Sanjay Ghodawat University, Kolhapur 2019-20

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017 EXM/P/09/01

Year and Program: 2019-20 & S.Y B.Tech | **School of Technology** | **Department of Aeronautical Engineering**

Course Code: AET204 | **Course Title: Aerodynamics I** | **Semester – IV**

Day and Date Tuesday 31/12/19 | **End Semester Examination (ESE)** | **Time: 3 Hours** 10.30am to 01.30pm | **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1		**Attempt the Following**			
	a)	Derive continuity equation with suitable assumption	07	L_2	CO1
		OR			
	a)	Explain in detail about aerodynamic center and centre of pressure	07	L_2	CO1
	b)	Illustrate the pressure and Velocity distribution flow over a non rotating circular cylinder	08	L_3	CO2
		OR			
	b)	Explain source and sink elementary flow with clear sketches.	08	L_2	CO2
Q.2		**Attempt the Following**			
	a)	Show that w= (i-iz)/(1+z) transforms the circle {z}=1 onto the real axis of the w plane.	07	L_3	CO3
		OR			
	a)	With neat sketch explain blasius theorem	07	L_3	CO3
	b)	Derive the equation for thin aerofoil Theory.	08	L_3	CO4
		OR			
	b)	Derive kelvin circulation theorem and the starting vortex and its applications.	08	L_3	CO4
Q.3		**Solve any Two**			
	a)	Derive a momentum equation with neat sketches	08	L_2	CO1
	b)	Explain the following terms: 1) Doublet	08	L_2	CO2

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		2) Rankine full oval			
	c)	Derive a relation for kutta juokowaski transformation of a circle into flat plate	08	L_3	CO3
	d)	Explain the following: 1) What is meant by Vortex Sheet and its applications? 2) Define Kutta Condition.	08	L_3	CO4
Q.4		**Solve any Two**			
	a)	Describe about helmholtz theorem with neat sketches	09	L_3	CO4
	b)	Derive an expression for prandtl's classical lifting line theory With neat sketches	09	L_3	CO4
	c)	Discuss about general lift distribution over aircraft wing	09	L_3	CO4
Q.5		**Solve any Two**			
	a)	Derive the equation for blade element theory in aircraft.	09	L_2	CO5
	b)	An airscrew is required to produce a thrust of 4000N at a flight speed of 120ms-1 at sea level. If the diameter is 2Sm, estimate the minimum power that must be supplied, on the basis of Froude's theory.	09	L_2	CO5
	c)	Define and Prove the Froude Momentum Theory of Propulsion	09	L_2	CO5
Q.6		**Solve any Three**			
	a)	What is meant by induced drag? How do avoid it.	06	L_3	CO4
	b)	Explain about biot savart law	06	L_3	CO4
	c)	Derive the relation for torque coefficient of airscrew pitch	06	L_2	CO5
	d)	Derive an activity factor of airscrew power coefficient.	06	L_2	CO5

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