Sanjay Ghodawat University, Kolhapur 2018-19

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

Year and Program:2018-19 **School of Technology** **Department of SY B.Tech**

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

Day and Date Thursday 23rd May, 2019 **End Semester Examination (ESE)** **Time:** (10.30 am to 1.30 pm) **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)	Explain in detail about Aerodynamic Forces and Moments calculation	07	L_2	CO1
	OR			
a)	Derive an Continuity Equation with suitable diagram	07	L_3	CO1
b)	Explain in detail about Elementary Flow with clear sketches.	08	L_2	CO2
	OR			
b)	Discuss in detail about Flow over a rotating Circular cylinder	08	L_2	CO2
Q.2	**Attempt the Following**			
a)	Derive a relation for Kutta – Juokowaski transformation of a circle into Ellipses.	07	L_3	CO3
	OR			
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
b)	Discuss in detail about Kelvin Circulation Theorem and the starting Vortex.	08	L_3	CO3

OR

ESE

	b) Derive an fundamental Thin aerofoil Theory equation.	08	L_3	CO3
Q.3	**Solve any Two**			
	a) Explain the following: 1)Application of the Momentum Equation: 2)Aerodynamic Center	08	L_2	CO1
	b) Explain the following terms: 1) Rankine half oval 2) Doublet	08	L_2	CO2
	c) Explain the following: 1)Blasius theorem 2) Principles of conformal transformation	08	L_2	CO3
	d) Explain the following: 1)Vortex Sheet 2)Kutta Condition	08	L_2	CO3
Q.4	**Solve any Two**			
	a) Derive an Expression for 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 in details about Elliptical Lift Distribution	09	L_3	CO4
Q.5	**Solve any Two**			
	a) Discuss in detail about Froude Momentum Theory of Propulsion	09	L_3	CO4
	b) An airscrew is required to produce a thrust of 4000N at a flight speed of 120ms-' 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_3	CO4

ESE

c)	At 1.25m radius on a 4-bladed airscrew of 3.5m diameter the local chord of each of the blades is 250 mm and the geometric pitch is 4.4 m. The lift-curve slope of the blade section in incompressible flow is 0.1 per degree, and the lift/drag ratio may, as an approximation,be taken to be constant at 50. Estimate the thrust and torque gradings and the local efficiency in flight at 4600m *(a* = 0.629, temperature = -14.7 *"C),* at a flight speed of 67m/s TAS and a rotational speed of 1500 rpm.	09	L_3	CO4
Q.6	**Solve any Three**			
a)	Write short notes on Downwash & Induced Drag	06	L_2	CO4
b)	Describe in detail about Straight Vortex Filament	06	L_2	CO4
c)	Explain the following a) Torque Coefficient of Airscrew Pitch b) Efficiency of Airscrew Coefficient	06	L_3	CO4
d)	Derive an Activity Factor of Airscrew Pitch Coefficient.	06	L_3	CO4

*****

ESE