U.S.N.										

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

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 19AE3DCMAE **Max Marks: 100**
Course: Materials for Aerospace Engineering **Date: 17.05.2023**

Instructions: 1. Answer any five questions choosing one full from each unit.
2. Missing data, if any may suitable assumed
3. Sketch the figures wherever necessary.
4. Use of logarithmic tables and scientific pocket calculator is allowed

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

1. a) Discuss the importance of the following engineering materials as suitable to Aerospace industry. **10**
    1. Aluminium
    2. Titanium
    3. Magnesium
    4. Nickel

   b) List the factors that influence the selection of Aerospace engineering material. **5**

   c) Taking the historical timeline, discuss the development of Aerospace materials. **5**

OR

2. a) What are thermoplastics? Give out their properties and applications. **7**

   b) Corrosion protection is a major aspect of aircraft industry. State the various ways of avoiding corrosion in aircraft components. **6**

   c) With sketch explain any one ceramic processing method. **7**

UNIT - II

3. a) How are aluminium alloys classified? List out the complete classification with major composition of the alloy stated. **6**

   b) 2000 series of aluminium alloy finds an extensive use in Aircraft industry. Justify with reasons for its usage. **5**

   c) Discuss different heat treatments done on aluminium alloys. **6**

   d) Categorize aluminium alloys as age-hardenable and non-age hardenable. **3**

OR

4.	a)	State the alloy composition and applications of 5000 series of aluminium alloy.	**5**
	b)	State and discuss in detail properties and applications of alpha titanium alloys.	**7**
	c)	State the properties and usage of magnesium in aircraft industry.	**4**
	d)	State the usage of wood and fabric in modern aircraft industry.	**4**

UNIT - III

5.	a)	How is strengthening of iron achieved with alloying? Which are the different typically used steel alloys in aircraft industry.	**7**
	b)	With iron-carbon phase diagram, explain the formation of Austenite, Ferrite and cementite.	**8**
	c)	Discuss the development of superalloys over the years.	**5**

UNIT - IV

6.	a)	What is a cermet? Discuss its construction and applications.	**5**
	b)	With classification discuss the uses of metal matrix composites in aerospace industry.	**7**
	c)	Illustrate the Duraclan method of liquid metal matrix composite.	**8**

UNIT - V

7.	a)	With stress-strain diagram explain the elastic and plastic behaviour of engineering metal.	**6**
	b)	Internal defects are critical to safe working of an aircraft component. Discuss any one NDT method of detecting an internal defect.	**5**
	c)	With relevant sketch explain the following 1. Bauschinger effect 2. Strain hardening	**7**
	d)	List the machine tools used for the following property characterization of materials. 1. Hardness 2. Bending strength 3. Shear strength	**2**

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