BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTECH **SEMESTER : IV**
BRANCH: BIOTECHNOLOGY **SESSION : SP/2025**

SUBJECT: BE209 FLUID MECHANICS AND HEAT TRANSFER

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

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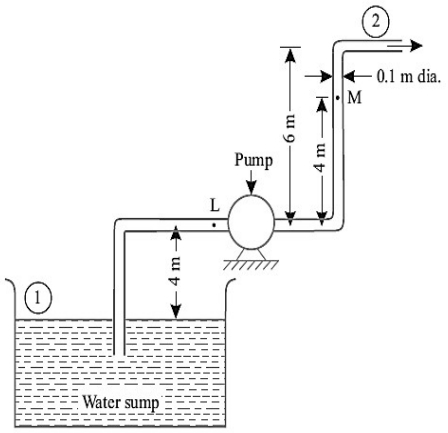
Q.1(a)	In a pipe of 300 mm diameter and 800 m length an oil of specific gravity 0.8 is flowing at the rate of 0.45 m^3/s. Find (i) Head lost due to friction (ii) Power required to maintain the flow. The kinematic viscosity of oil as 0.3 stoke.	[5]	1	Analyzing
Q.2(a)	Figure shows a pump employed for lifting water from a sump. If it is required to pump 60 litres/sec of water through a 0.1 m diameter pipe from the sump to a point 10m above determine the power required. Also determine the pressure intensities at L and M. Assume overall efficiency of 70 percent .	[5]	1	Evaluating



Q.3(a)	A pipe carrying water experiences a sudden reduction in area. The area at point (1) is 0.002 m^2 and at point (2) it is 0.001 m^2 . The pressure at point (2) is 500 kPa and the velocity is 8 m/s. The loss coefficient K is 0.4. The density of water is 1000 kg/m^3 . Calculate the following. i. The mass flow rate. ii. The pressure at point (1)	[5]	2	Applying
Q.4(a)	A fluid of viscosity 8 poise and specific gravity 1.2 is flowing through a circular pipe of diameter 100mm. The maximum shear stress at the pipe wall is 210 N/m^2. Find (i) The pressure gradient (ii) The average velocity (iii) Reynold's number of flow?	[5]	2	Evaluating
Q.5(a)	An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil of sp. Gravity 0.9 when the coefficient of discharge of orifice meter = 0.64.	[5]	2	Understanding

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