



40531



12. a) 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)
- b) Compare any two techniques of flaw detection in aerospace structural components and state their relative advantages.
13. a) 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)
- b) Explain the heat treatment processes for carbon steels and titanium alloys. What are the benefits and disadvantages of heat treatment ?
14. a) What is a cermet ? Discuss the various qualities and applications of cermets and give an example of how a cermet is manufactured. (5)  
(OR)
- b) 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)
15. a) 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 ? (8)  
(OR)
- b) i) Briefly explain material fatigue and the S-N curve. (5)  
ii) List the different mechanical and thermal properties of a high temp. materials and explain the variation of these properties at elevated temperatures. (8)

PART - C

(1×15=15 Marks)

16. a) Compare the density and mechanical properties of a few different aluminium alloys, titanium alloys and composite materials used for aerospace structural application. (15)  
(OR)
- b) 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. (15)