Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: AO409

Course Name: WIND TUNNEL TECHNIQUES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1		A partially sub-merged body is towed in water. The resistance R to its motion depends on the density ρ, the viscosityμ of water, length l of the body, velocity v of the body and the acceleration due to gravity g. Express the functional relationship between these variables and the resistance to motion.	(10)
2	a)	Explain the importance of dimensionless number in aerodynamics.	(8)
	b)	Define the importance of model analysis.	(2)
3		Explain open and closed-circuit wind tunnel with neat diagram also write its advantage and disadvantages.	(10)
4	a)	Show the variation of diffuser efficiency with diffuser angle.	(3)
	b)	Explain the components of supersonic wind tunnel in detail.	(7)

PART B

Answer any three full questions, each carries 10 marks.

5	a)	Explain how the velocity calibration done in subsonic wind tunnel test section.	(8)
	b)	Define horizontal buoyancy?	(2)
6	a)	Explain yaw sphere and turbulence sphere in detail.	(6)
	b)	What are the parameters are considered while calibrating subsonic and supersonic wind tunnel?	(4)
7		Write in detail about principle and working of Laser Doppler Anemometer, How LDA principle is used to measure velocity of flow in a wind tunnel?	(10)
8		Write in detail about principle and working of hot wire anemometry with neat diagram.	(10)

PART C

Answer any four full questions, each carries 10 marks.

9		Explain the performance of shock tube tunnel in detail with diagram.	(10)
10	a)	Why are the wall static pressure holes very small?	(5)

	b)	Pitot tube are used both in subsonic and supersonic flows. Is the measurement principle different in two cases?	(5)
11		Explain in detail about the pressure measurements in wind tunnel?	(10)
12		Explain in detail about Schlieren and shadowgraph methods for flow visualization and compare their performances.	(10)
13		Explain particle image visualization with neat diagram?	(10)
14	a)	Why tracer method cannot be used for visualization of compressible flows?	(5)
	b)	What are the requirements of tracer particles used for flow visualization?	(5)

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