Code.No: 07A72112 | R07 | SET-1

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
PROPELLANT TECHNOLOGY
(AERONAUTICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
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1.a) How the liquid propellants are classified and explain about oxygen-Hydrogen system used in practice?
b) What are the various physical & chemical properties of liquid propellants used and compare them. Explain about high performance, high content of chemical energy per unit of liquid propellant. [8+8]

2.a) Describe the economic & performance factors to be considered in the selection of liquid propellants.
b) What are the advantages of low freezing point, High specific gravity & stability of liquid propellants used in practice? [8+8]

3.a) What are the advantages of finding ignition, combustion and flame properties of liquid propellants?
b) What are the advantages & disadvantages of gelled propellants over liquid propellants? [8+8]

4.a) Describe about detonation and deflagration as applied to solid propellants.
b) Describe the characteristics & applications of Ammonium perchlorate-Aluminum-polyurethane as solid propellant. [8+8]

5.a) Explain about aging & useful life and mention the effect of propellants on them.
b) What are the various ingradients used in propellants and explain the composition in Double base (DB) and composite modified Double base (CMDB) propellants and their effect on the performance? [8+8]

6.a) Describe various cryogenic propellants used in practice mentioning their relative properties & applications.
b) How liquid Hydrogen is produced mention its relative advantages & limitations? [8+8]

7.a) Sketch and explain expansion engine and describe about Joule Thompson effect.
b) What are problems encountered in storing cryogenic propellants and describe the various precautions to be taken in handling of cryogenic propellants. [8+8]

8.a) Explain various tests made in the performance estimation of Helium3 & Helium4.
b) Sketch and explain the arc image furnace & mention various tests made on this. [8+8]

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IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
PROPELLANT TECHNOLOGY
(AERONAUTICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) What are the various properties to be considered in the selection of liquid propellants for Rockets?
b) Describe the characteristics & advantages of Aviation gasoline used in Rockets. [8+8]

2.a) How much will the worst combined changes in liquid propellant temperature effect the mass ratio?
b) Describe the ignition & combustion qualities of mono propellants used in Rockets. [8+8]

3.a) What should be the approximate percentage utilage volume for Nitrogen tetroxide tank when the vehicle is exposed to ambient temperatures?
b) What are the advantages of mixing small metallic fuel particles of beryllium and aluminum in liquid propellants? [8+8]

4.a) What are the characteristics of the solid propellant be considered in the selection for a particular Rocket?
b) Describe how the specific impulse and flame temperatures are depending on Nitroglycerine concentration of double base propellants. [8+8]

5.a) What are the advantages & disadvantages of metalized composites?
b) What are the composite propellants and explain the effect of Nitro glycerin (NG) on specific impulse and flame temperature? [8+8]

6.a) What are the methods used to produce low temperatures and explain the need of it?
b) Derive an expression to find the efficiency of a cycle used for cryogenic temperature applications. [8+8]

7.a) What are the various problems encountered in loading of low temperature liquids in to Rockets & their handling?
b) Sketch & explain the expansion engine and mention its applications. [8+8]

8.a) Describe the importance of thermo-gravimetric analysis of propellants and explain the method of analysis.
b) What are the various performance estimation tests done on propellants and explain about differential thermal analysis. [8+8]

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IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
PROPELLANT TECHNOLOGY
(AERONAUTICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) What are the various tests performed in finding the quality of liquid propellants used in Aviation vehicles?
b) Differentiate between Aviation Kerosenes and high flash point type of liquid propellants used in practice. [8+8]

2.a) What are the properties to be considered to improve ignition, combustion and flame propagation of liquid fuels?
b) What are the various additives used in altering and tailoring propellant properties of liquid propellants? [8+8]

3.a) Differentiate between Monopropellants and bi-propellant systems mentioning their advantages & limitations?
b) Describe about the advantages & applications of Hydrazine, Hydroxyl, Ammonium Nitrate as liquid propellants. [8+8]

4.a) What are the various properties to be considered in the selection of solid propellants for Rockets & Missiles?
b) What are the various ingredients used in double base propellants and mention their applications? [8+8]

5.a) What are the various ingredients present in composite propellants and explain their advantages?
b) What are the various oxidizers, metal fuels & binders used in composite fuel binders and mention their effects? [8+8]

6.a) What are the cryogenic propellants used in Rockets & Missiles and mention their relative advantages?
b) How the liquid Hydrogen is produced and mention its physical & chemical properties? [8+8]

7.a) What are the general problems occurred during loading of cryogenic propellants and how to overcome them?
b) What are the ideal cycles for cryo-systems and derive an equation for the efficiency of any one of the cycles? [8+8]

8.a) Describe the method of micro particle size using micro-merograph.
b) What are the various tests performed in ignitability tests of Liquid Hydrogen? [8+8]

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IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
PROPELLANT TECHNOLOGY
(AERONAUTICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
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1.a) What are the requirements of fuel oils and mention their properties?
b) Bring out the differences between Aviation gasoline and Aviation turbine fuels. [8+8]

2.a) Compare the advantages & limitations of liquid fuels of liquid Hydrogen and Nitrogen Tetroxide.
b) What are the various additives used to increase the efficiency & performance of liquid propellants? [8+8]

3.a) What are the advantages of mono propellants and explain about Hydrazine as mono propellant?
b) What are the rocket oxidizers and explain about liquid oxygen and Nitric acid as oxidizers? [8+8]

4.a) How the solid propellants are classified and mention their applications?
b) How the combustion temperature, molecular mass of the combustion gases, specific impulses depend on the oxidizer concentration? [8+8]

5.a) Differentiate between single base and double base propellants and mention their applications.
b) Specify various solid propellants which give high impulse, high burning rate, less smoke, low absorption and low hazard and mention their effects. [8+8]

6.a) How the liquid Hydrogen & Liquid Helium is manufactured and mention their properties & applications.
b) What is the need of liquid Nitrogen in Rockets & Missiles and mention its applications? [8+8]

7.a) Derive an equation for the efficiency of a cycle used on cryo systems.
b) How the low temperatures are obtained and explain the importance of using liquid Hydrogen & Oxygen. [8+8]

8.a) Describe about Differential thermal analysis used to evaluate the properties of propellants.
b) What are the various tests performed to evaluate the performance of propellants and explain about standard burner tests? [8+8]

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