Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: CE206

Course Name: FLUID MECHANICS II (CE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1	a)	Explain the functions of draft tube.	(4)
	b)	List down the classification of turbines.	(3)
	c)	A jet of water 75 mm diameter having a velocity of 20 m/s strikes normally a flat smooth plate. Determine the thrust on the plate if: i) if the plate is at rest ii) if the plate is moving in the same direction as the jet with a velocity of 5 m/s. Also find the work done per second on the plate in each case and the efficiency of jet when the plate is moving	(8)
2	a)	What do you mean by specific speed of a centrifugal pump?	(3)
	b)	Obtain an expression for minimum speed to start a centrifugal pump.	(8)
	c)	Explain cavitation in centrifugal pump.	(4)
3	a)	Derive an expression for hydraulic efficiency of a Pelton wheel.	(7)
	b)	A centrifugal pump having outer diameter equal to two times the inner diameter andrunning at 1200 rpm works against a total head of 48m. The velocity of flow through theimpeller is constant and equal to 3m/s. The vanes are set back at an angle of 40^0 atoutlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50mm,determine the vane angle at inlet, work done by impeller on water per second andmanometric efficiency.	(8)

PART B

Answer any two full questions, each carries 15 marks.

4	a)	Define Conveyance of a channel section.	(2)
	b)	Write a short note on velocity distribution in open channels.	(5)
	c)	A circular drainage pipe 0.8m in diameter conveys a discharge at a depth of 0.3m. If the pipe is laid on a slope of 1 in 1000, estimate the discharge. N=0.02.	(8)
5	a)	Define section factor for critical flow.	(3)
	b)	What are the applications of hydraulic jump?	(4)
	c)	Obtain an expression for energy loss due to a hydraulic jump in horizontal rectangular channels.	(8)
6	a)	Prove that the most economical trapezoidal section is a half hexagon.	(7)
	b)	A 3m wide rectangular channel carries a total discharge of 12 m^3/s. Calculate: i) the critical depth ii) the minimum specific energy iii) the alternate depths when E = 4 m.	(8)

PART C

Answer any two full questions, each carries 20 marks.

7 a) With neat sketches explain the classification of water surface profiles. (10)

b) Design a lined canal to carry 100 m^3/s on a slope of 1 in 2500. The maximum permissible velocity is 2 m/s, N=0.013 and side slope is 1.25 H to 1 V. (10)

8 a) Differentiate between distorted models and undistorted models. (4)

b) Obtain scale ratios for time, acceleration, force and power based on Froude model law. (6)

c) Define the following: (3)
i) Mach Number ii) Weber number iii) Euler's number

d) A pipe of diameter 1.5 m is required to transport an oil of specific gravity 0.90 and viscosity 3×10^{-2} poise at a rate of 3000litre/s. Tests were conducted on a 15cm diameter pipe using water at 20^0C. Find the velocity and rate of flow in the model. Viscosity of water at 20^0C = 0.01poise. (7)

9 a) The frictional torque T of a disc of diameter D rotating at a speed of N in a fluid of viscosityμ and density ρ in a turbulent flow is given by $T=D^5N^2\ \rho\phi(\mu/D^2N\rho)$. (10)

b) A trapezoidal channel having bottom width 6m, side slope 2H to 1 V, N=0.025 and bottom slope 0.0016 carries a discharge of 10 m^3/s. Compute the back water profile created by a dam which backs up the water to a depth of 2m immediately behind the dam. Use the direct step method for computation. (10)

****