Hall Ticket No | | | | | | | | | | | Question Paper Code:AMEB08

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

B. Tech IV Semester End Examinations (Regular), MAY – 2020

Regulations: IARE - R18

FLUID MECHANICS AND MACHINES

(MECHANICAL ENGINEERING)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

		UNIT – I	
1.	a)	List out the physical properties of fluids. Define them and write their units?	**[7M]**
	b)	The space between two parallel plates kept 3mm apart is filled with an oil of dynamic viscosity 0.2 Pa.s. What is the shear stress on the lower fixed plate, if the upper one is moved with a velocity of 1.50m/sec?	**[7M]**
2.	a)	Express pressure intensity of 7.5 kg/cm2 in all pressure units. Take the barometer reading as 76 cm of mercury.	**[7M]**
	b)	If 5 m^3 of certain oil weighs 4000 kg (f), calculate the specific weight, mass density, and specific gravity of oil.	**[7M]**
		UNIT – II	
3.	a)	Define and explain stream line, path line and streak line in fluid mechanics	**[7M]**
	b)	Define and distinguish between (i) steady and unsteady flow, (ii) uniform and non-uniform flow, (iii)rotational and irrotational flow	**[7M]**
4.	a)	Explain different types of flows in fluid mechanics.	**[7M]**
	b)	A bend in pipeline conveying water gradually reduces from 60 cm to 30 cm diameter and deflects the flow through angle of 600 At the larger end the gage pressure is 1.75 kg/cm2 Determine the magnitude and direction of the force exerted on the bend, i) when there is no flow, ii) when the flow is 876 litres per sec.	**[7M]**
		UNIT – III	
5.	a)	Derive the Darcy Weisbach equation	**[7M]**
	b)	A pipe of dia 400mm carries water at a velocity of 25m/s. The pressures at a point are given as 29.43n/cm2 and 22.563n/cm2 while the datum head at A	**[7M]**

		and B are 28m and 30m. Calculate the loss of head between A and B	
6.	a)	A venture meter having a diameter of 7.5 cm at the throat and 15 cm diameter at the enlarged end is installed in a horizontal pipeline 15 cm in diameter carrying an oil of specific gravity 0.9.The difference of pressure head between the enlarged end and the throat recorded by a U-tube is 17.5 cm of mercury. Determine the discharge through the pipe. Assume the co-efficient of discharge of the meter as 0.97.	**[7M]**
	b)	In a 100mm diameter horizontal pipe a Venturimeter of 0.5 contraction ratio has been fixed the head of water on the meter when there is no flow is 3m. Find the rate of flow for which the throat pressure will be 2m of water absolute. Take atmospheric pressure head= 10.3m of water. The coefficient of meter is 0.97	**[7M]**
UNIT – IV			
7.	a)	A jet of water strikes with a velocity of 50 m/sec a flat fixed plate inclined at 30 degrees with the axis of the jet. The cross sectional area of the plate is 100 cm^2. Find the force exerted by the jet on the plate and the ratio in which the jet gets divided after striking.	**[7M]**
	b)	What are the elements of hydroelectric power stations? Explain them in detail.	**[7M]**
8.	a)	A jet of water of diameter 50 mm moving with a velocity of 20 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 60°. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet.	**[7M]**
	b)	Explain briefly the principles on which a Kaplan turbine works.	**[7M]**
UNIT – V			
9.	a)	How will you classify the reciprocating pumps?	**[7M]**
	b)	Define slip, percentage slip and negative slip of reciprocating pump?	**[7M]**
10.	a)	What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of centrifugal pump.	**[7M]**
	b)	Draw and discuss the operating characteristics of a centrifugal pump.	**[7M]**

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COURSE OBJECTIVES:

The course should enable the students to:

S. No	Description
I	Learn about the application of mass and momentum conservation laws for fluid flows.
II	Understand the importance of dimensional analysis.
III	Obtain the velocity and pressure variations in various types of simple flows.
IV	Analyze the flow in water pumps and turbines.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

S. No.	Description
AMEB08.01	Define the properties of fluids and its characteristics.
AMEB08.02	Explain the hydrostatic forces on submerged bodies.
AMEB08.03	Define different types of manometers.
AMEB08.04	Apply the law of conservation of mass and derive continuity equation.
AMEB08.05	Demonstrate practical understanding of friction losses in internal flows.
AMEB08.06	Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
AMEB08.07	Calculate the performance analysis in turbines can be used in power plants.
AMEB08.08	Calculate the performance analysis in pumps.
AMEB08.09	Draw and analysis of performance characteristic curves of pumps.
AMEB08.10	Draw and analysis of performance characteristic curves of turbines.
AMEB08.11	Draw and analysis of characteristic curves of flow meters.
AMEB08.12	Determine the coefficient of impact of different types of vanes.
AMEB08.13	Determine the coefficient of discharge of different types of flow meters.
AMEB08.14	Determine the friction factor of different types of cross section of pipes.
AMEB08.15	Draw the characteristic curves of friction apparatus.
AMEB08.16	Determine the friction factor using moody's chart.
AMEB08.17	Applying the Darcy's Weisbach equation for the measurement of coefficient of friction.
AMEB08.18	Evaluate the performance of hydraulic turbines.
AMEB08.19	Evaluate the performance of hydraulic pumps.
AMEB08.20	Analyze flow in closed pipes, and design and selection of pipes including sizes.
AMEB08.21	Explain the working principle of various types of hydro turbines and know their application range
AMEB08.22	Demonstrate the various types of major and minor losses in pipes and explain flow between parallel plates.

MAPPING OF SEMESTER END EXAMINATION – COURSE LEARNING OUTCOMES

SEE Question No.		Course Learning Outcomes		Blooms Taxonomy Level
1	a	AMEB08.01	Define the properties of fluids and its characteristics.	Understand
	b	AMEB08.01	Define the properties of fluids and its characteristics.	Understand
2	a	AMEB08.01	Define the properties of fluids and its characteristics.	Understand
	b	AMEB08.02	Explain the hydrostatic forces on submerged bodies.	Understand
3	a	AMEB08.03	Define different types of manometers.	Understand
	b	AMEB08.03	Define different types of manometers.	Remember
4	a	AMEB08.04	Apply the law of conservation of mass and derive continuity equation.	Remember
	b	AMEB08.05	Demonstrate practical understanding of friction losses in internal flows.	Remember
5	a	AMEB08.07	Calculate the performance analysis in turbines can be used in power plants.	Understand
	b	AMEB08.06	Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.	Understand
6	a	AMEB08.07	Calculate the performance analysis in turbines can be used in power plants.	Understand
	b	AMEB08.08	Calculate the performance analysis in pumps.	Understand
7	a	AMEB08.09	Draw and analysis of performance characteristic curves of pumps.	Understand
	b	AMEB08.12	Determine the coefficient of impact of different types of vanes.	Remember
8	a	AMEB08.10	Draw and analysis of performance characteristic curves of turbines.	Remember
	b	AMEB08.11	Draw and analysis of characteristic curves of flow meters.	Remember
9	a	AMEB08.13	Describe the concepts of turbo machinery in the field of aerospace engineering and concepts of internal flows through engines.	Remember
	b	AMEB08.13	Determine the coefficient of discharge of different types of flow meters.	Understand
10	a	AMEB08.13	Determine the coefficient of discharge of different types of flow meters.	Understand
	b	AMEB08.13	Determine the coefficient of discharge of different types of flow meters.	Remember

Course Coordinator
Dr. CH.V.K.N.S.N Moorthy, Professor

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