U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 22AS3PCMAE **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.
3. Draw diagrams wherever necessary

UNIT - I

1	a)	State the advantages of each of the following material to be classified for aerospace industry. a. Titanium b. Aluminium c. Composites		**6**
	b)	The role of polymers is very important in Aerospace industry. Justify the statement by listing the applications of polymers in the aircraft.		**5**
	c)	How are the aircrafts detected when airborne? Discuss the stealth methodologies to avoid the detection		**6**
	d)	What is a shape memory alloy? Given an example.		**3**

OR

2	a)	List different intermetallics. Discuss any one aluminide and one silicide intermetallic material.		**7**
	b)	Discuss different types of corrosion. List the methods used to prevent corrosion of aircraft components.		**8**
	c)	Which are all the high temperature materials used in an aircraft for structural and engine applications? Discuss.		**5**

UNIT - II

3	a)	Give the IADS classification of aluminium alloy based on alloying element used. Discuss the properties of the following alloy grades in detail stating their applications. a. 2000 b. 6000 c. 7000 d. 8000		**10**

	b)	Bring out the classification of Titanium alloys. Discuss in detail, the composition, properties and applications of Titanium alloys	**7**
	c)	Explain briefly about the machining of Titanium alloy materials.	**3**

OR

4	a)	Why are Aluminium alloys extensively used in Aerospace industry? Justify by listing the properties which helps in their usage.	**6**
	b)	List the alloys of Copper. State the usage of Copper and its alloys in an aircraft.	**7**
	c)	Aluminium alloys can be strengthened by different heat treatments. Discuss in details about different heat treatments.	**7**

UNIT - III

5	a)	With an illustration of iron-carbon diagram, discuss different phase formations.	**10**
	b)	State the important requirements of superalloy material. Also give the classification of superalloys based on their composition	**6**
	c)	With an illustration, explain the thermal protection of Superalloy blades.	**4**

UNIT - IV

6	a)	Give a detailed classification of composite materials.	**6**
	b)	List the applications of composites in aircrafts, stating the type of composite used.	**6**
	c)	Bring out the role of ceramics in aerospace industry.	**5**
	d)	List the matrix materials used in polymer composite making.	**3**

UNIT - V

7	a)	What is strain hardening in materials? Explain.	**5**
	b)	With an illustration, explain elastic after effect.	**4**
	c)	With illustration, discuss the following NDT techniques. a. Dye Penetrant test b. Ultrasonic inspection	**8**
	d)	Identify the machine used for the following material testing. a. Compression test b. Bending test c. Hardness test	**3**

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