Registration No :

Total Number of Pages : 02

B.Tech
PCI3I101

3rd Semester Back Examination 2019-20
FLUID MECHANICS & HYDRAULICS MACHINES
BRANCH : CIVIL
Max Marks : 100
Time : 3 Hours
Q.CODE : HB888
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**
a) Mention specific weight and specific volume of a fluid.
b) Differentiate between absolute pressure and gauge pressure.
c) State the term total pressure and center of pressure.
d) Define the term buoyancy and center of buoyancy.
e) What is streamline flow?
f) Define stream function.
g) Write the expression for the discharge through venturimeter.
h) Define Hydraulic gradient line.
i) State the difference between a turbine and pump.
j) Mention the classification of turbine according to the type of energy at inlet.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**
a) Explain about the classification of fluids.
b) An oil of specific gravity 0.8 is contained in a vessel. At a point the height of oil is 30 m. Find the corresponding height of water at that point.
c) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the center of the plate is 3 m below the free surface of water.
d) With neat sketches, explain the conditions of equilibrium for floating body.
e) Distinguish between (i) steady flow and un-steady flow (ii) Uniform and non-uniform flow.
f) The velocity potential function is given by $\phi = 5(x^2 - y^2)$, calculate the velocity components at the point (5,6).
g) The diameters of a pipe at the sections 1 and 2 are 15 cm and 20 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 6 m/s. Also determine the velocity at section 2.
h) What is pitot tube? How will you determine the velocity at any point with the help of pitot tube?
i) Find the loss of head when a pipe of diameter 150 mm is suddenly enlarged to a diameter of 300 mm. The rate of flow of water through the pipe is 250 liter/s.
j) Develop an expression for the power transmission in fluid flow through pipes.
k) Illustrate the different types of efficiency of a turbine
l) Explain briefly about Indicator diagram of reciprocating pump.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 The space between two square flat parallel plates is filled with oil. Each side of the **(16)** plate is 60 cm. The upper plate, which moves at 2.5 m / s, requires a force of 98.1 N to maintain the speed. Determine the dynamic viscosity of the oil in poise and the kinematics viscosity of the oil in stokes if the specific gravity of the oil is 0.95.

Q4 A fluid flow is given by $V = x^2 yi + y^2 zj - \left(2xyz + yz^2\right)k$ prove that it is a case of **(16)** possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point (2, 1, 3).

Q5 State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an **(16)** expression for Bernoulli's equation from first principle and state the assumptions made for such derivation.

Q6 With a neat sketch, explain the constructional features of different parts of a centrifugal **(16)** pump.