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	Question Paper Code	e: 40531
6)	B.E./B.Tech. DEGREE EXAMINATION Sixth Semester Aeronautical Engineer AE 6604 – AIRCRAFT MATERIALS A (Regulations 2013)	ing
Time	e: Three Hours	Maximum: 100 Marks
	Answer ALL questions	S
	PART - A	(10×2=20 Marks)
1.	How can engineering materials be broadly classifi	ied?
2.	If the density of cubic manganese = 7440 kg/m^3 and it determine the number of atoms per unit cell.	ts lattice parameter a = 8.92 Å,
3.	Why are brittle materials with very high stiffness ur applications?	nsuitable for many engineering
4.	What are the features of ductile fracture?	produced the sept and W
5.	Give examples of magnesium alloys for aerospace	application.
6.	Name an aluminium alloy with very good fatigue alloy composition.	characteristics and state the
7.	Sketch the structure of a plastic material.	anin on the salangle.
8.	What is a closed mould process?	in Brade equipment a com-
9.	State the material used and typical operating temperat	ture of an aircraft turbine blade.
10.	The change in the modulus value for ordinarily and their melting point is approximately (an increase of about 25-35%/a decrease of about 10-20%).	elastic materials between 0°K ase of about 25-35%/a decrease
	PART – B	(5×13=65 Marks)
11.	Classify crystalline imperfections based on their type of imperfection. (OR)	ir geometry and explain each
	b) i) List the various requirements of materials application. Give examples.	for aerospace structural (5)
	ii) Describe the X-ray diffraction process and scop	e of material characterization. (8)

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i) What are the different stages of material creep behaviour?	(5)
ii) Describe yielding of materials, strain hardening, fracture and the Bauchinger effect.	(8)
(OR)	
Compare any two techniques of flaw detection in aerospace structural components and state their relative advantages.	
 i) List the different types of corrosion and state the effect of corrosion on the mechanical properties of aerospace metals and alloys. 	(5)
ii) What is stress corrosion cracking and what are the causes of stress corrosion cracking?	(8)
(OR)	
Explain the heat treatment processes for carbon steels and titanium alloys. What are the benefits and disadvantages of heat treatment?	
What is a cermet? Discuss the various qualities and applications of cermets an give an example of how a cermet is manufactured. (OR)	
 i) How are shape memory alloys useful with respect to aerospace application? Cite examples. 	(5)
ii) Discuss the role of carbon-carbon composites for aerospace application. What are the features and characteristics of this class of materials?	(8)
i) What are the testing methods and practical difficulties associated with material characterization at high temperatures?	(5)
ii) Define 'superalloy'. Which class of superalloys are best suited for aerospace application - list their attractive feature/qualities? (OR)	(8)
N D : 0	(5)
ii) List the different mechanical and thermal properties of a high temp. materials and explain the variation of these properties at elevated temperatures.	9
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PART – C (1×15=15 Mar	rks)
Compare the density and mechanical properties of a few different aluminium alloys, titanium alloys and composite materials used for aerospace structural application.	
(OR)	
Why is a thermal protection system necessary for a spacecraft? Explain how a thermal protection system works and give examples of thermal protection	
materials and systems for a spacecraft.	