Register Number: ……..

B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Third Semester

MEC106: FLUID MECHANICS AND MACHINERY

(Common to AERO, AUTO & MECH)

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. One litre of water occupies a volume of
   a) 100 cm^3 b) 250 cm^3
   c) 500 cm^3 d) 1000 cm^3
2. In one dimensional flow, the flow
   a) is steady and uniform b) takes place in straight line
   c) takes place in curve d) takes place in one direction
3. The pressure less than atmospheric pressure is known as
   a) suction pressure b) vacuum pressure
   c) negative gauge pressure d) all of these
4. The total energy line lies over the hydraulic gradient line by an amount equal to the
   a) pressure head b) velocity head
   c) pressure head + velocity head d) pressure head - velocity head
5. The maximum efficiency of transmission through a pipe is
   a) 50% b) 56.7% C.
   c) 66.67% d) 76.66%
6. Head developed by a centrifugal pump depends on its
   a) speed b) impeller diameter
   c) both (a) and (b) d) neither (a) nor (b)
7. Power loss in an orificemeter is _____ that in a venturimeter.
   a) less than b) same as
   c) more than d) data insufficient, cannot be predicted
8. For the transfer of solution of thick slurry, the pump used is a _____ pump.
   a) reciprocating b) gear
   c) diaphragm d) centrifugal

9. If the water flows along the tangent of the runner is known as
   a) Tangential flow turbine b) Radial flow turbine
   c) Axial flow turbine d) Mixed flow turbine
10. The inward flow reaction turbine having radial discharge at outlet is known as
   a) Kaplan turbine b) Francis turbine
   c) Pelton turbine d) All these

PART B (10 x 2 = 20 Marks)

11. Define Newton's law of viscosity.
12. One litre of crude oil weighs 9.6 N. Calculate its specific weight, density and specific gravity.
13. Write the applications of Bernoulli's equation.
14. State Buckingam's π theorem.
15. Mention the characteristics of Laminar flow.
16. What is mean by equation of motion and explain Navier-Stokes equation?
17. Differentiate Impulse and Reaction turbine.
18. What is meant by specific speed.
19. What is pump and classify it.
20. What is priming? Why is it necessary?

PART C (5 x 14 = 70 Marks)

21. a) If the velocity profile of a fluid over a plate is parabolic with the vertex 20 cm from the plate, where the velocity is 120 cm /sec. Calculate the velocity gradients and shear stresses at a distance of 0, 10 and 20 cm from the plate, if the viscosity of the fluid is 8.5 poise.

(OR)

b) What is simple manometer? Explain the Piezometer and U tube manometer with neat sketch.

22. a) Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8m in diameter and carries one third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

(OR)

b) A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at apposition B which is 4 metres at a higher level. If the pressure at A and B are 9.81 N/ cm^2 and 5.886 N/ cm^2 respectively and the discharge is 200 litres/s determine the loss of head and direction of flow.

23. a) The rate of flow of water through a horizontal pipe is 0.25 m^3/s. 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 (i) loss of head due to sudden enlargement, (ii) pressure intensity in the large pipe, (iii) Power lost due to enlargement.

(OR)

b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm, and 400 mm respectively is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively. Considering: (i) minor losses also (ii) neglecting minor losses.

24. a) Explain the construction and working principle of Pelton wheel with neat sketch.

(OR)

b) A water turbine has a velocity of 6m/s at the entrance to the draft-tube and a velocity of 1.2m/s at the exit. For frication losses of 0.1m and a tail water 5m below the entrance to the draft-tube, find the pressure head at the entrance.

25. a) What is axial flow reaction turbine and explain its types in detail.

(OR)

b) Explain about Air vessels fitted to reciprocating pump.

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