

AE8007 AIRCRAFT MATERIALS

DETAILED SYLLABUS

OBJECTIVE:

- To study the types of mechanical behaviour of materials for aircraft applications.

UNIT I ELEMENTS OF AEROSPACE MATERIALS

Structure of solid materials – Atomic structure of materials – crystal structure – miller indices – density – packing factor – space lattices – x-ray diffraction – imperfection in crystals – physical metallurgy - general requirements of materials for aerospace applications

UNIT II MECHANICAL BEHAVIOUR OF MATERIALS

Linear and non-linear elastic properties – Yielding, strain hardening, fracture, Bauehinger's effect – Notch effect testing and flaw detection of materials and components – creep and fatigue - comparative study of metals, ceramics plastics and composites.

UNIT III CORROSION & HEAT TREATMENT OF METALS AND ALLOYS

Types of corrosion – effect of corrosion on mechanical properties – stress corrosion cracking – corrosion resistance materials used for space vehicles heat treatment of carbon steels – aluminium alloys, magnesium alloys and titanium alloys – effect of alloying treatment, heat resistance alloys – tool and die steels, magnetic alloys,

UNIT IV CERAMICS AND COMPOSITES

Introduction – powder metallurgy - modern ceramic materials – cermets - cutting tools – glass ceramic –production of semi-fabricated forms - plastics and rubber – carbon/carbon composites, fabrication processes involved in metal matrix composites - shape memory alloys – applications in aerospace vehicle design, open and close mould processes.

UNIT V HIGH TEMPERATURE MATERIALS CHARACTERIZATION

Classification, production and characteristics – methods and testing – determination of mechanical and thermal properties of materials at elevated temperatures – application of these materials in thermal protection systems of aerospace vehicles – super alloys – high temperature material characterization.

TEXT BOOK

1. Titterton. G., "Aircraft Materials and Processes", V Edition, Pitman Publishing Co., 1995.

REFERENCES

1. Martin, J.W., "Engineering Materials, Their properties and Applications", Wykedham Publications (London) Ltd., 1987.
2. Raghavan. V., "Materials Science and Engineering", Prentice Hall of India, New Delhi, 1993.
3. Van Vlack. L.H., "Materials Science for Engineers", Addison Wesley, 1985.