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Question Paper Code : 42841

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth Semester

Mechanical Engineering

ME 2204 – FLUID MECHANICS AND MACHINERY

(Common to Manufacturing Engineering/Industrial Engineering/Industrial Engineering and Management/Automobile Engineering/Mechanical and Automation Engineering/Mechatronics Engineering and Production Engineering)

(Regulations 2008)

[Also Common to PTME 2204 Fluid Mechanics and Machinery for B.E.(Part-Time) Third Semester – Mechanical Engineering – Regulations 2009]

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. Define capillarity.
2. What are Non-Newtonian fluids ?
3. What is Moody's chart ?
4. What are minor losses ?
5. What are model and prototype ?
6. Mention some applications of dimensionless numbers.
7. Write Euler's equation.
8. What is cavitation ?
9. What is slip in a pump ?
10. Write the equation for work done by reciprocating pump.



11. a) i) Derive the continuity equation for fluid flow. (8)
ii) The diameters of pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. (8)

(OR)

- b) Derive hydrostatic law.

12. a) An oil of specific gravity 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200 mm at the rate of 60 litres/sec. Find the head lost due to friction for a 500 mm length of pipe. Find the power required to maintain the flow.

(OR)

- b) The rate of flow of water through a horizontal pipe is $0.25\text{m}^3/\text{sec}$. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2 . Determine the loss of head due to sudden enlargement, pressure intensity in the large pipe and power lost due to enlargement.

13. a) A pipe of diameter 1.5 m is required to transport an oil of sp.gr. 0.90 and viscosity 3×10^{-2} poise at the rate of 3000 liters/s tests were conducted on a 15 cm diameter pipe by using water at 20°C . Find the velocity and rate of flow in the model. Viscosity of water at $20^\circ\text{C} = 0.01$ poise.

(OR)

- b) Explain the various types of similarities between model and prototype.

14. a) Derive the workdone for a pelton wheel.

(OR)

- b) Describe the performance curves of a centrifugal pump and mention the significance of each.

15. a) The cylinder of a single acting reciprocating pumps is 15 cm in diameter and 30 cm in stroke. The pump is running at 30 rpm and discharge water to a height of 12 m. The diameter and length of the delivery pipe are 10 cm and 30 cm respectively. If a large air vessel is fitted in the delivery pipe at a distance of 2 m from the centre of the pump, find the pressure head in the cylinder at the beginning of delivery stroke and in the middle of delivery stroke. Take $f = 0.01$.

(OR)

- b) A single acting reciprocating pump running at 50 rpm delivers $0.01\text{m}^3/\text{s}$ of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine the theoretical discharge of pump, coefficient of discharge and slip and percentage slip of pump.