

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2019**

**Course: Aircraft Systems& Instruments**  
**Program: B-Tech ASEA**  
**Course Code: ASEG-346**

**Semester: VI**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions: Make use of sketches/plots to elaborate your answer. Brief and to the point answers are expected. The Question Paper contain 3 Sections- Section A, B and C**

**SECTION A**

S. No.		Marks	CO
Q 1	Differentiate slot and slat. Why fowler flap is used as high lift devices?	4	CO1
Q2	Differentiate open Centre and closed Centre hydraulic system(Any 4)	4	CO2
Q3	Explain Significance of Mach Number by comparing different aircraft refrigeration systems based on DART	4	CO4
Q4	Classify four types of brakes used in different categories of an aircraft.	4	CO2
Q5	Write application of triple breech cartridge type starter with necessary sketch	4	CO3

**SECTION B**

Q 6	Discuss aircraft control system.(a)Explain primary and Secondary control surface using diagram.(b) Write dis advantages of mechanical system over electrical system	10	CO1
Q7	Write Components and working of Landing gear strut with necessary diagram. OR Categorize types of Emergency Extension system. Explain, working of aircraft retraction system with necessary diagram.	10	CO2
Q8	Steam at 250 psia & 700F steadily enters a nozzle whose inlet area is 0.2 ft <sup>2</sup> . The mass flow rate of steam through nozzle is 10 lbm/s. steam leaves the nozzle at 200psia with a velocity of 900 ft/s. Heat losses from the nozzle per unit mass of the steam are estimated to be 1.2 Btu/lbm. Specific volume and enthalpy at nozzle inlet are 2.6883 ft <sup>3</sup> /lbm and 1371.1 btu/lbm. Determine (a) Inlet Velocity (b) The exit enthalpy of the steam.(Assume K.E , P.E negligible)	10	CO4

Q9	Write principle and working of magneto ignition system with necessary circuit diagram.	10	CO3
<b>SECTION-C</b>			
Q 10.	<p>(a) Distinguish Simple aircraft refrigeration system and Bootstrap refrigeration system with necessary Schematic and T-S Diagram.</p> <p>(b) Explain Vapor compression Refrigeration cycle with necessary Schematic and T-S diagram. How HCFC refrigerants affects environment.</p> <p style="text-align: center;">OR</p> <p>(a) Compute COP of Reverse Brayton Cycle. <math>COP = \{ (rp^{1/\gamma}) - 1 \}^{-1}</math></p> <p>(b) Draw humidity Verses Temperature on a Psychometric chart of Direct and In-direct Evaporative cooling. Illustrate real life example on Evaporative cooling Systems.</p>	20	CO4
Q11.	<p>a) Write a short note on Flight Instruments and Navigation Instruments. Discuss principle and working of Airspeed Indicator with necessary sketch</p> <p>b) Discuss working of Pitot static Instrument and Write its application in aircrafts.</p>	20	CO5

SET-B

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**SECTION A**

S. No.		Marks	CO
Q 1	Define Ruddervator. Which type of aircrafts use ruddervator as secondary control surfaces. Illustrate with one example	4	CO1
Q2	Define Master Cylinder. Write any "TWO" functions.	4	CO2
Q3	Write a short note on Additives and inhibitors used in ATF	4	CO3
Q4	Define Weeping wing. Which type of anti-icing systems are used for stall- warning sensors	4	CO4
Q5	Explain principle of gyroscope with necessary sketch.	4	CO5

**SECTION B**

Q 6	What is the requirement of aircraft fuel system? Differentiate AVGAS fuel with Turbine engine fuel. How performance rating can be increased of aviation fuel?	10	CO3
Q7	Steam at 150Kpa & 300K steadily enters a nozzle whose inlet area is 1.5m <sup>2</sup> . The mass flow rate of steam through nozzle is 0.02kg/s. steam leaves the nozzle at 600Kpa with a velocity of 50m/s. Heat losses from the nozzle per unit mass of the steam are estimated to be 16KJ/kg. Specific volume and enthalpy at nozzle inlet are 0.164m <sup>3</sup> /kg and 3214.4KJ/kg. Determine (a) Inlet Velocity (b) The exit enthalpy of the steam.(Assume K.E , P.E negligible)	10	CO4
<b>OR</b>			

	B) Air at 100 KPa and 200K compressed steadily to 560KPa and 350 K. The mass flow rate of the air is 0.02 kg/s, and a heat loss of 16KJ/Kg occurs during process. Assuming the changes in K.E and P.E are negligible, determine the necessary power input to the compressor. $H_1 = h_{@200k} = 280\text{KJ/Kg}$ , $H_2 = h_{@350k} = 400\text{KJ/Kg}$		
Q8	(a) Illustrate working of hydraulic system for light aircraft. Write applications of hydraulic power  (b)Categorize fuel tanks on basis of aircraft.	10	CO2
Q9.	(a) Explain fly-by- wire Technology and Auto pilot system Active control Technology using block diagram.  (b) Write a short note on practical application of Auto pilot system Active control Technology	10	CO1
<b>SECTION-C</b>			
Q 9.	(a)Distinguish Brayton cycle and Bell-colemon cycle with necessary Schematic and T-S Diagram.  (b) Explain Vapor compression Refrigeration cycle with necessary Schematic and T-S diagram. How HCFC refrigerants affects environment.  OR  (a)Define Critical point, Saturated liquid, superheated Vapor and saturated Vapor with necessary T-V Diagram.  Draw P-V and T-S Diagram of Vapor compression Refrigeration cycle  (b) Draw humidity Verses Temperature on a Psychometric chart of Direct and In-direct Evaporative cooling. Illustrate real life example on Evaporative cooling Systems.	20	CO4
Q10.	a) Explain different gyroscopic Instruments with necessary sketch and discuss their importance in aviation Industry[10M] b) Discuss functions of Pitot static Instruments with necessary sketch[5M] c) Write functions of Cockpit displays used in aircraft[5M]	20	CO5