SLOT: C2+TC2+V5

OPEN BOOK

SEPARATE

VIT

Vellore Institute of Technology

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST – II - WINTER SEMESTER 2019-2020

Programme Name & Branch: B. Tech (BME, BMA)

Course Code: MEE 2028

Course Name: Automotive Aerodynamics

Faculty Name(s): Dr. Y. Mukkamala

Class Number(s): 1267 **Exam Duration:** 90 mins **Maximum Marks:** 50

General instruction(s):

Answer briefly with net schematics, plots, equations and data analysis

Section – A (5 x10 = 50 Marks)		
Sl.No.	**Question**	**Course Outcome (CO)**
1.	Due to smaller fan size, most small-scale wind tunnels can't produce the required Reynolds number for drag measurements. Suggest a testing method to test vehicles at the design Reynolds number.	2
2.	Moving belt simulation in wind tunnels is difficult due to belt vibrations and slip. How would you correct such data to make it reflect on-road data more accurately?	2
3.	Active noise control in vehicles is limited to low frequencies by the short cabin distances. Suggest a way to boost or amplify this frequency attenuation to extend it to higher frequencies.	1
4.	Consider turbulent flow past an isothermal flat plate of width b and length L with constant (ρ, μ, c_p , k). Assume $\delta = \delta_t$, and Pr = 1. At x = 0 the flow has uniform velocity U and temperature T_∞ . At x = L, the mean flow may be approximated by the one seventh power law profile: $(u/u_\infty) = (y/\delta)^{1/7}$. There is no information about the flow structure between the leading and trailing edges. Use a control volume analysis to estimate the total friction drag on one side of the plate.	1
5.	Briefly explain how the DNS method can be modified to make it more suitable for wake and drag analysis.	3