Aircraft Systems and Insurmentation VTU CBCS Question Paper Set 2018

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10AE848

Eighth Semester B.E. Degree Examination, June/July 2016
Aircraft Systems and Instrumentation

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Explain the operation of a push-pull rod control system used for operating the elevator through a powered actuator unit with a neat sketch. **(10 Marks)**

b. Explain the following with a neat diagram.
   i) Mechanical actuation
   ii) Electro – hydraulic actuation. **(10 Marks)**

2 a. Explain the following :
   i) Hydraulic fluid, with examples. What are its advantages?
   ii) Power packs, with relevant diagram
   iii) Hydraulic actuations, with relevant diagram. **(12 Marks)**

b. Draw a sketch of simplified bleed air system and associated aircraft systems. Explain the same. **(08 Marks)**

3 a. Explain the gravity feed fuel systems, with neat diagram. **(10 Marks)**

b. With a help of neat sketch explain fuel tank. Name some of the fuel tanks used. **(10 Marks)**

4 a. With neat sketch explain the importance of cabin distribution system. **(08 Marks)**

b. Explain the following with neat diagram.
   i) Vapour cycle cooling system.
   ii) Liquid cooling system. **(12 Marks)**

PART – B

5 a. Under instrument grouping, explain both flight instruments and power plant instruments grouping, with a neat sketch. **(10 Marks)**

b. Describe the principle of operation of a head up display with a schematic diagram. **(10 Marks)**

6 a. With a neat sketch, describe the mach warning system. **(10 Marks)**

b. Describe altitude – alerting system, with a neat sketch. **(10 Marks)**

7 a. With the aid of diagrams, describe how a ball type of bank indicator indicates.
   i) A correctly banked turn.
   ii) A turn to star board in which the aircraft is over banked. **(10 Marks)**

b. Define gyroscope. Mention its three degrees of freedom. Explain the term gimbals systems of a free (or) space gyroscope, gyroscopic inertia (or) rigidity and precession; and angular momentum. **(10 Marks)**

8 a. Explain the turbine vibration monitoring system, with neat sketch. **(10 Marks)**

b. Explain typical automatic temperature – control engine system, with neat sketch. **(10 Marks)**

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PART – A

1 a. Describe about the primary and secondary flight controls with relevant diagrams. **(10 Marks)**

b. With clear illustration, explain about the power assisted and fully powered flight control system. **(10 Marks)**

2 a. Write notes on hydraulic actuators and pneumatic system. **(07 Marks)**

b. List out the use of bleed air. **(03 Marks)**

c. Discuss about the different types of retraction systems. **(10 Marks)**

3 a. With neat diagrams, explain about the different types of fuel feed system. **(12 Marks)**

b. Describe about the classification of fuel pumps and its working principle. **(08 Marks)**

4 Describe about the aircraft anti-icing system and deicing system with suitable diagram. **(20 Marks)**

PART – B

5 a. Discuss and describe about the aircraft instrumentation grouping. **(10 Marks)**

b. Explain about the inertial navigation systems with neat block diagram. **(10 Marks)**

6 a. With neat diagrams, explain about the working principle of pitot static system. **(10 Marks)**

b. Write notes on:

i) AOA sensing,

ii) Mach meter. **(10 Marks)**

7 a. List out the properties of gyroscope. **(02 Marks)**

b. Write down the limitations of directional gyros. **(04 Marks)**

c. Discuss the functioning of a turn and bank indicator. **(14 Marks)**

8 a. Explain the different types of instruments used for RPM measurement. **(10 Marks)**

b. Discuss about the several types of fuel flow indicators. **(10 Marks)**

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PART – A

1 a. What is the need of flight control system? With neat sketch explain power assisted flight control system. **(10 Marks)**

b. Stating the advantages and disadvantage explain fly – by – wire system with necessary sketch. **(10 Marks)**

2 a. List the advantage and disadvantages of hydraulic system used in aircraft. **(05 Marks)**

b. With a neat sketch explain typical high pressure pneumatic system used in aircraft. **(10 Marks)**

c. Write a note on : Hydraulic accumulator. **(05 Marks)**

3 a. What is the purpose of an aircraft fuel system? With neat sketch explain generalized fuel system of large transport aircraft. **(10 Marks)**

b. Explain with neat sketch, Vane type fuel pump. **(10 Marks)**

4 a. Explain operation of vapour cycle cooling system with necessary sketch. **(10 Marks)**

b. What are the consequences of information? With neat sketch explain hot air anti-icing system. **(10 Marks)**

PART – B

5 a. With neat sketches explain 'blind flying panel' and basic 'T' type of instrument grouping. **(10 Marks)**

b. Write a note on :
i) Power plant instruments.
ii) Head up display system. **(10 Marks)**

6 Explain the following systems with neat sketches.
a) Pitot – static system.
b) Mach meter.
c) Vertical speed Indicator. **(20 Marks)**

7 a. Define the two fundamental properties of gyroscope and on what factors do these properties depend. **(10 Marks)**

b. What is meant by 'earth rate and how the input axis of a gyroscope would have to be aligned to exhibit apparent drift equal to this rate? **(10 Marks)**

8 a. What is tachometer? With neat sketch explain a mechanical tachometer. **(10 Marks)**

b. How are engine temperature measuring instruments classified? Explain how resistance is being measured using wheatstone bridge? **(10 Marks)**

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