



Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Course: Flight Instrumentation and Data Acquisition System

Semester: II

Program: M. Tech ASE+UAV

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 has three sections: Section A, B and C, Section B and C have internal choices.**

SECTION A (5X4 =20)

S. No.	Questions	Marks	CO
Q 1	Describe two of the methods adopted for the display of indications related to high-Range measurements.	4	CO1
Q 2	Discuss the rotor and inner Gimbal rings of a directional gyro are erected to the level position.	4	CO2
Q 3	What do you understand by the term Head-Up-Display? With aid of diagram describe how required basic flight data is displayed to a pilot.	4	CO3
Q 4	In a typical series thermoelectric circuit temperature to be 500 ⁰ C, the following resistance value apply : R _{th} = 0.79 Ω , R _l = 24.87 Ω , R _v = 7 Ω , R _i = 23 Ω voltage generated by thermocouple is 20.64 mV, Find the current in the circuit.	4	CO4
Q 5	Define the Nyquist frequency and aliasing effects in the digital signal	4	CO5

SECTION B (4X10=40)

Q 6	Given the following information find the value of deviation coefficients A, B, C aircraft magnetism	10	CO3																				
	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Magnetic Heading</th> <th>Compass Deviation</th> <th>Magnetic Heading</th> <th>Compass Deviation</th> </tr> </thead> <tbody> <tr> <td>000⁰</td> <td>+4⁰</td> <td>180⁰</td> <td>-1⁰</td> </tr> <tr> <td>045⁰</td> <td>+2⁰</td> <td>225⁰</td> <td>-2⁰</td> </tr> <tr> <td>090⁰</td> <td>+4⁰</td> <td>270⁰</td> <td>-2⁰</td> </tr> <tr> <td>035⁰</td> <td>+3⁰</td> <td>315⁰</td> <td>0⁰</td> </tr> </tbody> </table>			Magnetic Heading	Compass Deviation	Magnetic Heading	Compass Deviation	000 ⁰	+4 ⁰	180 ⁰	-1 ⁰	045 ⁰	+2 ⁰	225 ⁰	-2 ⁰	090 ⁰	+4 ⁰	270 ⁰	-2 ⁰	035 ⁰	+3 ⁰	315 ⁰	0 ⁰
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Q 7	<p>a) What are the principal components which comprise an aircraft pitot-static system?</p> <p>b) The vertical speed indicator of an aircraft flying at a true airspeed of 100 kt, in a descent with a slope of 3 degrees indicates</p>	10	CO1
Q 8	Describe the construction and operation of a ring laser gyroscope processes under the influence of an applied torque.	10	CO3
Q 9	<p>Design the Multiplexer for consider the function $F(A,B,C,D)=\sum(1,3,4,11,12,13,14,15)$ and implemented with an 8-to-1 line with logic diagram</p> <p style="text-align: center;">(Or)</p>	10	CO5
Q 10	What types of conversion technique used in telemetry in UAVs and Satellites?	10	CO5
SECTION C (2X20=40)			
Q 11	<p>Assuming an aircraft is flying in the southern hemisphere, What errors compass reading will be introduce when</p> <p>(i) The Aircraft accelerates on an easterly heading</p> <p>(ii) The aircraft turns from southerly heading towards East.</p> <p>(iii) Acceleration Error and northerly turning error</p>	20	CO2
Q 12	<p>a) Draw Explain the circuit of typical capacitance type fuel quantity indicating system and what effects do temperature changes have on the fuel used and how these are compensated in a fuel quantity indicating system.</p> <p>b) Describe how the rate gyroscope principle is applied to a turn and bank indicator.</p> <p style="text-align: center;">(Or)</p>	12	CO4
Q 13	<p>a) The rotor of a turbojet engine has a mass 200 kg and a radius of gyration 25 cm. The engine rotates at a speed of 10,000 rpm in the clockwise direction if viewed from the front of the aero plane. The plane while flying at 1000 km/hr. turns with a radius of 2 km to the right. Compute the gyroscopic moment the rotor exerts on the plane structure. Also, determine whether the nose of the plane tends to rise or fall when the plane turns.</p> <p>b) Draw diagram to illustrate the relationship between the earth's magnetic components and magnetic dip at the equator and at the magnetic poles.</p>	12	CO4
		08	CO3

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Name of Examination (Please tick, symbol is given)	:	MID		END	<input checked="" type="checkbox"/>	SUPPLE	
Name of the School (Please tick, symbol is given)	:	SOE	<input checked="" type="checkbox"/>	SOCS		SOP	
Programme	:	M. Tech ASE+UAV					
Semester	:	II					
Name of the Course	:	Flight Instrumentation and Data Acquisition System					
Course Code	:	AVEG 7004					
Name of Question Paper Setter	:	M Raja					
Employee Code	:	40000908					
Mobile & Extension	:	8938817363					
Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":							
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Time of Examination	:						
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SECTION A (5X4 =20)

S. No.	Questions	Marks	CO
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Q 2	What are the principal components which comprise an aircraft pitot-static system?	4	CO1
Q 3	Why is it necessary for the Gyroscope assembly of a directional gyro to be caged when setting is heading?	4	CO3
Q 4	Explain how the effects of temperature change in an aircraft compass?	4	CO4
Q 5	Define the Sampling frequency and quantization errors in the digital signal	4	CO5

SECTION B (4X10 =40)

Q 6	Describe the construction and operation of Air speed indicator.	10	CO1
Q 7	Draw diagram to illustrate the relationship between the earth's magnetic components and magnetic dip at the equator and at the magnetic poles.	10	CO3
Q 8	a) In a typical parallel thermoelectric circuit temperature to be 500 ⁰ C, the following resistance value apply: $R_{th} = 0.79 \Omega$, $R_l = 24.87 \Omega$, $R_v = 7 \Omega$, $R_i = 23 \Omega$ voltage generated by thermocouple is 20.64 mV, Find the current in the circuit. b) Describe the construction and operation of a fiber optic gyroscope processes under the influence of an applied torque.	05 05	CO4 CO2
Q 9	What effect does acceleration of an aircraft have on the indicating of a gyro horizon	10	CO4

(or)

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