U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Aerospace Engineering **Duration: 3 Hrs.**

Course Code: 22AS7PCAMC **Max Marks: 100**

Course: Aviation Maintenance Concepts and Technologies

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)	Explain the relation between aircraft maintenance, reliability and re-design.	CO1	PO1	**07**
	b)	What are the differences between the Predictive and Proactive maintenance concepts?	CO1	PO12	**05**
	c)	Explain with an example on how self-healing technologies can be used in aeroengines and structures to achieve the maintenance free aircraft concept.	CO3	PO2	**08**
		OR			
2	a)	Define maintainability and what are the parameters used for quantifying the maintainability in commercial aviation?	CO1	PO1	**05**
	b)	What are the typical sources of data for reliability control program in commercial airlines?	CO1	PO6	**05**
	c)	A full-service airline operating a fleet 10 Airbus 320 aircraft fleet has flown a total of 29,400 flying hours during the year 2020. The defects data and the time taken to repair the Electrical System of the fleet for the year 2020 is given in Table1. Calculate the Maintainability, Reliability and Availability of the Electrical system for the fleet in terms of MTTR and MTBR.	CO3	PO12	**10**
		UNIT - II			
3	a)	What is the purpose of aircraft weighing and explain two methods of weighing of an aircraft?	CO5	PO1	**05**
	b)	What is unscheduled maintenance and what are the reasons for unscheduled maintenance in aviation?	CO2	PO6	**05**

		c)	An Aerosport company operating a general aviation aircraft intends to modify the aircraft by integrating the daylight and thermal camera system for horticulture crop monitoring. The camera package weighs 3 kg and to be located at a longitudinal distance of 1.8 m behind the firewall. As per the flight manual, the datum point of the aircraft is located at the firewall and the permissible range of longitudinal CG is 1.08 m to 1.20 m behind the datum point. The load and trim data for the unmodified aircraft for a typical operational flight is given below. Calculate the new CG location and check if modification is acceptable from the limitations of CG locations and AUW.	CO3	PO12	**10**

Description of Equipment	Weight (kg)	Arm (Distance from Datum) (m)	Arm Location
Basic Empty Weight	560	1.02	Behind Datum
Front Seats with occupant	166	0.94	Behind Datum
Rear Seat	16	1.85	Behind Datum
Baggage area 1	34	2.41	Behind Datum
Baggage area 2	5	3.12	Behind Datum
Fuel -195 litres with specific Gravity 0.72	140	1.22	Behind Datum

		OR			
4	a)	Explain the concept of packaging of maintenance tasks into checks and What are the advantages and disadvantages of phased (Equalized or Progressive) checks?	CO1	PO1	**08**
	b)	What is the difference between line and base maintenance in civil aviation?	CO3	PO5	**05**
	c)	What are the primary segments of commercial aviation MRO and explain the scope of modification?	CO2	PO6	**07**
		UNIT - III			
5	a)	A full-service ABC Airline operating a fleet of 20 Airbus 320 aircraft have experienced the following categories of delays and flown 74,615 revenue flights for period of one year during 2020. Calculate the technical dispatch reliability by segregating the delays into uncontrollable and controllable categories.	CO3	PO12	**10**

			Departure Delays for the Year 2020 for ABC Airlines Revenue Departures: 74615 Number of Delays **Type of Delays** / <15 Min / >15 Min / Total Spares Not available: 12 / 35 / 47 Air Traffic Congestion: 12 / 91 / 103 Shortage of AME: 3 / 26 / 29 Ground Equipment: 2 / 11 / 13 Foreign Object Damage: 2 / 27 / 29 Component Failure: 13 / 344 / 357 Incorrect Trouble Shooting: 0 / 33 / 33 Unconfirmed / Nuisance Defects: 4 / 135 / 139 Ongoing Servicing: 0 / 34 / 34 Adverse weather: 5 / 54 / 59			
	b)	What are the differences between Continuing Airworthiness Management Exposition (CAME) and Management Organization Exposition (MOE)?	CO2	PO6	**06**
	c)	What the possible outcomes of unsafe maintenance in order of their severity?.	CO1	PO5	**04**
		OR			
6	a)	What is Airworthiness and explain the two Stages of Airworthiness in aircraft life cycle?	CO2	PO5	**08**
	b)	What are the tools and techniques used for ensuring Airworthiness Requirements?	CO1	PO6	**07**
	c)	What are the 5 categories of Licensed Aircraft Maintenance Engineer under DGCA regulations?	CO3	PO12	**05**
		UNIT IV			
7	a)	What are the three primary ways AHM reduces airline schedule interruptions?	CO2	PO5	**05**
	b)	What are the advantages of HUMS?	CO2	PO12	**07**
	c)	What is the difference between Magnetic Particle Testing (MT) and Electromagnetic Testing (ET)?	CO3	PO5	**08**
		OR			
8	a)	What are the ways to improve Maintainability during DFM process?	CO2	PO5	**05**
	b)	What are the obvious features of the product built with Design for Maintainability?	CO2	PO5	**05**
	c)	The OEM of a widebody commercial aircraft designed with DFM features has developed the MPD with MSG -3 methodologies. As per the aircraft MPD, the planned/scheduled maintenance effort for Aircraft systems, Powerplant and Structures under their respective subcategories for the design life cycle period of 20 years is tabulated in the Table below. An airline operating the	CO3	PO12	**10**

			aircraft has captured the unscheduled maintenance effort for one aircraft for the design life cycle of 20 years are tabulated in the Table below. The aircraft has logged **80,500** flying hours during the same period. Calculate the Planned Maintenance Percentage (PMP) and Maintenance Man Hours /Flying hours (MMH/FH) as the measures of maintainability of the aircraft.			

Scheduled and Unscheduled Mainteence Effort of wide body Commercial Aircraft for Design Life Cycle of 20 Years						
Flying hours logged 40,500 Hours	MPD Scheduled Mainteence Task Effort (Hours)			Unscheduled Mainteence Task Effort (Hours)		
Maintenance Groups and Subgroups	Aircraft Systems	Power plant	Structures	Aircraft Systems	Power plant	Structures
Systems and Components Checks	12261	7109	3909	1114	356	292
Zonal Checks	140	216	3683	66	37	312
Line Maintenance Checks	1407	834	91	180	120	16

			UNIT - V			
	9	a)	What do you understand by Advocacy Groups in the context of aviation regulations?	CO2	PO6	**07**
		b)	Explain the term Harmonisation of Aviation Regulations?	CO3	PO5	**05**
		c)	What are the different categories of documents required in aircraft maintenance? Briefly explain the scope of manufacturer documentation.	CO3	PO6	**08**
			OR			
	10	a)	Why do we need Aviation Regulations? Who are the stakeholders of Aviation Regulations?	CO3	PO5	**07**
		b)	What are the important roles of Aviation regulatory Body.	CO3	PO6	**05**
		c)	What are the Aviation Regulations which are important for aviation engineers. Explain the scope and importance of any one of them.	CO3	PO6	**08**

Table 1

Electrical System Failure and Repair Data for the Calendar Year 2020												
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Number of Defects for the Month	0	3	3	2	4	8	8	4	0	5	1	3
Time taken to Repair (Hours)	0	7	6	5	13	15	20	9	0	13	2	9

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