the total-to-static efficiency. If, in addition, the exhaust velocity of the turbine is 160 m/s, determine the inlet total temperature.

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Printed Pages: 4

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012240 **Roll No.** | | | | | | | | | | |

B.TECH

Regular Theory Examination (Odd Sem - VII),2016-17

THERMAL TURBO MACHINES

Time : 3 Hours ***Max. Marks : 100***

Section - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

a. What is reheat factor in a multistage turbine?

b. Define Polytropic Efficiency?

c. Define Slip factor.

d. State some of factors that affect stage pressure ratio.

e. What are free vertex blades.

f. Define NPSH and its significance.

g. Why governing of steam turbine is done?

h. Define Degree of reaction.

i. State the requirements of efficient blade cooling in gas turbine.

j. Name some of the starting ignition system used in gas turbine.

Section - B

Note : Attempt any Five questions from this section.

(5×10=50)

2. Discuss cascade testing and curves.

3. Obtain the Euler's energy equation for turbo machines and state its relevance.

4. A Centrifugal compressor running at speed of 15000 rpm admits 25m^3/s air at static states 1 bar, 300 K and compresses adiabatically by the pressure ratio of 2, the air velocity at the inlet and radial velocity at the exit is same as 75m/s. The inlet and outlet impeller diameters are 60 cm and 80 cm, respectively. Considering the inlet to be axial, find the

a. blade angles at the inlet and outlet of the impeller

b. angle at which the air leave the impeller

c. impeller breadth at the inlet and exit

5. A compressor of axial flow type has air admission at 1.01 bar, 300 K for delivery at 800 mm water gauge and 320 K. If the air flow rate is 3 m^3/s, then find the mass flow rate, power required to run the fan and static efficiency. Take Cp = 1.005 kJ/kg K.

6. Explain the principle, construction and working of reaction turbine.

7. A three stage centrifugal pump has impellers 40 cm in diameter and 2 cm wide at outlet. The vaves are curved back at the outlet at 45° and they reduce the

circumferential area by 10%. The manometric efficiency is 90% and the overall efficiency is 80%. Determine the head generated by the pump, when running at 1000 rpm delivering 50 litres/second what should be the shaft power.

8. Describe about combustion chamber in which fuel is injected upstream of air for a gas turbine.

9. Explain the various criteria that is used in design with traditional materials.

Section - C

Note : Attempt any two questions from this section.

(2×15=30)

10. a. What is stalling in an axial compressor stage? How is it developed? **(7)**

b. Describe the criteria for the selection of material in turbo machines. **(8)**

11. a. Explain the different major parts of a steam turbine. **(9)**

b. State the various laws used in design of turbo machines. **(6)**

12. An axial flow turbine operating with an overall stagnation pressure of 8 to 1 has a polytropic efficiency of 0.85. Determine the total-to-total efficiency of the turbine. If the exhaust mach number of the turbine is 0.3, determine