QP Code: RM23MTECH121 Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech. (Second Semester) Examinations, May-2024

MPCTE2020 – Advanced Fluid Mechanics

(Heat Power and Thermal Engineering)

Time: 3 hrs Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q1. Answer all questions

	CO#	Blooms Level
a. Define a non-Newtonian fluid.	CO1	K1
b. Explain Reynolds number.	CO3	K2
c. Define Couette flow.	CO4	K1
d. How do aircrafts reduce drag?	CO3	K2
e. Explain the laminar flow with example.	CO4	K3
f. Explain no-slip condition.	CO3	K2
g. Define viscosity with mathematical formula.	CO4	K3
h. Write a short note on turbulent flow.	CO4	K1
i. Define Prandtl number and write it's formula.	CO4	K1
j. Define Nusselt number.	CO4	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions

		Marks	CO#	Blooms Level
2. a.	Explain the difference between the Lagrangian and the Eulerian description of fluid motion.	5	CO1	K2
b.	Water is heated to 80oC for 10 min. How much would be the temperature if k = 0.56 per min and the surrounding temperature is 25^{o}C?	5	CO1	K3
3.a.	Describe laminar and turbulent flow. Explain the Reynolds number value of laminar and turbulent flow.	5	CO3	K2
b.	A rectangular film of liquid is formed in a frame of wire and a movable rod of length 4cm.What force must be applied to the rod to keep it in equilibrium if the surface tension of the liquid is 40 x 10-3 N/m.	5	CO3	K3
4. a.	Explain thermal entrance region? Describe thermal entry length? What is thermally developing flow.	5	CO2	K2
b.	A light square wireframe each side of which is 10cm long hangs vertically in the water with one side just touching the water surface. Find the additional force necessary to pull the frame clear of the water (Surface tension=0.074 N/m).	5	CO3	K3
5.a.	Where is the end point of entry length? Discuss entry lengths through laminar flow and turbulent flow.	5	CO4	K2
b.	Define hydrodynamic entrance region? Describe hydrodynamic entry length?	5	CO1	K2

Explain hydrodynamically fully developed region.

6. a.	A thin and light ring of the material of radius 3 cm is rested flat on the liquid surface. When slowly raised, it is found that the pull required is 0.03N more before the film breaks than after. Find the surface tension of the liquid.	5	CO2	K3
b.	Explain Friction Drag. Describe how it is caused.	5	CO2	K2
7.a.	Discuss the concept of continuum and definition of a fluid. Explain Nusselt number.	5	CO3	K2
b.	Differentiate between Newtonian and non-Newtonian fluid. Explain time dependent viscosity.	5	CO3	K2
8. a.	Define Bernoulli's equation? Describe Pascal's Law.	5	CO3	K2
b.	Describe a shear thickening fluid? Explain a shear thinning fluid? Enumerate oobleck.	5	CO4	K2

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