A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 53A04

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Third Semester

Agricultural Engineering

15UAG304 - FLUID MECHANICS AND HYDRAULICS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Surface tension is due to CO1-R

   (a) Cohesion and adhesion (b) Cohesion only

   (c) Adhesion only (d) None of the above

2. The principle of floatation of bodies is based on the premise of CO1-R

   (a) Newtons law of viscosity (b) Newtons first law

   (c) Metacentre (d) None of the mentioned

3. Three flows named as 1,2 and 3 are observed. The Reynold's number for the three are 100, 1000 and 10000. Which of the flows will be laminar? CO2-App

   (a) Only 1 (b) Only 1 and 2 (c) Only 3 (d) 1, 2 and 3

4. Streamline and equipotential lines in a flow field CO2-R

   (a) are parallel to each other (b) are identical to each other

   (c) are perpendicular to each other (d) intersect at acute angles

5. _____ measures velocity at a point of fluid in a stream. CO3-App

   (a) Venturi meter (b) Pitot-Static tubes (c) pH meter (d) None of the mentioned

6. Which one of the following is a major loss? CO3-R

   (a) Frictional loss (b) Shock loss (c) Entry loss (d) Exit loss

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 device used for measuring discharge of irrigation channel, well or canal outlet is called CO4-R

(a) Weir (b) Notch (c) Meter gate (d) All are correct

9. The ratio of inertia force and gravitational force is called as _____ CO5-R

(a) Reynolds number (b) Stokes number (c) Froude's number (d) Euler's number

10. The fluid coming into the centrifugal pump is accelerated by _____ CO5-R

(a) Throttle (b) Impeller (c) Nozzle (d) Governor

PART – B (5 x 2= 10Marks)

11. Write the equation of surface tension of liquid jet and soap bubble. CO1-R

12. Define Streak line . CO2-R

13. List out the types of minor losses in pipes. CO3-R

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

15. Distinguish between pump and turbine. CO5-Ana

PART – C (5 x 16= 80 Marks)

16. (a) A vertical gap 2.2 cm wide of infinite extent contains a fluid of viscosity 2.0 Ns/m^2 and specific gravity 0.9. A metallic plate 1.2 m X 1.2 m X 0.2 cm is to be lifted up with a constant velocity of 0.15 m/sec, through the gap. If the plate is in the middle of the gap, find the force required. The weight of the plate is 40 N. CO1 -U (16)

Or

(b) With the help of neat sketch describe the working principle of bourdon tube pressure gauge. CO1 -U (16)

17. (a) The velocity in a fluid is given $V = 4x^3\, i - 10x^2 yj + 2tk$. Find the velocity and acceleration of a fluid particle at (2,1,3) at time t=1. CO2 -U (16)

Or

(b) Define the equation of continuity. Obtain an expression for a continuity equation in Cartesian co-ordinates. CO2 -U (16)

18.	(a)	The water is flowing through a pipe of diameter 30 cm and 20 cm at the section 1 and 2 respectively. The rate of flow through pipe is 35 litre/s. The section 1 is 8 m above datum and section 2 is 6 m above datum. If the pressure at section 1 is 44.5 N/cm^2. Find the intensity of pressure at section 2.	CO3 -U	(16)
		Or		
	(b)	Derive the expression for Darcy Weisbach formula.	CO3 -U	(16)
19.	(a)	Derive the condition for the best side slope of the most Economical trapezoidal channel	CO4 -App	(16)
		Or		
	(b)	A cipolletti weir of crest length 60 cm discharges water. The head of water over the weir is 360 mm. Find the discharge over the weir if the channel is 80 cm wide and 50 cm deep. Take $C_d = 0.60$.	CO4 -App	(16)
20.	(a)	Using Buckingham's π- theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH}\,\phi\left[\frac{D}{H}, \frac{\mu}{\rho V H}\right]$, where H is the head causing flow, D is the diameter of the orifice, μ is co-efficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.	CO5- U	(16)
		Or		
	(b)	Draw a neat sketch of reciprocating pump and explain the working principle of reciprocating pump.	CO5- U	(16)