Sanjay Ghodawat University, Kolhapur

2020-21

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EXM/P/09/00

Year and Program: Final YearB.Tech	**School of Technology**	**Department: AERO**
Course Code: AET407B	**Course Title: Computational Fluid Dynamics**	**Semester : 07**
Day : Saturday **Date: 26.12.2020**	**End Semester Examination**	**Time:2 Hrs.** **Max Marks:50**

Instructions: 1) All Questions are compulsory.
2) Assume data wherever necessary

Q.1	**Answer the following (any Two)**–	**Marks**	**Bloom's Level**	**CO**
a)	Analyze the different parameters of source panel method & vortex panel method with an example in detail	8	4	CO1
b)	Imagine you are flow analyst, apply different fluid properties for substantial derivative with different fluid model and interpret the physical significance.	8	4	CO2
c)	Evaluate the pressure distribution by applying the continuity equation with different fluid model	8	4	CO2

Q.2 **Answer the following (any two)** –

a) Given the following data, compute $f'5$, $f'7$, $f'9$ .Use finite differencing of order (Δx). Compare the results obtained finite differencing order of (Δx^2). — 8 — 4 — CO3

x	5	6	7	8	9
f(x)	125	216	343	512	729

b) Extract different results in terms of research model and describe the applications of continuity, momentum and energy equations for different fluid flow. — 8 — 4 — CO3

c) A rectangular fin of 2cmX20cmX2mm is attached to a plane wall. The wall temperature T_w=200°C and ambient temperature T_∞=25°C. For the fin material k=45W/mK and the operating h=15W/m^2K determine the steady state temperature distribution by taking 5 equal control volumes. Assume the fin tip is insulated. — 8 — 3 — CO4

Q.3 Answer the following (any two) –

a)	Consider heat transfer in the boundary layer over a flat plate. The flow is steady, 2D incompressible laminar flow over a flat plate. For stream velocity of the flow is uniform and parallel, write the governing equations for flow and heat balance. Identify whether the equation is linear, elliptic or parabolic.	9	4	CO4
b)	Discuss any one of low Reynolds number turbulence model. Discuss the various constants and functions used for predicting near wall behavior.	9	2	CO5
c)	An slab of aluminium, L=5cm thick is initially at a uniform temperature of 200°C. Suddenly one of its surface is brought to 70°C while the other surface is kept insulated. By using explicit scheme and mesh size Δx = 1cm, calculate the transient temperature distribution of the slab at time t=10sec. Take ρ = 2700kg/m^3, c=0.9kJ/kg.K and k=215W/mK. Consider 5 equal control volumes.	9	4	CO5

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