

8. (a) What do you mean by notches and weirs ? Classify various types of notches and weirs. 7
(b) Derive an expression for determining discharge through a triangular notch or weir. 6
9. (a) Compare centrifugal pump with reciprocating pump. 8
(b) Write short notes on :
(i) Net positive suction head
(ii) Priming of a centrifugal pump. 5

OR

10. (a) A centrifugal pump delivers water at $0.35 \text{ m}^3/\text{s}$ and is raised through a height of 30 m. The diameter of pipe is 30 cm and lengths of pipe is 100 m. The frictional loss in the suction pipe of the pump is 1 m and the frictional loss in the delivery pipe is 9 m. Determine the work done by the pump per second. The pump efficiency is 60%. $\rho_{\text{water}} = 1000 \text{ kg/m}^3$. $\mu = 1 \text{ cP}$. 7
(b) Discuss in brief about :
(i) Rotary gear pump
(ii) Plunger pump. 6
11. (a) Derive an expression for pressure drop across the packed column for laminar flow. 6
(b) Discuss in detail about loading and flooding in packed column. 7

OR

12. (a) Classify fluidisation in detail. 6
(b) Describe the construction of fluidised column. 7

NTK/KW/15/7901

Faculty of Engineering & Technology

B.Tech. Fifth Semester (Chemical Tech.) (C.B.S.)

Examination

FLUID FLOW OPERATION

Paper—I

Time : Three Hours]

[Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Due credit will be given to neatness and adequate dimensions.
- (3) Assume suitable data wherever necessary.
- (4) Diagrams and Chemical equations should be given wherever necessary.
- (5) Illustrate your answers wherever necessary with the help of neat sketches.
- (6) Use of non-programmable calculator is permitted.

1. A U-tube manometer is used to measure the pressure of water in a pipeline, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipeline is reduced to 9810 N/m^2 , calculate the new difference in the level of mercury. Sketch the arrangements in both cases. 14

OR

2. (a) Prove that pressure or intensity of pressure at a point in a static fluid is equal in all directions. 7
- (b) Explain in brief about differential U-tube manometers and derive the equation for measuring the difference of pressure between two points. 7
3. (a) Derive an expression for losses due to sudden enlargement of pipe cross-section. 6
- (b) Derive an expression for velocity distribution in laminar flow of an incompressible fluid flowing through a circular pipe. 7

OR

4. (a) Describe Reynold's experiment in detail for determination of type of flow. 6
- (b) A crude oil of viscosity 0.97 poise and relative density 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. 7
5. (a) Compare venturimeter with orificemeter. 7
- (b) Give various types of valves used to control a fluid flow in chemical industry. Also draw neat sketches of various pipe fittings. 7

OR

6. (a) Describe the Boundary layer formation in detail. 6
- (b) What do you understand by two phase flow ? Draw a neat sketch showing all the flow regime in a two phase flow. 8
7. In a vertical pipe conveying oil of specific gravity 0.8, two pressure gauges are installed at A and B where the diameters are 16 cm and 8 cm respectively. A is 2 m above B. The pressure gauge readings have shown that the pressure at B is greater than at A by 0.981 N/cm^2 . Neglecting all losses, calculate the flow rate. If the gauges at A and B are replaced by tubes filled with same liquid and connected to a U-tube containing mercury, calculate the difference of level of mercury in the two limbs of the U-tube. 13

OR