



**B.Tech III Semester Supplementary Examinations, July 2024**

**Fluid Mechanics**  
(CE)

**Maximum Marks: 70**

Date: 27.07.2024 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks		(10X2M=20 Marks)	CO	Bloom Tx
1	Define Dynamic viscosity and Give their dimensions.		1	L1
2	Differentiate between simple and differential types of manometers		1	L1
3	State the stability criteria for a submerged body in unstable and neutral equilibrium positions.		2	L1
4	Distinguish between uniform and non-uniform flow.		2	L1
5	State Bernoulli's theorem and mention assumptions underlying it.		3	L1
6	List out the advantages of triangular notch over rectangular notch.		3	L1
7	When do you prefer pipes in series and pipes in parallel?		4	L1
8	What does Hydraulic gradient line represent?		4	L1
9	Define the term boundary layer and boundary layer theory?		5	L1
10	Define laminar boundary layer.		5	L1

**Part-B**

Answer All the following questions.		(5X10M=50Marks)		
11	The shaft of diameter 100 mm is rotating inside a journal bearing of diameter 102 mm at a space of 360 rpm. The space between shaft and bearing is filled with a lubricating oil of viscosity 5 poise. The length of the bearing is 200 mm. Find the power absorbed in the lubricating oil. [10M]		1	L2
OR				
12	a. Define manometer? How they are classified? [5M] b. Derive an expression for the total force and depth of center of pressure from free surface of a liquid of vertical plane surface submerged in liquid. [5M]		1	L2
13	a. Define buoyancy and metacentre. [5M] b. A wooden log of 0.8m diameter and 6m length is floating in a river water. Find the depth of wooden log in water when specific gravity of wooden log is 0.7 [5M]		2	L2
OR				
14	Derive the condition for irrotational flow, prove that, for potential flow, both the stream function and velocity potential function satisfy the laplace equation.		2	L2

15	Derive Bernoulli's equation from Euler's equation of motion and assumptions made in it. [10M]	3	L2
OR			
16	What are the different types of notches? Explain Rectangular, trapezoidal and Stepped notches [10M]	3	L2
17	Derive an expression for loss of head due to i) sudden contraction and ii) sudden enlargement of pipes. [ 10M ]	4	L2
OR			
18	The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300m, 170m, and 210m and of diameters 300mm, 200mm and 400mm respectively is 12m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively. (i) Considering minor losses (ii) neglecting minor losses [ 10M ]	4	L2
19	Derive Von-Karman's momentum integral equation. What is the significance of it? [ 10M ]	5	L2
OR			
20	Explain Boundary layer separation with a neat sketch. What are the conditions under which separation takes place? [10M]	5	L2