ad Half-13(9)-PKL-15

Con. 7888-13.

SE-III / PROD / FMF

GX-12074
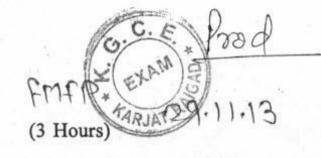
(3 Hours)   [Total Marks : 80

N. B. : (1) Question No. **1** is **compulsory**.

(2) Attempt any **three** questions out of remaining **five** questions.

(3) Assume suitable data wherever required.

(4) Assumptions made should be clearly stated.

1. (a) Calculate the work done in blowing a soap bubble of diameter 12 cm. Assume the   5
surface tension of soap solution = 0.040 N/m.

   (b) In a variable speed drive consisting of a variable capacity pump and fixed capacity   5
motor show that motor speed is directly proportional to pump capacity.

   (c) What is manometer? How are they classified.   5

   (d) With reference to a pressure relief valve, explain   (i) Cracking pressure   5
                                                            (ii) Pressure over-ride.

2. (a) Explain with a neat sketch the operation of a sequence circuit. What is the limitation   10
of this circuit? How the basic circuit canbe modified to overcome this limitation?

   (b) A vertical venturimeter of d/D ratio equal to 0.6 is fitted in a 10 cm diameter pipe.   10
The throat is 20 cm above the inlet. The meter has a coefficient of discharge of 0.92.
A liquid of specific gravity 0.8 flows through the meter at the rate of 50 lpc.
Determine

   (i) Pressure difference as recorded by two gauges fitted at inlet and throat.

   (ii) Differnce on a vertical differential mercury manometer.

3. (a) A thrust bearing consist of 10 cm diameter pad separated by an oil film of 1.5 mm.   10
Determine the power dissipated in the bearing if it rotates at 200 rpm. Take μoil =
0.8 poise. Prove the formula if any used.

   (b) Explain the working of the valves with neat sketch and their applications in hudraulic   10
circuit.

   (i) Pressure reducing valve.

   (ii) Counter balance valve.

4. (a) Explain with neat sketch the operation of regenerative circuit. Derive the relationship   10
between extend and retrast speed and thrust in terms of piston area and rod area and
prove that they are equal for 2:1 cylinder.

   (b) State and derive Bernoulli's equation. List the assumptions also.   · 10

5. (a) Explain with neat sketch the operation of external gear pump. Draw a performance   10
characteristics of the pump and explain.

   (b) Three pipes connected in series have their diameter 400 mm, 280 mm and 500 mm;   10
length 400 m, 250 m, 300 m; coefficient of friction as 0.006, 0.0065, 0.0055
respectively. The ends of the compound pipes join two water tanks having a difference
of 20 m in their levels. Determine the discharge of water considering all the losses.

[TURN OVER

6.   (a) Differentiate between the Eulerian and Lagrangian methods of representing fluid flow.

    (b) A sliding gate 3 m wide and 1.5 m high lies in a vertical plane and has coefficient of friction of 0.2 between itself and guides. If the gate weighs 30 KN, find the vertical force required to raise the gate if its upper edge is at a depth of 9 m from free surface of water.

    (c) Give the ISO symbol for the following:–   8
         (i) Variable displacement unidirectional hudraulic motor.
        (ii) Five way two position directional control valve.
       (iii) Pressure switch.
       (iv) Pilot operated check valve.
        (v) Double acting cylinder with variable cushion at both ends.
       (vi) Pressure and temperature compensated flow control valve.
      (vii) Unloading valve.
     (viii) Pressure intensifier.

———————