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Question Paper Code: 93A04

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Agricultural Engineering

19UAG305 - FLUID MECHANICS AND OPEN CHANNEL HYDRAUILCS

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The ratio of weight of fluid to unit volume of fluid is called   CO1- R

    (a) density   (b)specific weight   (c)mass density   (d)viscosity

2. Surface tension is due to   CO1- R

    (a) cohesion and adhesion   (b) cohesion only

    (c) adhesion only   (d) none of these

3. It is a type of flow in which are fluid particles while flowing along   CO2- R
   stream lines also rotate about their own axis

    (a)rotational flow   (b) laminar flow   (c) irrigational flow   (d) vortex flow

4. The flow net is used to determine the   CO2- R

    (a) stream lines   (b) Equipotential lines   (c)path line   (d) both a and b

5. Which of the flowing is a major loss   CO3- R

    (a) Friction loss   (b) shock loss   (c) entry loss   (d) exit loss

6. Venturimeter is one of the application of   CO3- R

    (a) Equation of continuity   (b) Bernoulli's equation

    (c) Light equation   (d) Speed relation

7. The discharge in an open channel corresponding to critical depth is   CO4- R

   (a) zero   (b)minimum   (c)maximum   (d) none of these

8. The most efficient rectangular section is the one which has   CO4- U

   (a) b = d   (b)d = 2b   (c)b = 2d   (d) b = d/3

9. The fluid coming into the centrifugal pump is accelerated by   CO5- U

   (a) throttle   (b)impeller   (c)nozzle   (d) governor

10. The manometric efficiency of a centrifugal pump is given by   CO5 -U

    (a) infiltration   (b) percolation   (c) runoff   (d) seepage

PART – B (5 x 2= 10Marks)

11. State Newton's law of Viscosity and give examples   CO1- R

12. Derive the continuity equation   CO2- U

13. What is venturimeter? Write the main parts of Venturimeter.   CO3- U

14. What is meant by critical flow?   CO4- U

15. What are the methods of dimensional analysis?   CO5- R

PART – C (5 x 16= 80Marks)

16. (a) A differential manometer is connected at the two points A &   CO1- Ana   (16)
         B of two pipes asshown in fig. The Pipe A Contains a liquid of
         specific gravity is 1.5. While pipeB contains a liquid of specific
         gravity is 0.9.The pressures at A & B are 1Kgf/cm 2 and 1.5
         Kgf/cm 2 respectively. Find the difference in mercury level in
         thedifferential manometer.
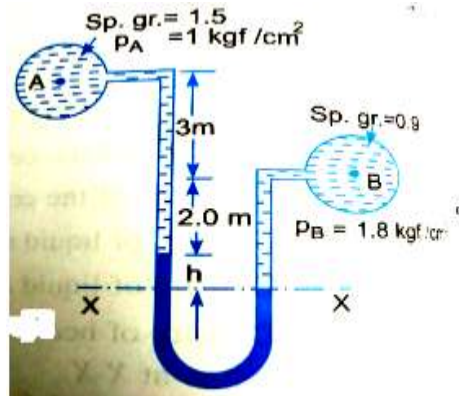
                                       Or

    (b) A single column vertical manometer is connected to a pipe   CO1- U   (16)
         containing oil of sp.gr 0.9.The area of the reservoir is 80times the
         area of the manometer tube. The reservoir contains mercury of
         sp.gr 13.6.The level of mercury in the reservoir is at a height of
         30cm below the center of the pipe and difference of mercury
         levels in the reservoir and right limb is 50cm.find the pressure in
         the pipe.

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17. (a) The water is flowing through a pipe having diameter 20cm and 10cm at section 1 and 2 respectively. The rate of flow through pipe is 35 liters/sec.The section 1 is 6 m above datum and section 2 is 4m above the datum. If the pressure at section 1 is 39.24N/cm2.Find the intensity of pressure at section 2. CO2 - Ana (16)

Or

(b) Water flow through a pipe AB 1.2 m diameter at 3 m/s and the passes through a pipe BC 1.5 cm diameter. At C, the pipe branches. Branch CD is0.8 m in diameter and carries one third of flow in AB. The velocity in branchCE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, thevelocity in CD and the diameter of CE. CO2 - Ana (16)

18. (a) Derive the expression for Darcy Weisbach formula CO3- U (16)

Or

(b) The rate of flow of water through a horizontal pipe is $0.3m^3$/s.the diameter of the pipe which is 200mm is suddenly enlarged to 400mm.the pressure intensity in the smaller pipe is $12.772N/cm^2$.determine
i)loss of head due to sudden enlargement ii)pressure intensity in the large pipe iii)power loss due to enlargement CO3 - Ana (16)

19. (a) A rectangular channel 4m wide has depth of water 1.5m.the slope of the bed of the channel is 1 in 1000 and value of chezy's constant c=55.it is desired to increase the discharge to a maximum by changing the dimensions of the section for constant area of cross section slope of the bed and roughness of the channel.find the new dimensions of the channel and increase in discharge. CO4- Ana (16)

Or

(b) Derive the condition for the most economical rectangular channel CO4 -U (16)

20. (a) Draw a neat sketch of centrifugal pump and explain the working principle of centrifugal pump CO5- U (16)

Or

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(b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400mm respectively. the pump is running at 1200 r.p.m.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.dtermine the work done by the impeller per unit weight of water.

CO5- Ana   (16)

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