

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
AERO SPACE PROPULSION -I
 (AERONAUTICAL ENGINEERING)

MAY 2005

TIME - 3 HOUR
 MARK - 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Discuss the salient features of blade element theory as applied to the analysis of propellers.
 (b) Explain the combustion process taking place in a piston engine. [8+8]
2. (a) Explain the term 'knocking'. How will you take care of it? [8+8]
 (b) What do you understand by Direct and Fuel injection carburetion? Which one is advantageous and why?
3. (a) Explain and derive the condition for free vortex design for axial flow compressor.
 (b) Explain the axial compressor characteristics with the help of sketches. [8+8]
4. (a) How compressibility affects the performance of axial flow compressor. [8+8]
 (b) How do you classify combustion chambers. Briefly explain the factors affecting the design of a combustion chamber.
5. The following design data apply to a double sided centrifugal compressor. Outer diameter of impeller = 50 cm Speed = 270 rev/s
 Mass flow = 16 kg/sec
 Inlet temperature = 288 k
 Inlet pressure = 1.01 bar
 Isentropic efficiency of impeller only = 0.90
 Radial gap of vaneless space = 4 cm
 Axial depth of vaneless space = 5 cm
 Slip factor = 0.9
 Power input factor = 1.04
 (a) Calculate the stagnation pressure and temperature at outlet of impeller, as suming no pre-whirl.
 (b) Show that the radial outlet velocity at the impeller tip is about 96 m/s and hence find the mach number and are leaving at the impeller tip (thickness of impeller disc may be neglected). [8+8]
6. (a) Draw and explain briefly the velocity triangles throught a stage of an axial flow turbine.
 (b) Compare axial flow compressor with axial flow turbine. [8+8]
7. (a) How will you choose the profile of a turbine blade. Explain briefly.
 (b) Explain briefly the airflow through a single stage centrifugal compressor. [8+8]
8. Write short note on any FOUR of the following:-
 (a) Multispool engines
 (b) Flame stabilization
 (c) Surging in compressor
 (d) Comparison of two stroke and four stroke engine [4*4]