Roll No.									

The Assam Royal Global University
Royal School of Engineering and Technology
B Tech CE 4th Semester
Special Supplementary Examination, August 2024
Course Title: Hydraulic Engineering
Course Code: CEE022C407

Time: 3 hours **Maximum Marks: 70**

Attempt all questions as per instructions given

The figures in the right-hand margin indicate marks

Section-A

Q. No.	Answer the following in brief (within 50 words)	Marks	CO	BT Level
1(a)	Define Stoke's Law.	2	CO 1	BT 1
1(b)	Write the characteristics of laminar flow.	2	CO 1	BT 1
1(c)	What is Dimensional Homogeneity?	2	CO 1	BT 1
1(d)	Solve to find the head lost due to friction in a pipe of diameter 300 mm and length 50 m. through which water is flowing at a velocity of 3 m/s using Chezy's formula for which c=60. Take v for water = 0.01 stoke.	2	CO 3	BT 3
1(e)	Find the specific energy of flowing water through a rectangular channel of width 5 m when the discharge is 10 m^3/s and depth of water is 3 m.	2	CO 1	BT 1
1(f)	The depth of flow of water, at a certain section of a rectangular channel of 4 m wide, is 0.5 m. This discharge through the channel is 16 m^3/s. If a hydraulic jump takes place on the downstream side, find the depth of flow after the jump.	2	CO 1	BT 1
1(g)	Explain Hydraulic Gradient Line and Total Energy Line.	2	CO 2	BT 2
1(h)	Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to diameter of 400 mm. The rate of flow of water through the pipe is 250 litres/s.	2	CO 1	BT 1

Section-B

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
2 (a)	Develop the differential equation for steady gradually varied flow in open channels and list all assumptions.	6	CO 3	BT 3
2 (b)	Find out an expression for loss of head due to friction in pipes using Darcy-Weisbach equation	6	CO 1	BT 1
2 (c)	Analyze and find the diameter of a pipe of length 2000 m when the rate of flow of water through the pipe is 200 litres/s and the head lost due to friction is 4 m. Take the value of C = 50 in Chezy's formulae.	6	CO 4	BT 4

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
3 (a)	Show that for the trapezoidal channel of most economical section: (i) Half of top width=Length of one of the sloping sides (ii) Hydraulic mean depth=(1/2) depth of flow.	7	CO 2	BT 2
3 (b)	The time period (t) of a pendulum depends upon the length (L) of the pendulum and acceleration due to gravity (g). Analyze and find out an expression for the time period using Rayleigh's method	7	CO 4	BT 4
3 (c)	A 40 cm diameter pipe, conveying water, branches into two pipes of diameters 25 cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is 2.5 m/s, analyze and find the discharge in this pipe. Also determine the velocity in 20 cm pipe if the average velocity in 25 cm diameter pipe is 2 m/s.	7	CO 4	BT 4

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
4 (a)	Explain specific energy with the help of a diagram. Develop an expression of specific energy at critical depth.	3+4	CO 2 CO 3	BT 2 BT 3
4 (b)	Explain different types of Hydraulic jump.	7	CO 2	BT 2
4 (c)	The velocity distribution in a boundary layer is given by $u/U=\sin\sin(\frac{\pi y}{2\partial})$. Show that (i) Ratio of boundary layer thickness ∂^* is $\frac{\pi}{\pi-2}=\frac{\partial}{\partial*}$ (ii) Ratio of boundary layer thickness θ^* is $\frac{2\pi}{4-\pi}=\frac{\partial}{\theta*}$	7	CO 2	BT 2

Q. No.	Answer any two of the following (Within 300 words each)	Marks	CO	BT Level
5 (a)	The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m. 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Solve to find the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively. considering: (i) minor losses also (ii) neglecting minor losses.	7	CO 3	BT 3
5 (b)	What do you mean by turbulent flow ? What factor decides the type of flow in pipes ?	7	CO 1	BT 1
5 (c)	Show that in a horizontal rectangular channel to create Hydraulic jump, $y_c^3=y_1.y_2(\frac{y1+y2}{2})$, where y_1, y_2,y_c are depths before the jump, after the jump and critical depth respectively.	7	CO 2	BT 2

Course Outcomes	Marks Allotted	Percentage
CO1	25	Approx 60%
CO2	33	
CO3	19	Approx 20%
CO4	20	Approx 20%