KUMARAGURU
college of technology
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Register Number:…………….

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2013)

Third Semester

CIVIL ENGINEERING

U13CET301: Fluid Mechanics

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Kinematic Viscosity is defined as equal to

   a) Dynamic viscosity x density
   b) Dynamic viscosity/density
   c) Dynamic viscosity x pressure
   d) Pressure x density

2. Surface Tension has the units of _____

3. The Resultant Hydrostatic Force acts through a point known as

   a) Centre of gravity
   b) Centre of buoyancy
   c) Centre of pressure
   d) Buoyancy

4. For a floating body, the buoyant force passes through the _____ of liquid displaced by a body

5. Bernoulis 's equation is derived making assumption that

   a) The flow is uniform & incompressible
   b) The flow is non-viscous, uniform & steady
   c) The flow is steady, On-viscous incompressible & irrotational
   d) The flow is steady

6. A stream line is _____

7. A Pitot tube is used to measure

   a) Discharge
   b) Average velocity
   c) Velocity at a point
   d) Pressure at a point

8. Venturi-meter is used to measure _____

9. Maximum efficiency of power transmission through pipe is

   a) 50%
   b) 66.67%
   c) 75%
   d) 100%

10. When the pipes are connected in parallel, the total loss of head in each pipe is _____

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. Define Fluid

12. Define Surface Tension

13. What is meant by Meta Centric Height?

14. Define Centre of Buoyancy

15. Distinguish between Steady and Unsteady Flow

16. What do you mean by Flownet?

17. What are components of venturi meter?

18. What is a Pitot tube?

19. What are uses of dimensional analysis?

20. State Buckingham pi-theorem

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. a)   A Simple U tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having a vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40cm and the height of fluid in the left from the centre of pipe is 15cm below.

22. a)   A rectangular buoy4mx1mx0.5m floats in water with 1mx4m in plan. It weights 12kN. Calculate the volume of water displaced and the meta centric height.

(OR)

    b)   Derive the expression to find the total pressure and centre of pressure of plane surface immersed vertically in a fluid

23. a)   Derive the Euler's equation of motion of steady flow of an ideal fluid. Using Euler's equation , derive the Bernoulli's equation and also write down the assumptions made in the derivation of the above equation

(OR)

    b)   A two dimensional flow is described by the velocity components ,$u=5x^3$ and $v=-15x^2y$.Determine the Stream Function, velocity and acceleration at a point

P(x=1m;y=2m)

24. a) A venturi-meter with inlet diameter 0.2m and throat diameter 0.1m is inserted in a vertical pipe carrying oil specific gravity 0.8. The flow of oil is in upward direction. The difference of levels between the throat and inlet section is 0.6m. The oil mercury differential manometer gives a reading of 0.25m of mercury. Find the discharge of oil, neglecting the losses

(OR)

b) Water flows over a rectangular weir 1m wide at a depth of 150mm and afterwards passes through a triangular right- angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir

25. a) The pressure difference $\triangle p$ in a pipe of diameter D and length L due to viscous flow depends on the velocity V,viscosity μ and density ρ. Using Buckingham pi-theorem, obtain an expression for $\triangle P$

(OR)

b) Two pipes of diameter 400mm and 200mm are each 300mm long. When the pipes are connected in series the discharge through pipe line is $0.12m^3/s$, find the head loss incurred what would be the loss of head in the system to convey the same total discharge when the pipes are connected in parallel. Take the friction factor for each pipe as 0.008

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