the weight of the plate is 300 N. Differentiate rotational and irrotational flows. OR An inverted U-tube is being used to measure the pressure between two points A

- 3.a) and B in a pipe which is carrying oil of specific gravity 0.9. The column connected to point B stands 2m above the point at A. A commercial pressure gauge attached directly to the pipe at A reads 10 N/m^2 , determine its reading when attached directly to the pipe at B.
 - Differentiate steady and unsteady, uniform and non-uniform, laminar and b) turbulent, rotational and irrotational flows. [5+5]
- 4. The diameter of pipe bend is 0.4m at inlet and 0.2m at outlet and the flow is turned through 120° in a vertical plane. The axis at inlet is horizontal and the centre of the outlet section is 1m below the centre of inlet section. The total volume of fluid contained in the bend is 0.09m³. Neglecting friction, calculate the magnitude and direction of force exerted on the bend by the water flowing through it at 0.4 WWWhen Manle apressus it 140 th Sm². CO. IN [10]

OR

Write about stream tube with neat diagram.

Describe the absolute pressure and gauge pressure with neat diagram. b)

Each question carries 10 marks and may have a, b, c as sub questions.

Give a classification of body forces on fluid. c)

Note: This question paper contains two parts A and B.

- Differentiate venture meter and nozzle meter. d)
- Give list of types of hydropower plants. e)
- f) Derive the thrust exerted by the jet in the direction normal to the stationary flat plate. [3]
- Mention the causes of cavitation in Francis turbine. **g**)
- Differentiate Francis turbine and Kaplan turbine. h) [3]
- Define the hydraulic losses for centrifugal pump. i) [2]
- Differentiate manometric efficiency and overall efficiency of the centrifugal i) pump. [3]

PART-B

plane at 45° to the horizontal with a velocity of 0.45 m/s. There is a cushion of fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if

(50 Marks) Define Viscosity. A plate having an area of 0.7 m^2 is sliding down the inclined

[7+3]

PART-A

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit.

(Electrical and Electronics Engineering)

Code No: 113BX JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD **B.Tech II Year I Semester Examinations, November/December - 2017** FLUID MECHANICS AND HYDRAULIC MACHINERY

Time: 3 Hours

1.a)

2.a)

b)

Max. Marks: 75

R13

(25 Marks)

[2]

[3]

[2]

[2]

- [3]
 - [2]

- 5.a) Differentiate the Hydraulic Gradient Line and Total Energy Line.
 - b) A pipe line carrying water has a diameter of 0.7m and is 1.8km long. To increase the delivery another pipe line of the same diameter is introduced parallel to the first pipe in the second half of its length. Find the increase in discharge if the total head loss in the both the cases is 10m. Assume =0.02 for all pipes. [3+7]
- 6. Consider the jet striking a moving symmetrical series of curved vanes at its centre. Derive the expression for force exerted by the jet on the wheel, work done and maximum efficiency. Draw neat figures. [10]

OR

- 7.a) Describe any four elements of hydropower plants.
- b) Differentiate storage and pondage.
- c) Explain the concept of pumped storage plants. [5+2+3]
- 8.a) A 1/3 scale model of Kaplan turbine is designed to operate at a head of 35m. The prototype produces 25 kW of power under a head of 40m when operating at a speed of 250 rpm. Find the speed, discharge and the power of the model. Assume the efficiency of the model and prototype is same at a value of 95%.
- b) Give classification of surge tanks with neat figures and mention their importance. [5+5]

OR

- 9.a) A Pelton wheel is working under a head of 55m and the discharge of $0.7 \text{ m}^3/\text{s}$. The mean bucket speed is 18 m/s. Find the overall efficiency and the power produced if the jet is deflected by the blades through the angle of 145^0 . Assume the coefficient of velocity as 0.85 and mechanical efficiency as 85%.
- b) With a neat figure explain the governing mechanism of turbines. [5+5]
- 10. A centrifugal pump has an impeller of 80cm diameter and it delivers 1.1 m³/s against a head of 70m. The impeller runs at 1000 rpm and its width at outlet is 8cm. If the leakage loss is 4% of the discharge, external mechanical loss is 10 kW and hydraulic efficiency is 82%, calculate the blade angle at outlet and overall efficiency. [10]

OR

- 11.a) Two homologous pumps A and B are to run at the same speed of 800 rpm. Pump A has an impeller of 40cm diameter and discharges $0.3 \text{ m}^3/\text{s}$ of water under a net head of 40m. Determine the diameter of the impeller of pump B and its net head if it is to discharge $0.5 \text{ m}^3/\text{s}$.
 - b) Describe about the main characteristic curves of the pump with neat sketches.

[5+5]

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