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Question Paper Code: 93105

B.E. / B.Tech DEGREE EXAMINATION, MAY 2022

Third Semester

Civil Engineering

19UCE305 FLUID MECHANICS

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- Property of fluid by which its own molecules are attracted is called CO1- U
(a) Adhesion (b) Cohesion (c) Viscosity (d) Compressibility
- Bernoulli's theorem deals with the law of conservation of CO1- U
(a) Mass (b) Momentum (c) Energy (d) None of the above
- The unit of physical quantity which does not depend on the unit of any other CO3- U
physical quantity is called as
(a) independent dimension (b) fundamental dimension
(c) core dimension (d) none of the above
- A liquid flows through pipes 1 and 2 with the same flow velocity. If the ratio of CO2- Ana
their pipe diameters $d_1 : d_2$ be 3:2, what will be the ratio of the head loss in the
two pipes?
(a) 3:2 (b) 9:4 (c) 2:3 (d) 4:9
- The boundary layer separation takes place if CO1- U
(a) Pressure gradient is zero (b) Pressure gradient is positive
(c) Pressure gradient is negative (d) None of the above

PART – B (5 x 3= 15 Marks)

- What is a fluid? How are fluids classified? CO1- U

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| 7. | Define stream line. | CO1- U |
| 8. | List the types of similarities between model and prototype.. | CO1- U |
| 9. | Define critical velocity | CO1- U |
| 10. | Illustrate the examples of formation of boundary layer in day to day life | CO2- App |

PART – C (5 x 16= 80 Marks)

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|-----|--|----------|------|
| 11. | (a) The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of the oil film is 1.5 mm | CO2- App | (16) |
| | Or | | |
| | (b) Calculate the capillary effect in millimeters a glass tube of 4 mm diameter, when immersed in a) water b) mercury. The temperature of the liquid is 20° C and the values of the surface tension of water and mercury at 20° C in contact with air are 0.073575 and 0.51 N/m respectively. The angle of contact for water is zero that for mercury 130°. Take specific weight of water as 998 kg/m ³ | CO2- App | (16) |
| 12. | (a) Briefly describe about velocity potential function and stream function and its relations | CO1- U | (16) |
| | Or | | |
| | (b) A 30cm diameter pipe conveying water branches into two pipes of diameters 20cm and 15 cm respectively. if the average velocity in the 30cm diameter pipe is 2.5m/s. Find the discharge in the pipe, also determine the velocity in 15cm pipe .if the average velocity in 20cm diameter pipe is 2m/s | CO2- App | (16) |
| 13. | (a) Find the expression for the power P, developed by a pump when P depends upon the head H, the discharge Q and specific weight w of the fluid. Use Rayleigh's Method | CO2- App | (16) |
| | Or | | |
| | (b) Discuss about Buckingham's theorem. State the procedure for solving problems. | CO2- App | (16) |
| 14. | (a) Differentiate major and minor losses. | CO1- U | (16) |
| | Or | | |
| | (b) Calculate the discharge through a pipe of diameter 200mm when the difference of pressure head between the two ends of a pipe 500m apart is 4m of water. Take the value of f=0.009 in the formula $h_f = 4flv^2/2gd$ | CO2- App | (16) |

15. (a) Explain in detail about the boundary layer separation CO1- U (16)
- Or
- (b) Determine the thickness of boundary layer at the end of the plate and the drag force on one side of a plate 1 m long and 0.8m wide when placed in water flowing with a velocity of 150mm per second .Calculate the value of coefficient of drag. Take kinematic viscosity =0.01 poise CO2- App (16)