

	<p style="text-align: center;">ADAMAS UNIVERSITY END-SEMESTER EXAMINATION : JANUARY 2021 (Academic Session: 2020 – 21)</p>		
Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	B. Tech.	Semester: (I/III/ V/ VII/IX)	III
Paper Title :	Fluid Mechanics and Hydraulic Machinery	Paper Code:	ECE42105
Maximum Marks :	40	Time duration:	3 Hours
Total No of questions:	10	Total No of Pages:	2
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following

$5 \times 1 = 5$

1.

- a) Explain the surface tension on liquid droplet with diagram.
- b) A rectangular floating body 20 m long and 5 m wide. The water line is at 1.5 m and the C.G. is at 1.8 m above the bottom line. So, what will be the metacentric height of the body?
- c) Show the Bernoulli's equation from Bernoulli's theorem.
- d) State Chezy's formula for discharge through open channel. Also describe each parameters of the equation.
- e) Differentiate Laminar flow from Turbulent flow according to Reynold number.

GROUP –B

Answer *any three* of the following

$3 \times 5 = 15$

2. A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and height of fluid in the left from the center of pipe is 15 cm below.
3. A 2m X 3m rectangular plane submerged in water in such manner that it makes an angle of 30° with free surface water. Determine the total pressure and position of center of pressure when the upper edge of the plane is 1.5 m below the free water surface.
4. Define the Co-efficient of Contraction (C_c) and state its values. Also show its relation with the Co-efficient of Discharge. [4 + 1]
5. A flow of water through a pipe with 20 cm of diameter at section 1 and will be of 10 cm diameter at section 2. If the velocity of water at section 1 is 4 m/sec. Find the velocity at sections 1 and 2.

6. State the Mechanical efficiency (η_m) and Overall efficiency (η_o) of a Centrifugal pump. Also show the relationship in between these efficiencies. [4 + 1]

GROUP –C

Answer *any two* of the following

2 × 10 = 20

7. (a) A square plate of 1m X 1m size, weighing 350 N slides down over an oil film of 1 mm thickness, spread on an inclined plane with uniform velocity of 1.5 m./sec. The inclined plane is laid on a slope of 5 vertical to 12 horizontal. Calculate the Dynamic viscosity of the oil.
- (b) Define Compressibility and Bulk Modulus of fluid. Draw necessary diagram. [6 + 4]
8. (a) State Continuity equation for a flow of water. [2]
- (b) A rate of water flow through a horizontal pipe is 0.25 m³/sec. The pipe diameter which is 200 mm, is suddenly enlarged to 400 mm. The pressure intensity of the smaller diameter pipe is 11.772 N/cm². Then, determine the head loss due to sudden enlargement and the pressure intensity in larger section of the pipe. [4 + 4]
9. Derive the equation for the discharge over a triangular notch. Draw necessary diagram.
10. (a) Find the bed slope of a trapezoidal channel of bed width 4 m, depth of water 3 m and side slope of 2 horizontal to 3 vertical, when discharge through the channel is 20 m³/sec. Take, Manning's constant is equal to 0.03.
- (b) Define Rapidly Varied Flow and Gradually Varied Flow. Use necessary diagram. [8 + 2]
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