Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40790

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

Third/Fourth Semester

Mechanical Engineering

CE 6451 – FLUID MECHANICS AND MACHINERY

(Common to Aeronautical Engineering/Automobile Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/ Mechanical and Automation Engineering/Mechatronics Engineering/ B.E. Production Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A (10×2=20 Marks)

1. What are compressible and incompressible fluids ?
2. Draw the shear stress-velocity gradient profile for Non Newtonian fluids.
3. When a tube is said to be hydraulically smooth ?
4. Define equivalent diameter of a non circular tube.
5. What is dimensional homogeneity ?
6. List the methods of dimensional analysis.
7. What is suction head of a pump ?
8. Define mechanical efficiency of a pump.
9. How are hydraulic turbines classified ?
10. Define hydraulic efficiency of a turbine.

PART – B (5×13=65 Marks)

11. a) Explain the various properties of fluids.

(OR)

b) Explain the various classification of fluids with the help of a stress-strain graph.

12. a) An old water supply distribution pipe of 250 mm diameter of a city is to be replaced by two parallel pipes of smaller equal diameter having equal lengths and identical friction factor values. Find out the new diameter required.

(OR)

b) A pipeline of length 2000 m is used for power transmission. If 110.3625 kW power is to be transmitted through the pipe in which water having a pressure of 490.5 N/cm^2 at inlet is flowing. Find the diameter of the pipe and efficiency of transmission if the pressure drop over the length of the pipe is 98.1 N/cm^2. Take f = 0.0065.

13. a) The pressure difference Δp in a pipe of diameter D and length l due to turbulent flow depends on the velocity V, viscosity μ, density ρ and roughness k. Using Buckingham's π theorem, obtain an expression for Δp.

(OR)

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

14. a) The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impleller per unit weight of water.

(OR)

b) Explain the following :

i) Manometric efficiency.

ii) Mechanical efficiency.

iii) Overall efficiency.

15. a) Explain the parts of Pelton wheel.

(OR)

b) A pelton wheel is supplied with water under a head of 35 m at the rate of 40.5 kl/min. the bucket deflects the jet through an angle of 160° and the mean bucket speed is 13 m/s. Calculate the power and hydraulic efficiency of the turbine.

PART – C (1×15=15 Marks)

16. a) Derive the Euler's equation of motion.

(OR)

b) Derive the work done by the centrifugal pump on water.

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