

II B. Tech II Semester Regular/Supplementary Examinations, November - 2020
HYDRAULICS AND HYDRAULIC MACHINERY
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
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PART -A

1. a) Differentiate between Steady and unsteady flow (3M)
- b) Explain the term dimensionally homogeneous equation (3M)
- c) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet (2M)
- d) Define the term Hydraulic machines (2M)
- e) Define the terms suction head and delivery head. (2M)
- f) What is a penstock (2M)

PART -B

2. a) Obtain an expression for the depth after the hydraulic jump and the loss of head Due to the jump. Write the assumptions made (7M)
- b) Determine the economical cross-section for an open channel of trapezoidal section with side slopes of 1 vertical to 2 horizontal, to carry 10 m³/s, the bed slope being 1/2000. Assume Manning coefficient as 0.022. (7M)
3. a) What are the different laws on which models are designed for dynamic similarity? Where are they used? (7M)
- b) Explain Distorted models and undistorted models. What is the use of distorted models? (7M)
4. a) Prove that the force exerted by a jet of water on a fixed semi-circular plate in the direction of the jet when the jet strikes at the center of the semi-circular plate is two times the force exerted by the jet on an fixed vertical plate (7M)
- b) Find the force exerted by a jet of water of diameter 100 mm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 30 m/s. (7M)
5. a) A Francis turbine working under a head of 5 m at a speed of 210 rpm develops 75 KW when the rate of flow of water is 1.8 m³/ sec. If the head is increased to 16 m, determine the speed, discharge and power (7M)
- b) Explain briefly the principles on which a Kaplan turbine works. (7M)



6. a) Define cavitation, what are the effects of cavitation? Give the necessary precautions against cavitation. (7M)
- b) A double acting reciprocating pump, running at 50 r.p.m. is discharging 900 litres of water per minute. The pump has stroke of 400 mm. The diameter of piston is 250 mm. The delivery and suction head are 25 m and 4 m respectively. Find the slip of the pump and power required to drive the pump. (7M)
7. Explain the following : i) Estimation of hydropower potential ii) Load factor (14M)
iii) Utilization factor