SUBJECT CODE NO:- P-345

FACULTY OF ENGINEERING AND TECHNOLOGY

S.E.(Civil) Examination MAY/JUNE-2016

Fluid Mechanics- II

(Revised)

[Time: Three Hours] **[Max Marks:80]**

"Please check whether you have got the right question paper."

N.B
1) Q. no 1 and Q. no 6 are compulsory.
2) Solve any two questions from the remaining questions in each section.
3) Assume suitable data if any.

Section A

Q.1		Solve any five from following	10
	i)	Define gradually and rapidly varied flow.	
	ii)	Draw neat diagram of specific energy depth relationship.	
	iii)	Find the critical depth if discharge per unit width is $4.0m^2/s$ per m.	
	iv)	What do you mean by pipes in series and pipes in parallel?	
	v)	Define specific energy.	
	vi)	State Buckingham π-theorem.	
	vii)	Define distorted models.	
	viii)	Enlist the advantages of distorted models.	
	ix)	What do you mean by velocity defect?	
	x)	Define Froude number.	
Q.2	a)	Derive an expression for Prandtl's universal velocity distribution for turbulent flow in pipes.	07
	b)	Water flows through a 300mm diameter pipe and the flow causes a measured lost head of 20m in 400m of pipe length. Calculate i) Shear stress at the walls. ii) The shear stress at 50mm from the centerline of the pipe. iii) The friction velocity	08
Q.3	a)	Show that the condition for the most economical section for trapezoidal channel is that the sides have a slope of $\frac{1}{\sqrt{3}}$ with respect to the base.	07
	b)	Calculate the lowest possible specific energy for flow rate of $12m^3/s$ through a horizontal rectangular channel of width 3.0m.	08
Q.4	a)	Define and explain Reynolds number and Froude's number	08
	b)	Work out the dimensions of the following physical quantities i) Discharge ii) Momentum	07
Q.5		Write a short notes on (any three) i) Slope profiles ii) Friction factors for commercial pipes iii) Merits and demerits of distorted models iv) Classification of flow in open channels.	15

Section-B

Q.6		Solve any five		10
	i)	Draw neat diagram of vortex casing.		
	ii)	Enlist the advantages of air vessel.		
	iii)	Define jet propulsion.		
	iv)	What do you mean by self-priming?		
	v)	Define manometric head.		
	vi)	Define governing of turbines.		
	vii)	What do you mean by unit power and unit discharge?		
	viii)	Enlist the characteristics curves of turbines.		
	ix)	If C_d=0.92, determine the % slip of reciprocating pump.		
	x)	Draw inlet velocity triangle for pelton wheel turbine.		
Q.7	a)	Explain with neat sketch working of a inward flow reaction turbine.		07
	b)	A nozzle of 9.0cm diameter delivers stream of water at 40 m/s perpendicular to a plate that moves away from the jet at 12.0 m/s. find:		08
		i)	The force on the plate	
		ii)	The work done	
		iii)	The efficiency of the jet.	
Q.8	a)	Derive an expression for specific speed of a centrifugal pump.		07
	b)	A centrifugal running at 1200 rpm delivers water against total head of 25m. The outlet vane angle is 45^0. The outer diameter of the impeller is 40cm and vane width is 4cm. find the discharge of the pump assuming manometric efficiency = 80%		08
Q.9	a)	Derive an expression for friction head in suction and delivery pipe of reciprocating pump.		07
	b)	A single acting reciprocating pump having 15cm bore and 30cm stroke lifts water against total head of 25m. When running at 60 rpm. The diameter and length of delivery pipe are 12cm and 20m. Find a theoretical discharge and theoretical power required to run the pump. Also find acceleration head at the beginning and middle of the delivery stroke.		08
Q.10		Write short notes on (any three)		15
	i)	Hydraulic crane		
	ii)	Governing of turbines		
	iii)	Characteristics curves of centrifugal pump.		
	iv)	Hydraulic press.		