

Sem III / Prof / CBGS / FMFP / 18-05-16
Fluid mechanics & Fluid Power



QP Code : 30601

(3 Hours)

[Total Marks :80

- N.B. : (1) Question No 1 is compulsory.
(2) Out of remaining questions attempt any three questions.
(3) In all four questions to be attempted.
(4) All questions carry equal marks.
(5) Answer to each new questions to be started on a fresh page.
(6) Figures on the right hand side indicate full marks.

1. (a) Define the following properties and state their units. 4
(i) Specific weight (ii) Kinematic Viscosity
(b) Distinguish between. 4
(a) Steady and un-steady flow
(b) Uniform and non uniform flow
(c) Explain the following terms. 4
(a) Total pressure and Centre of pressure
(b) Metacenter and Metacentric height
(d) State various properties of hydraulic fluid. 4
(e) Differentiate between Hydraulic and Pneumatic system. 4
2. (a) State the condition of equilibrium of floating and submerged bodies. 4
(b) Draw ISO symbol for the following. 8
(a) Unidirectional variable displacement pump
(b) Pressure relief valve
(c) Check valve
(d) 3/2 DC valve
(c) Lateral stability of a long shaft 150 mm dia. is obtained by means of 250 mm stationary bearing having an internal diameter of 150.25 mm. if the shaft is filled with lubricant having the viscosity 0.245 N-s/m^2 , what power will be required to overcome the viscous resistance, when the shaft is rotated at 180 rpm. 8
3. (a) List the field of application where hydraulics can be used more effectively than any other power source. 4
(b) Write a short note on hydraulic actuators. 8
(c) An oil of viscosity 0.97 poise and relative density 0.9 is flowing through a horizontal pipe of 10 cm and of length 10 m. If 100 kg of oil is collected in a tank in 30 seconds. Calculate the difference of pressure at the two ends of pipe 8

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4. (a) State Bernoulli's theorem of fluid flow and list the various applications of it. 4
(b) Explain with neat sketch 8
 (a) Sequence valve
 (b) Pressure reducing valve
- (c) A circular opening, 3 m diameter in a vertical side of a tank is closed by a disc 8
of 3 m diameter which can rotate about horizontal diameter. Find
 (i) The force on the disc
 (ii) The torque required to maintain the disc in equilibrium in vertical
 position when the head of water above the horizontal diameter is 4 m.
5. (a) State various types of accumulator and explain one of them with neat sketch. 4
(b) Explain in brief the working and performance characteristic of gear pump. 8
(c) A 20 x 10 cm Venturimeter is provided in a vertical pipe line carrying oil of 8
specific gravity 0.8, the flow being upwards. The difference in elevation of
the throat and entrance section of the Venturi meter is 50 cm. The differential
U-tube mercury manometer shows a deflection of 30 cm of mercury.
Calculate i) The discharge of oil ii) The pressure difference (in N/cm^2)
between entrance section and throat section. Assume $C_d = 0.98$ and specific
gravity of mercury as 13.6.
6. (a) Explain working of Meter-In and Meter-Out circuits with the help neat sketch 10
and also state their advantages, disadvantages and limitations.
(b) An old water supply distribution pipe of 250 mm diameter of a city is to be 10
replaced by two parallel pipes of smaller equal diameter having equal lengths
and identical friction factor values. Find out the new diameter required