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BAS-016

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00816 **December, 2014**

BAS-016 : PROPULSION – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Use of Steam table and Mollier chart is allowed.*

1. (a) Show, by deriving the suitable expressions, that the divergent portion of a nozzle is necessary to produce supersonic velocity when flow of steam takes place in a nozzle isentropically and under steady conditions. 7

(b) What is supersaturated flow and what are its effects ? 7

2. (a) Discuss the combustion process in combustion chamber of jet engine. 7

(b) Differentiate between the characteristics of a Turbo prop and Turbo jet engine. 7

3. (a) Why is there a need of blade cooling ? Discuss the mechanism. 7

(b) A turbine is running at 1800 rpm, the available enthalpy for an expansion is 55·2 kJ/kg. If the mean diameter of the rotor in the expansion is 81·5 cm, calculate the number of rows of moving blades necessary in the expansion, given that the stage efficiency = 0·8, blade outlet angle = 20° and speed ratio = 0·7. *7*

4. (a) Discuss the working of an axial flow compressor with the help of T-S diagram. *7*

(b) Discuss the physical meaning of Euler's equation. *7*

5. Design a centrifugal compressor for the following data :

m =15 kg/s, r_p = 4·5, N = 16,000 rpm

P_{01} = 1·013 bar, T_{01} = 300 K, where the symbols have their usual meanings. *14*

6. (a) Describe the turbofan cycle. How can this cycle be optimized ? *7*

(b) Discuss the cooling system of jet engine. *7*

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Ignition system

(b) Turbine performance

(c) Degree of reaction

(d) Ramjet engine

(e) Flame stability

(f) Effect of back pressure in nozzle