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# B.Tech.(Aerospace Engg.) (2012 Onwards) (Sem.-4) AEROSPACE PROPULSION – I Subject Code : ASPE-207 M.Code : 71531

Time: 3 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

## **SECTION-A**

- 1) Answer briefly :
  - a. Name two types of gas turbine engines which primarily provides shaft power output.
  - b. Write trust equation for a jet engine which is operating at fully expanded nozzle condition.
  - c. How is an isentropic flow different from an adiabatic flow?
  - d. Define total pressure.
  - e. Which thermodynamic cycle does a gas turbine works on?
  - f. Write the relation for isentropic efficiency of a compressor.
  - g. Which thrust augmentation is utilized during take-off in hot weather?
  - h. Name any 4 categories of rocket engine types based on propellants.
  - i. What is uninstalled thrust?
  - j. What is the maximum achievable exit Mach number in convergent nozzle?



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#### **SECTION-B**

- 2) Obtain thrust equation for a rocket engine.
- 3) Mention the property variation across an oblique shock on a neat diagram.
- 4) For isentropic flow, obtain the relation for pressure ratio vs temperature ratio.
- 5) Show that the least pressure ratio required across a nozzle to reach sonic speed is 1.89.
- 6) Briefly explain about any two parameters affecting the takeoff thrust of an engine.

### **SECTION-C**

- 7) Classify aircraft engines based on their operational flight Mach no. and explain their limitations.
- 8) With neat diagram, explain the various configurations of solid propellant structures and state their advantages.
- 9) Explain the over expanded and under expanded rocket nozzle operating conditions with help of a neat diagram.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.