid.

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g   The diameter of a pipe at the sections 1-1 and 2-2 are 200mm and 300mm respectively. If the velocity of water flowing through the pipe at section 1-1 is 4m/sec. Find:
    (i)   Discharge through the pipe and
    (ii)   Velocity of water at section 2-2

3   State and prove the Bernoulli's theorem.   10

4   The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The centre of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.   10

5   (a) Derive discharge formula for triangular notch.   10
    (b) Find the discharge over a triangular notch of angle 60^0 when the head over the V-notch is 0.3m. Assume $C_d = 0.6$.

6   Derive force exerted & work done by the jet on a stationary (fixed) vertical force.   10

7   Water is flowing through a pipe 1500m long with a velocity of 0.8m/sec. What should be the diameter of the pipe, if the loss of head due to friction is 8.7m, take 'f' for the pipe as 0.01.   10