6/10/26 FN

Name :
Roll No:

MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM – 686 666

DEPARTMENT OF MECHANICAL ENGINEERING
SECOND SESSIONAL EXAMINATION, OCTOBER 2026
THIRD SEMESTER (ME)

B24ME2T02 MECHANICS OF FLUIDS

Time – 1.5 Hour **Max: 40 Marks**

PART-A
Answer All Questions

1.	State Bernoulli's equation and list the assumptions in its application.	[CO 3]	3 Marks
2.	Name the various parts of a Venturimeter and explain its working with a neat sketch.	[CO 3]	3 Marks
3.	State the Chezy's equation, explain its various terms and name the condition under which it is applied.	[CO 4]	3 Marks
4.	Name and explain the major and minor losses in pipe flow.	[CO 4]	3 Marks

PART-B
Answer All Questions

5. a	Derive Euler's equation of motion for fluid flow and obtain the Bernoulli's equation for real fluids.	[CO 3]	7 Marks
5.b	A pitot-static tube placed in the center of a 300 mm pipe line has one orifice pointing upstream and other perpendicular to it. The mean velocity in the pipe is 80% of the central velocity. Find the discharge through the pipe if the pressure difference between the two orifices is 60 mm of water. Take the coefficient of pitot tube as 0.98.	[CO 3]	7 Marks
6. a	For low viscosity and high velocity flow through a uniform circular pipe, develop the relationship between frictional head loss and the flow parameters using a suitable force balance equation.	[CO 4]	7 Marks
6. b	Oil is transported from a tanker to the shore at the rate of 0.6 m^3/s using a pipe of 32 cm diameter for a distance of 20 km. If the oil has viscosity of 0.1 N-s/m^2 and density of 900 kg/m^3. Assuming the flow to be either laminar or turbulent as applicable, determine the power required to maintain the flow.	[CO 4]	7 Marks

VISION

Mentoring to Ensure Excellence

MISSION

- To facilitate comprehensive and integrated development of students by providing quality education that encourages sustainable practices
- To mold disciplined and socially committed engineers capable of assuming professional leadership upholding national integrity

6/10/26 AN

Name: .....

Roll Number: .....

M. A. COLLEGE OF ENGINEERING, KOTHAMANGALAM
SECOND SESSIONAL EXAMINATION, OCTOBER – 2026
S5ME PROGRAM ELECTIVE I
B24ME3P14 OPERATIONS RESEARCH

Time – 1.5 Hours (Answer all questions) Max. Marks – 40

Part A (4 x 3 Marks)

1. State the necessary conditions to apply Johnson's algorithm to an n job, 3-machine sequencing problem. [CO-4]
2. Differentiate between single-machine and flow-shop sequencing problems. [CO-4]
3. What is meant by the value of a game? [CO-5]
4. What are the basic elements of a game in Game Theory? [CO-5]

Part B (2 x 14 Marks)

5. A company requires 10,000 units of a raw material annually. The ordering cost is ₹400 per order, and the annual holding cost is 20% of the purchase price per unit. The supplier offers the following quantity discounts: ₹100 per unit for orders below 1,000 units, ₹96 per unit for orders of 1,000–1,999 units, and ₹92 per unit for orders of 2,000 units or more. Replenishment is instantaneous and shortages are not permitted. Determine the optimal order quantity and minimum annual total inventory cost, including purchase cost, considering the quantity discount structure. [CO-3]

6. For the following two-person zero-sum game, determine whether a pure strategy solution exists by identifying the presence or absence of a saddle point. If a saddle point does not exist, apply the principle of dominance to simplify the game to a 2×2 payoff matrix. Using the reduced game, determine the optimal mixed strategies for both players and calculate the value of the game. The entries in the payoff matrix represent the gain to Company A and the corresponding loss to Company B. [CO-5]

	B1	B2	B3	B4	B5	B6
A1	5	7	6	8	7	5
A2	7	2	9	4	9	8
A3	2	1	5	2	6	5
A4	2	4	3	6	4	2
A5	2	2	9	4	3	2
A6	7	1	8	3	1	7

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Note: CO indicates course outcome