

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2019

Programme Name: B.Tech ASE, ASEA

Semester : III

Course Name : Introduction to Aerospace Engineering

Time : 03 hrs

Course Code : ASEG 2004

Max. Marks : 100

Nos. of page(s) : 02

Instructions:

- 1) Mention Roll No. at the top of the question paper.
- 2) Do not write anything else on the question paper except your roll number.
- 3) ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY.
- 4) Internal choice is given for question number 5.
- 5) Assume any suitable data if missing.
- 6) Attempt ANY TWO in Section-C.

**SECTION A
(4x 5 = 20 Marks)**

S. No.		Marks	CO	
Q 1	Establish reason for the correctness of the following statements in not more than five sentences and one sketch/plot if necessary.			
	a.	The stall of swept wing tends to occurs first at the tip of the wing.	4	CO2
	b.	The principle of Boundary layer Blowing is similar to that of the leading edge slot.	4	CO2
	c.	Swing of a cricket ball is an aerodynamic phenomenon.	4	CO2
	d.	The Introduction of controllable slot overcomes to some extent the disadvantage of high drag.	4	CO2
	e.	Turbojet engine is preferred over turboprop engine at high altitude and high velocity.	4	CO4

SECTION B (10 x 4 = 40 Marks)

Q 2	Why Flaps are lowered during landing and take-off of an Airplane?	10	CO2
Q 3	Consider a thin symmetrical airfoil. It has a chord of 0.35 m. it is kept at an angle of attack of 4° in a free stream of velocity 50 m/sec and density 1.2256 kg/m ³ (assume lift curve slope for airfoil is 5.7 per radian approximately). Determine, (i) Lift coefficient and lift per unit span. (ii) Lift Coefficient for a wing of Aspect Ratio 10.	10	CO2

	(iii) Drag Coefficient for wing of Aspect ratio 10 (Assume $C_{D0} = 0.05$).		
Q 4	(a) What is the working principle of Hot Air Balloon? How they changed the face of aeronautical history? (5 Marks) (b) Ornithopters are flying machines. Justify your answer. (5 marks)	10	CO1
Q 5	Explain the principle of Gas Turbine. Describe with p-v and T-s diagram. Or What are the different types of compressors used in gas turbine engine? Write advantages and disadvantages of each of them.	10	CO4

SECTION – C (20 X 2 = 40 MARKS)

Q 6	<p>(a) What are the primary and secondary control surfaces of an Aircraft and what are their functions? Draw a typical Aircraft and mark all the control surfaces.(8 Marks)</p> <p>(b) Consider the wind tunnel shown below (approximate size: 20m x 6 m) with air entering from the left at 1 m/s at a static pressure of 1.013×10^5 Pa. Make plots of air velocity vs. x, static pressure vs. x and dynamic pressure vs. x. The wind tunnel has a rectangular cross section, and is 1m deep (into the page). (12 Marks)</p>	20	CO1 CO2									
Q 7	<p>(a) What is the importance of structural weight in aircraft? (8 Marks)</p> <p>(b) What are the different types of wings used in aircraft? Explain the function of the following in wing structure: Spar, Stringer, Ribs and Skin. (12 Marks)</p>	20	CO3									
Q 8	<p>(a) Aerodynamically, would it be easier to make a model glider fly on Earth or on Mars? Justify your answer. (10 Marks)</p> <table border="0"> <tr> <td>Planet</td> <td>Gravitational acceleration</td> <td>Atmospheric density</td> </tr> <tr> <td>Earth</td> <td>9.82 m/sec^2</td> <td>1.22 kg/m^3</td> </tr> <tr> <td>Mars</td> <td>3.7 m/sec^2</td> <td>0.015 kg/m^3</td> </tr> </table> <p>(b) Explain the following: Altimeter, Mach Meter, Airspeed Indicator and Pressure Gauge. (10 Marks)</p>	Planet	Gravitational acceleration	Atmospheric density	Earth	9.82 m/sec^2	1.22 kg/m^3	Mars	3.7 m/sec^2	0.015 kg/m^3	20	CO2 CO3
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