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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2023 Semester End Main Examinations

Programme: B E **Semester: IV**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 19AE4DCAAI **Max Marks: 100**
Course: Aircraft Systems, Avionics and Instrumentation

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Explain the classification of landing gear based on the mechanisms used.		**6**
	b)	Explain the aircraft braking systems.		**6**
	c)	Answer the following for a typical hydraulic system of an aircraft		**8**
		i.	Main advantage over electric system	
		ii.	Mechanical advantage	
		iii.	Uses of hydraulic system on an aircraft	
		iv.	Components	

UNIT - II

2	a)	Write a short note on three generations of engine control systems.	**7**
	b)	Explain the advantages of digital fly-by-wire system over analogue fly-by-wire system.	**7**
	c)	Write a short note on MCAS.	**6**

UNIT - III

3	a)	Describe the effects of bird hit and its consequences on an airplane in flight.	**8**
	b)	Distinguish between the two types of fuel feed systems clearly highlighting the differences between them.	**8**
	c)	Note down the various components of a fuel system.	**4**

OR

4	a)	Briefly explain the principle of operation of the low-pressure pump and the high-pressure pump used in the fuel system of an aircraft.	**10**
	b)	Explain the process of starting of a jet engine.	**10**

UNIT - IV

5 a) What is PPO2? Explain the various techniques of maintaining it in the cabin stating the merits and demerits of each of them. **10**

b) A simple air cooled system is used for an aeroplane having a load of 10 tonnes. The atmospheric pressure and temperature are 0.9 bar and 10°C respectively. The pressure increases to 1.013 bar due to ramming. The temperature of the air is reduced by 50°C in the heat exchanger. The pressure in the cabin is 1.01 bar and the temperature of air leaving the cabin is 25°C. Determine: **10**

i. Power required to take the load of cooling in the cabin; and

ii. C.O.P. of the system.

Assume that all the expansions and compressions are isentropic. The pressure of the compressed air is 3.5 bar.

UNIT - V

6 a) A flight test engineer flying at a geometric altitude of 2500 m measures the ambient temperature to be 10% hotter than the standard value (given in Kelvins). Simultaneously she measures the ambient pressure and finds that the pressure altitude is also 2500 m. Compute the density of the air at this point. **10**

b) What is meant by Aircraft Navigation? What are its types? Explain any one of them briefly. **10**

OR

7 a) Briefly explain a typical Guidance, Navigation and Control System. **7**

b) Describe ACAS with a neat sketch. **7**

c) The moment of inertia of a gyroscope is 0.20 kgm2 and its rotor is spinning at 600 RPM. Calculate the gyroscope's precessional rate and mark its direction of precession on a sketch. The distance from the support to the flywheel is 16 cm and the mass of the flywheel is 8.0 kg. **6**

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