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**SUBJECT CODE NO:- H-1025**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.Y.B.Tech. (Civil ) CBC & Grading Sys (Sem-IV)**  
**Fluid Mechanics -II**  
**[Revised]**

**[Time: Three Hours]****[Max.Marks: 80]**

- N.B Please check whether you have got the right question paper.
- 1) Q.No.1 from section A and Q.No.6 from section B are compulsory.
  - 2) Solve any two from remaining questions from each section.
  - 3) Explain with diagram, if required.

**Section A**

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|-----|--|----|
| Q.1 | Answer the following question:<br><ol style="list-style-type: none"> <li>1) Explain hydro dynamically smooth and rough pipes.</li> <li>2) Define, 'friction velocity' for turbulent flow in pipe.</li> <li>3) Define equivalent pipe.</li> <li>4) What is meant by alternate depths?</li> <li>5) Define siphon.</li> </ol>                     | 10 |
| Q.2 | a) Describe Reynold's experiment to demonstrate the types of flow.   | 07 |
|     | b) Compare between open channel flow and flow through pipes.   | 08 |
| Q.3 | a) Show that for a trapezoidal channel of given area of flow, the condition of maximum flow requires that hydraulic mean depth is equal to one half the depth of flow.   | 07 |
|     | b) A rectangular channel 4m wide has a depth of 1.5m. The slope of the channel is 1 in 1000 and value of Chezy's constant $C = 55$ . It is desired to increase discharge to maximum by changing dimensions of the section. Keep area of cross-section, bed slope & roughness of channel constant. Find new dimensions and increase in channel. | 08 |
| Q.4 | a) A 7.5m wide rectangular channel conveys, $12 \text{ m}^3/\text{s}$ of water with a velocity 1.5 m/s calculate<br><ol style="list-style-type: none"> <li>i) Specific energy</li> <li>ii) Depth if water for critical condition</li> <li>iii) Critical velocity</li> </ol>  | 07 |
|     | b) An irrigation channel of trapezoidal section, having side slopes 3 horizontal and 2 vertical, is to carry a flow of 10 cumec on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction coefficient in Manning's formula is $n = 0.012$ . Find the most economic section of the channel.              | 08 |

- Q.5 Write a short note on (any three) 15
- 1) Energy losses in pipes.
  - 2) Types of flow
  - 3) Applications of CFD in civil engineering
  - 4) Moody's diagram
  - 5) Specific energy curve

### Section B

- Q.6 Answer the following questions: 10
- 1) What is meant by turbine?
  - 2) What is meant by pumps?
  - 3) Give the classification of turbines.
  - 4) What is range of specific speed of Francis turbine?
  - 5) What is meant by jet propulsion?
- Q.7 a) Derive an expression for force exerted by a fluid jet on moving flat plate. 07
- b) A jet of water 75 mm diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate 08
- a) If the plate is moving
  - b) If the plate is moving in the same direction as the jet with a velocity of 5 m/s.
- Also find the work done per second on the plate in each case and the efficiency of the jet when the plate is moving.
- Q.8 a) A pelton wheel has to develop a shaft power of 1180kW at an overall efficiency of 85% under a head of 200mt, find the diameter of jet. Take  $C_v = 0.95$ . 07
- b) A hydraulic turbine has an output of 600 kW when it works under a head of 25 m and runs at 100 rpm. What is the type of turbine? What would be its speed? And what power will it develop when working under a head of 16m? 08
- Q.9 a) Explain with neat sketches the working of reciprocating pump. 07
- b) The impeller of a centrifugal pump is 350mm outside dia and 175mm internal dia. The vane angles of the impeller at inlet and out are 30 and 25 degrees respectively. The pump runs @ 1400 rpm. The velocity of flow through impeller is constant find the work done by impeller per second per N of water. 08
- Q.10 Write a short note on (any three) 15
- 1) Draft tube and its type
  - 2) Cavitation phenomenon
  - 3) Priming of pumps
  - 4) Hydraulic ram
  - 5) Centrifugal Pump