

SB / SEM-IV / CIVIL / R19 / FM-11 / FH 2022 / 30.5.22

Q.P. Code: 93803

University of Mumbai

Examination First Half 2022 under cluster __ (Lead College: _____)

Examinations Commencing from 17th May 2022 to 17th June 2022

Program: Civil Engineering

Curriculum Scheme: Rev2019

Examination: SE Semester IV

Course Code and Course Name: Fluid Mechanics-II

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The value of bulk modulus of a fluid is required to determine
Option A:	Reynold's number
Option B:	Froude's number
Option C:	Mach number
Option D:	Euler's number
2.	For a laminar flow through pipe, the shear stress over the cross section
Option A:	Varies inversely as the distance from the center of pipe
Option B:	Varies directly as the distance from the surface of the pipe
Option C:	Varies directly as the distance from the center of the pipe
Option D:	Remains constant over the cross section
3.	A flow in which _____ force is dominating over the viscosity is called turbulent flow
Option A:	Elastic
Option B:	Surface Tension
Option C:	Viscous
Option D:	Inertia
4.	When the fluid is called laminar?
Option A:	Low viscosity
Option B:	The density of the fluid is high
Option C:	Reynolds number is greater than 2000
Option D:	Reynolds number is less than 2000
5.	Power transmitted by the nozzle will be maximum when head lost due to friction is equal to _____ of total head at inlet of the pipe.
Option A:	One-fifth
Option B:	Half
Option C:	One-third
Option D:	One-fourth
6.	In Total Head or Energy formula what does "Z" stands for $TE = p/w + Z + v^2/2g$
Option A:	Datum Head
Option B:	Velocity Head
Option C:	Pressure Head
Option D:	Total Head

7.	Force can be written as
Option A:	$[M][L][T]^{-2}$
Option B:	$[M][L][T]^2$
Option C:	$[M][L][T]$
Option D:	$[M][L][T]^3$
8.	Boundary layer thickness is the distance from the surface of the solid body in the direction perpendicular to flow, where the velocity of fluid is equal to
Option A:	Free stream velocity
Option B:	0.9 times the free stream velocity
Option C:	0.99 times the free stream velocity
Option D:	0.5 times the free stream velocity
9.	For gradual closure of valve, time of closure
Option A:	$T > (2L/C)$
Option B:	$T < (2L/C)$
Option C:	$T > (L/2C)$
Option D:	$T < (L/2C)$
10.	Which property of the fluid accounts for the major losses in pipes?
Option A:	Density
Option B:	Specific Gravity
Option C:	Compressibility
Option D:	Viscosity

Q2.	Solve any Four out of Six	5 marks each
A	Explain Prandtl's mixing length theory.	
B	Explain different steps in solving distribution network by Hardy Cross method.	
C	Define Mach number and state its significance in compressible fluid flow.	
D	Explain Hydraulic Gradient Line and Total Energy Line.	
E	Explain Hydro dynamically smooth and rough boundaries.	
F	Explain Water hammer with its control measures.	

Q3.	Solve any Two Questions out of Three	10 marks each												
A	Explain & derive the expression for Momentum Thickness & Energy Thickness.													
B	Three pipes joined in series release water from 75-meter level to 35-meter level. The details of piping system are given in the table													
	<table border="1"> <thead> <tr> <th>Pipe</th> <th>Length</th> <th>Diameter (mm)</th> <th>Friction factor</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1200</td> <td>150</td> <td>0.015</td> </tr> <tr> <td>2</td> <td>800</td> <td>75</td> <td>0.025</td> </tr> </tbody> </table>	Pipe	Length	Diameter (mm)	Friction factor	1	1200	150	0.015	2	800	75	0.025	
Pipe	Length	Diameter (mm)	Friction factor											
1	1200	150	0.015											
2	800	75	0.025											

	3	1100	100	0.020
	Considering minor and major losses in pipes determine discharge, velocity and head loss in each pipe			
C	Two reservoirs are connected by a pipeline consisting of two pipes, one of 15 cm diameter and length 6m and the other of diameter 22.5 cm and 16 m length. If the difference of water level in the two reservoirs is 6m, calculate the discharge and draw the HGL & TEL. Take $f = 0.04$.			

Q.4	Solve any Two Questions out of Three	10 marks each
A	For a laminar flow through circular pipe, prove that the ratio of maximum velocity to the average velocity is equal to 2.	
B	Derive an expression for velocity distribution of turbulent flow in smooth and rough pipe	
C	Calculate the discharge in each pipe of the network shown in figure below by Hardy-Cross method. Take $n = 2.0$	

