Code No: 45048 **R07** **Set No - 1**

III B.Tech I Semester Regular Examinations,Nov/Dec 2009
AEROSPACE PROPULSION-I
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. What are carbon deposits? Explain crucial role played by it on the performance of combustors. [16]

2. Air at 1.032 bar and 288 K enters an axial flow compressor stage with an axial velocity 150 m/s. There are no inlet guide vanes. The rotor stage has tip diameter of 60 cm and hub diameter of 50 cm and rotates at 100 rps. The air enters the rotor and leaves the stator in the axial direction with no change in velocity or radius. The air is turned through 30.2^0 as it passes through rotor. Assume a stage pressure ratio of 1.2. Assuming the constant specific heats and that the air enters and leaves the blade at the blade angles.
   (a) Construct the velocity at mean dia for this stage,
   (b) Mass flow rate,
   (c) Power required and.
   (d) Degree of reaction. [16]

3. Differentiate between impulse and reaction blading of an axial flow turbine. [16]

4. Discuss the nozzle performance with reference to nozzle performance variables and useful correlations. [16]

5. What is ram recovery point and enumerate its significance in subsonic inlets. [16]

6. A centrifugal compressor of 40.6 cm diameter revolving at 18000 rpm delivers air at an isentropic efficiency of)0.78. what would be the approximate pressure ratio expected if the machine was at 6000 m altitude where P_0 = 35 cm of Hg and T_0 = 248 K. Calculate the actual delivery temperature and the power required to deliver air at the rate of 0.5 kg/s. Neglect effects of inlet and exit velocities. [16]

7. Explain in detail the steps involved in the combustion of a liquid fuel in a gas turbine combustor. [16]

8. A diffuser on a Mach 2 aircraft operates with a standing normal shock outside of the inlet at STP. If the internal diffuser recovery factor is 0.90, what are the diffuser exit total pressure and total pressure recovery from the free stream to the diffuser exit? [16]

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