Total No. of Pages : 02

G.R. No.	

Paper code - P119-121 (ESE)

DECEMBER 2019 / ENDSEM

F. Y. M. TECH. (Civil-WREE) (SEMESTER - I)

COURSE NAME: Advanced Fluid Mechanics

COURSE CODE: CVPA11181

(PATTERN 2018:R1)

Time: [3 Hour] [Max. Marks: 50]

(*) Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) A stream function is given by $\psi = 3xy$. Determine the velocity function φ. [3]

OR

Derive equation for streamlines and equipotential lines for superposition of source and sink [3]

Q.2) 2 tanks containing oil of density 950 kg/m^3 and dynamic viscosity 8×10^{-2} Pa.s are connected by a 15 cm diameter pipeline of length 200 m. Calculate the maximum difference in the elevation in the oil surfaces that can exist while maintaining laminar flow in the pipe [3]

OR

Starting with equation for velocity for steady laminar flow through circular pipe derive relation between velocity and maximum velocity [3]

Q.3) Calculate the displacement thickness in terms of nominal thickness for the following velocity distribution $\frac{u}{U} = \frac{y}{\delta}$ [2]

OR

Calculate the momentum thickness in terms of nominal thickness for the following velocity distribution $\frac{u}{U} = \frac{y}{\delta}$ [2]

Q.4) a) Discuss types of turbulent flow [6]

b) Derive Karman –Prandtl equation for velocity distribution in turbulent flow near hydrodynamically smooth boundary [8]

OR

Q.5) a) Write any four characteristics of turbulent flow [4]

b) Derive equation of shear stress for turbulent flow through two fixed parallel plates [10]

Q.6) a) Derive Borda Carnot equation for sudden expansion in pipe [8]

b) An existing pipeline 2000m long consists of the following sizes : [6]

a) 400mm diameter for 1000m
b) 350mm diameter for 600m
c) 300mm diameter for 400m

It is proposed to provide a pipe of uniform diameter in place of the existing pipe. Considering only friction losses and assuming the same value of f for all the pipelines, calculate the diameter of the new pipe

OR

Q.7

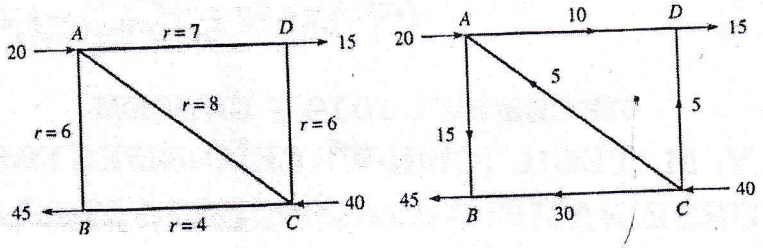

Figure shows a pipe network with first trial. Complete the first trial and take 2 more trials.

Q.8 a) Explain the variation of pressure and its distribution around a sphere. Draw the pressure distribution diagram. Show different points on it. [8]

b) Write a short note on Karman Vortex trail [6]

OR

Q.9 a) Write a short note on polar diagram [6]

b) Discuss development of lift on an airfoil [8]