Code No: 45048 **R07** **Set No - 4**

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. (a) Discuss significance of starting and stability characteristics on the performance of an inlet.
   (b) Discuss significance of life, cost and reliability characteristics on the performance of inlets. [8+8]
2. Discuss significance of boundary layer bleed flow on the performance of supersonic inlet. [16]
3. Enumerate and discuss briefly the effect of four operating variables on burner performance. [16]
4. Explain in detail the process of ignition occurring inside a combustion chamber. [16]
5. Discuss in detail fluid flow through a rotor blade and the nomenclature associated with it? [16]
6. Enumerate the significance of local angularity coefficient on the performance of nozzle with suitable plot. [16]
7. (a) Determine the slip factor in a single-sided centrifugal compressor fitted in the aircraft flying with a speed of 230 m/s at an altitude where the pressure is 0.25 bar and the static temperature is 22o K. the mean dia of the eye is 25.5 cm and the impeller tip dia is 54 cm. rotational speed of the compressor is 16,000 rpm and the inlet duct of impeller eye contains fixed vanes which gives the air pre-whirl of $65^0$with respect to the pre-whirl speed at allradii. Stagnation pressure at compressor outlet is 1.75 bar. Take the power input factor as 1.04 and isentropic efficiency as 0.8.
   (b) Derive Stanitz's formula for slip factor. [8+8]
8. Explain the three-dimensional flow in axial flow compressor and derive the free-vortex condition. What does free vortex condition signify? [16]

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