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

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E.   Semester: IV
Branch: Aerospace Engineering   Duration: 3 hrs.
Course Code: 22AS4PCAAI   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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Mention the different types of brake actuation system. Explain each one of them in detail.	CO 1	PO 1	**8**
	b)		What are the primary requirements of a landing gear mechanisms in an aircraft? Explain in detail about its types.	CO 1	PO 1	**6**
	c)		State Pascal's Law. With the help of a sketch briefly explain its application in achieving force multiplication and displacement multiplication.	CO 2	PO 1	**6**
			OR			
2	a)		Explain the mechanism of shock absorption in landing.	CO 1	PO 1	**5**
	b)		With the help of suitable sketches, describe about single disc brakes and multiple disc brakes.	CO 1	PO 1	**8**
	c)		Illustrate the working principle of pneumatic systems with the help of suitable sketches.	CO 2	PO 1	**7**
			UNIT - II			
3	a)		Explain about the digital fly-by-wire system with a circuit diagram clearly indicating the feedback paths.	CO 2	PO 1,2	**7**
	b)		What do you mean by modified manoeuvring characteristics augmentation system (MCAS) and give its case study.	CO 3	PO 1,2	**7**
	c)		Write a short note on applications of active control technology.	CO 2	PO 1,2	**6**
			UNIT - III			
4	a)		Explain the working of a wet sump lubrication system with the help of a block diagram	CO 1	PO 1,2	**8**
	b)		Describe the working principle of magneto ignition System with suitable sketches.	CO 1	PO 1,2	**7**
	c)		Illustrate the starting process of a gas turbine engine.	CO 1	PO 3	**5**

			UNIT - IV			
5	a)		Mention the different types of oxygen generating system. Explain in detail about on-board oxygen generating system with the help of suitable sketches.	*CO 1*	*PO 2*	**8**
	b)		An aircraft refrigeration plant has to handle a cabin load of 30 tones. The atmospheric temperature is 17°C. The atmospheric air is compressed to a pressure of 0.95 bar and temperature of 30° C due to ram action. This air is then further compressed in a compressor to 4.75 bar, cooled in a heat exchanger to 67°C, expanded in a turbine to I bar pressure and supplied to the cabin. The air leaves the cabin at a temperature of 27°C. The isentropic efficiencies of both compressor and turbine are 0.9. Calculate the mass of air circulated per minute and the C.O.P. For air, C_p = 1.004 kJ/kg K and $C_p/C_v = \gamma = 1.4$ also draw its T-S diagram.	*CO 3*	*PO 1,2*	**12**
			UNIT - V			
6	a)		Enumerate the properties of a gyroscope and explain its working principle and also list out the different types of gyroscopic instruments used in an aircraft.	*CO 2*	*PO 1*	**7**
	b)		With the help of suitable diagram, explain the working principle of air-pressure sensitive system or basic air-data system. Also enumerate the instruments which work based on this system.	*CO 1*	*PO 1*	**7**
	c)		Briefly describe the principle of operation of an altimeter with the help of a neat diagram.	*CO 1*	*PO 2*	**6**
			OR			
7	a)		List out the various types of engine instruments and explain any three of them in detail.	*CO 1*	*PO 1*	**10**
	b)		Draw the basic pack of 6-instruments in a cockpit and also specify its location.	*CO 1*	*PO 1*	**5**
	c)		A top consists of a spinning disc of radius 50 mm and mass 0.8 kg mounted at the end of a light rod as shown. If the disc rests on a pivot with its axis of spin horizontal as shown, and the distance X is 30 mm, calculate the velocity of the precession when its spins at 40 rev/min.	*CO 2*	*PO 1,2*	**5**

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