U.S.N.										

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

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 19AE3DCMAE **Max Marks: 100**
Course: Materials for Aerospace Engineering

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	Marks
	1	a)	State the specific advantages of following aerospace materials i. Titanium ii. Composites iii. Magnesium iv. Polymers	**8**
		b)	What are intermetallics? State the composition, temperature limits and possible applications of one silicide and one aluminide intermetallic.	**8**
		c)	List the functions of fiber and matrix in a composite	**4**
			OR	
	2	a)	Classify polymers. List the characteristics and typical applications of each of these polymers.	**8**
		b)	State reasons as to why corrosion an important aspect of study in aerospace industry? Discuss in detail any two possible corrosion processes in an aircraft and methods to control the same.	**8**
		c)	Explain the materials and processes used for thermal protection of aircraft components.	**4**
			UNIT – II	
	3	a)	Explain IADS nomenclature of aluminium alloy. Hence give the classification stating the composition of the alloy.	**6**
		b)	Mention any two major age-hardenable aluminium alloys and their properties and typical applications in an aircraft.	**8**
		c)	Discuss the following treatment processes as applied to aluminium alloys. i. Solid Solution treatment ii. Precipitation hardening iii. Age hardening	**6**
			OR	
	4	a)	What are two major groups of magnesium alloys? Discuss based on alloy composition.	**5**

		b)	State the classification and usage of commercially pure titanium.	**5**
		c)	Discuss in detail properties and applications of alpha titanium alloys.	**6**
		d)	State the uses of copper and its alloys in aerospace industry.	**4**
			UNIT - III	
	5	a)	Discuss the alloy composition, temperature limits and application of the following three superalloys. i. Nickel based superalloys ii. Cobalt based superalloys iii. Iron based superalloys	**9**
		b)	List and discuss the steels used for aerospace applications.	**7**
		c)	What is thermal barrier coating? Discuss stating the materials used for the coating.	**4**
			UNIT – IV	
	6	a)	List and discuss the modern ceramic materials used in aerospace industry.	**6**
		b)	What are carbon-carbon composites? List the properties and applications of them.	**7**
		c)	With sketch explain any one manufacturing method of metal matrix composite.	**7**
			UNIT – V	
	7	a)	Discuss the linear and non-linear behaviour of any one aerospace material with well-defined stress-strain curve.	**6**
		b)	Discuss the following with relevant sketches. i. Bauschinger effect ii. Yielding	**8**
		c)	Listing the any five methods of NDT inspection, sketch and explain one surface inspection.	**6**

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