

Con. 5218-09.

SP-7772

(REVISED COURSE)

(3 Hours)

[ Total Marks :100

- N.B.:** (1) Question No. 1 is compulsory.  
 (2) Attempt any four questions out of remaining six questions.  
 (3) Assume suitable data if required and state the same clearly.

1. (a) Differentiate between :— 10  
 (i) Liquids and Gases  
 (ii) Real fluids and ideal fluids  
 (iii) Specific Weight and Specific Volume  
 (iv) Dynamic viscosity and Kinematic viscosity and  
 (v) Bulk Modulus and Compressibility.
- (b) What are the advantages and disadvantages of hydraulic system ? Why oil in hydraulic system is used instead of water. Enlist the desirable properties of hydraulic fluid. 10
2. (a) An oil of viscosity 5 Poise is used for lubrication between a Shaft and Sleeve. The diameter of the shaft is 0.5 m and it rotates at 200 r.p.m. Calculate the power lost in oil for a sleeve length of 100 mm. The thickness of oil film is 1mm. 10
- (b) A pump supplies oil at  $0.0016 \text{ m}^3/\text{s}$  to a 40 mm diameter double acting hydraulic cylinder. If the extending and retracting load is 5000 N and the rod diameter is 20 mm. Find :— 10  
 (i) Hydraulic pressure during extending stroke and retracting stroke.  
 (ii) Piston velocity during the extending stroke and retracting stroke.  
 (iii) Cylinder kW power during the extending stroke and retracting stroke.
3. (a) (i) Give desirable properties of Manometric Fluid. 4  
 (ii) An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is flowing. The Vertical distance between the axes of two pipes is 30 cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water column in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes. 8
- (b) With a simple sketch explain the working of 3/2 and 4/3 directional control valve. 8
4. (a) A tank contains water upto a height of 0.5 m above the base. An immisible liquid of specific gravity 0.8 is filled on the top of water upto 1m height. Calculate :— 10  
 (i) Total pressure on the side of the tank  
 (ii) The position of centre of pressure for one side of the tank, which is 2 m wide.
- (b) With respect to Sequence Circuit (Draw sequence circuit), explain the working of a sequence valve with the help of neat sketch. 10

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5. (a) A horizontal venturimeter with inlet diameter 10 cm is used to measure the flow rate of water. The pressure at inlet is  $17.658 \text{ N/cm}^2$  and vacuum pressure at the throat is 30 cm of mercury. Find the discharge of water through venturimeter. Take  $C_d = 0.98$ . 10
- (b) Draw a neat sketch of :- 10
- (i) Meter-in and (ii) Meter-out circuit.
- Explain the advantages and disadvantages of each circuit.
6. (a) A horizontal pipe of diameter 500 mm is suddenly contracted to a diameter of 250 mm. The pressure intensities in the large and smaller pipe is given as  $13.734 \text{ N/cm}^2$  and  $11.772 \text{ N/cm}^2$  respectively. Find the loss of head due to contraction if  $C_c = 0.62$ . Also determine the rate of flow of water. 10
- (b) With the help of neat sketch explain the working of Balance Vane Pump. 10
7. (a) An oil of viscosity  $0.1 \text{ N.S/m}^2$  and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/sec. Find the pressure drop in a length of 300 m and also the Shear Stress at the pipe wall. 10
- (b) Explain constant torque loading and constant power loading with regard to combination of variable capacity pump and fixed motor. Plot the variable performance curves. 10
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