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B.E. VI Sem Examination (Nov-2015)

SUBJECT CODE : CV 601 SUBJECT NAME: APPLIED FLUID MECHANICS

DATE: 2/11/2015 TIME: 10.30 A.M TO 1.30 P.M TOTAL MARKS : 70

Instruction: (1) Answer each section in separate answer sheet.
(2) Use of Scientific calculator is permitted.
(3) Assume the data if it is required.

SECTION-I

Q.1	A.	Explain Reynold's equation of motion for turbulent flow.	5
	B.	Explain Prandtl's mixing length theory.	5
	C.	For laminar flow an oil having dynamic viscosity 1.766 N.s/m^2 in a pipe of 30 cm diameter, the maximum velocity is 3 m/s at the centre of the pipe. Calculate the shearing stresses at the pipe wall and within 50 mm from the pipe flow.	5
		OR	
	C.	Water flowing through a rough pipe of diameter 600 mm at the rate of 550 lit /sec. The wall roughness is 3 mm. Find the power lost for 1.2 km length of pipe.	5
Q.2	A.	Discuss the phenomenon of boundary layer separation	5
	B.	A steel spherical ball of 2 cm diameter having specific gravity of 8 falls in an oil of density 800 kg/m^3.Steel balls falls with a velocity of 40 cm/s. Find the viscosity of oil.	5
		OR	
	A.	Discuss drag on a circular cylinder with all possible flow conditions with sketch	5
	B.	A smooth pipe line of 10 cm diameter conveys water at the rate of 0.05m^3/s. Compute the friction factor, maximum velocity and wall shear stress. Take kinematic viscosity of water = 0.001 stokes.	5
Q.3	A.	Explain the following terms ... Magnus effect, Wake formation, Skin drag	5
	B.	Calculate the rate of flow of oil (μ = 0.8 poise) flowing between two fixed plates kept at a distance of 20 mm apart. The drop of pressure in a length of 4 m is 4 X 10^4 N/m^2. The width of the plate is 150 mm.	5
		OR	
	A.	Explain Von Karman integral equation for boundary layer flows.	5
	B.	Determine the distance from the pipe wall at which point velocity is equal to mean velocity of flow in case of a turbulent flow in pipes.	5

SECTION – II

Q.4 A. Explain normal depth, critical depth, and alternate depths and conjugate depth. 5

B. A trapezoidal channel has bed width 4.0 m. And side slope 1:2. Depth of flowing water is 5 m. If bed slope is 1 in 1000, Find discharge taking C = 55. 5

C. A rectangular channel carrying super critical flow is provided with a hydraulic jump type of energy dissipater. If it is expected to dissipate 5 m head of water in the formation of the jump, and if inlet Froude number is 8.5 , find the sequent depths. 5

OR

C. Distinguish between pipe flow and open channel flow. 5

Q.5 A. Write in brief Classification of turbine. 5

B. A turbine at running at 180 rpm under a head of 30 m and the discharge is 10 m3/s. Determine the speed, discharge and power developed by the turbine under the reduced head of 20m. Take overall efficiency of the turbine equal to 80%. 5

OR

A. Explainthe following terms.... Draft tube, Unit power, Priming of pump. 5

B. A rectangular channel of 4 m width conveys discharge of 20 m^3/s at a depth of 3.0 m. The channel width is reduced to 3.0 m near the hydraulic structure. Calculate the water surface elevation at contracted section. 5

Q.6 A. Explain the Buckingham's π theorem for dimensional analysis. 5

B. The lift force F_L on the air foil depends upon the mass density ρ of the medium, velocity of flow V, characteristics length d, viscosity μ and angle of attach α. Obtain an expression for the lift force. 5

OR

A. Explain different types of models and obtain the scale ratio for velocity, area and discharge. 5

B. A ship model 1/50 is towed through sea water at a speed of 1.5 m/s. A force of 5 N is required to tow the model. Determine the speed of ship and the propulsive force on the ship if prototype is subjected to wave resistance only. 5