

4481

BOARD DIPLOMA EXAMINATION, (C-14)

JUNE-2019

DME - FOURTH SEMESTER EXAMINATION

FLUID MECHANICS & HYDRAULIC MACHINERY

Time : 3Hours]

[Max. marks: 80

PART-A

10x3=30M

Instructions: 1) Answer **all** questions and each question carries **three** marks.
2) Answers should be brief and straight to the point and shall not exceed five simple sentences.

- 1) Define specific volume and vapour pressure.
- 2) State any three differences between compressible fluid and incompressible fluid.
- 3) Define terms a) unsteady flow b) turbulent flow.
- 4) State the use of pitot tube with simple sketch.
- 5) Write down losses in pipe flow and mention three types of minor losses in pipe flow.
- 6) Define hydraulic mean depth?
- 7) A jet of water of 50mm diameter with a velocity of 25m/sec is impinging normally on a plate. Find the force exerted by the jet. When
 - a) it is fixed
 - b) plate is moving with a velocity of 10m/sec in the direction of jet.
- 8) Define the terms of efficiencies of Francis turbine
 - a) hydraulic efficiency
 - b) overall efficiency.
- 9) What is governing of turbines?
- 10) Define a) slip b) percentage of slip related to reciprocating pumps.

PART-B

5x10=50M

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- Instructions:** 1) Answer any **five** questions and each question carries **ten** marks.
2) Answers should be comprehensive. The criteria for valuation is the content but not the length of the answer.

- 11) a) Explain phenomenon of capillarity? Write expression for capillary rise of liquid. 5
b) The space between two squares flat parallel plates is filled with oil. Each side of plate is 30 cm long and thickness of oil is 14 mm. The upper plate which moves at 2.5 cm/sec requires a force of 12 N to maintain the speed. Determine a) dynamic viscosity of oil and b) kinematic viscosity of oil. If the specific gravity of oil is 0.8. 5
- 12) A pipe of 300mm diameter carries an oil of specific gravity 0.9 at the rate of 120 liters/sec and under a pressure of 20 Kpa. Calculate the total energy in meters at a point which is 3m above the datum line.
- 13) The pressure at the inlet of water pipe is 7 N/mm² and pressure drop is 0.7 N/mm². The pipe line is 1.5 Km long. If 75 KW power is to be transmitted over the pipe line Find a) diameter of pipe line b) efficiency of transmission. If $f=0.006$. 5+5
- 14) A jet of water 50mm diameter moving with a velocity of 15m/sec impinges on a series of vanes moving with a velocity of 6 m/sec. Find a) force exerted by the jet. b) Work done by the jet. c) Efficiency of the jet. 4+3+3
- 15) a) Derive the expression for the force exerted by the jet strikes the stationary curved plate at one end tangentially. 5
b) State any five differences between impulse turbine and reaction turbine. 5

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- 16) A pelton wheel working under a head of 500 m produces 13000 KW at 600rpm, if the overall efficiency of the turbine is 85% and speed ratio is 0.45. Determine a) discharge of the turbine. b) diameter of the wheel c) diameter of the nozzle. 4+3+3
- 17) State the use of casing in a centrifugal pump? Mention different types of casings and explain them?
- 18) A double acting reciprocating pump running at 50rpm is discharging 900 litres of water per minute, the pump has a stroke of 400mm, the diameter of piston is 250mm, the delivery and suction heads are 25m and 4m respectively. Find the slip and power required to drive the pump. 4+6

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