B.E.CONSTRUCTION ENGINEERING FIRST YEAR SECOND SEMESTER-2017.

SUBJECT: HYDRAULICS

Time: Three Hour

Full Marks: 100

Answer any five Question

Question NO	Question	Marks
1. a)	State the Newton's law of viscosity and give example of its application.	2+2=4
b)	Explain the concept of continuum.	5
c)	Two large plain surface are 2.4 cm apart. The space between the surface is filled with glycerine. What force is required to drag a very thin plate of surface area 0.5 m^2 between the two-large plain surface at a speed of 0.6 m/s if: i) The thin plate is in the middle of the two-plain surface and ii) The thin plate is at distance of 0.8 cm from one of the plain surface? Take the dynamic viscosity of glycerine = 8.10×10^{-1} s/m^2	11
2. a)	What is open channel flow?	2
b)	Derive the expression for most effective cross section for rectangular channel.	6
C)	An open channel of most economical cross section having form of half hexagon with horizontal bottom is required to give a maximum discharge of 20.2 m^3/s of water. The slope of the channel bottom is 1 in 2500. Taking Chezy's constant C=60 in Chezy's equation determine the dimensions of cross section.	12
3. a)	Define the term dimensional analysis.	3
b)	State the principles of physical similarity and explain the types of physical similarity.	5
c)	The resistance force R of a supersonic plane during flight can be considered as depend upon the length of the aircraft l, velocity V, air viscosity μ, and air density p, and bulk modulus of air K. Express the functional relationship between this variable and the resisting force with help of Buckingham's π theorem.	12

4.	a)	How are the weir and notches classified? what is the advantage of triangular notch over rectangular notch.	7
	b)	Deduce the discharge equation of V-notch	6
	c)	The head of water over a triangular notch of angle 60° in 50 cm and coefficient of discharge is 0.62. the flow measurement by it to be within the accuracy of 1.5 % up or down. Find the limiting value of the head	7
5.	a)	Define the term hydraulic machine? Classify the different types of hydraulic machine.	2+2=4
	b)	What is centrifugal pump? Describe the different parts of centrifugal pump with sketch.	2+5=7
	c)	The internal and external diameter of the impeller of a centrifugal pump are 200 mm and 400 mm respectively the pump is running 1200 r.p.m. the vane angle of the impeller at inlet and out let are 20° and 30° respectively the water enters the impeller radially and velocity of flow is constant. Determine the work done of impeller per unit weight of water.	9
6.	a)	Define the equation of continuity.	3
	b)	Obtain the expression for continuity equation in three dimension also continuity equation for the steady flow.	6
	c)	The space between two square flat plates is filled with oil .Each side of plate will be 60 cm. The thickness of the oil film is 12.5 mm .The upper plate, which move at 2.5 meter parsec requires a force of 98.1 N to maintain the speed. Determine i) Dynamic viscosity of the oil in poise and Kinematic viscosity of the oil in stoke if the specific gravity of the oil is 0.95	11
7.	a)	Deduce the Darcy –Weisbach Equation	6
	b)	Describe the different type of losses major & minor.	6
	c)	150 mm diameter pipe reduce in diameter abruptly to 100 mm diameter if the pipe caries water at 30 liters per second. Calculate the pressure loss across the contraction. Take the co-efficient of contraction as 0.6	8
8.		Write short notes on the following a)Weir b) Venture-meter c) Hydraulic Grade Line (HGL) d) Critical depth	4×5=20