

Roll No .....

**MMTP - 204**  
**M.E./M.Tech. II Semester**  
 Examination, June 2013  
**Steam and Gas Turbine**  
*Time : Three Hours*

Maximum Marks : 70

**Note :** 1. Attempt any five questions.  
 2. Assume any missing data suitably and state the same.

1. a) Explain the working of a single-stage impulse turbine. Sketch pressure and velocity variations along the axis of turbine. 7
- b) What is the principle of operation of steam turbine? Which type of turbine is used in most steam turbine power plant? 7
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2. The steam supply to a velocity-compounded impulse stage with two rows of moving blades is at 60 bar and 400°C. Find (a) the stage pressure (b) the diagram efficiency and (c) the power output from the following data -  
 Speed 50 rev/sec, mean diameter of blading 1.2m, steam flow 5 kg/sec, blade speed ratio 0.2 Nozzle efficiency 90%, nozzle angle 18°, exit angle 26°, 25° and 40° for the first moving fixed and second moving blades respectively. Velocity coefficient 0.86 of all blades. 20KW is used in disc friction and windage. 14
3. a) Discuss ideal regenerative cycle. Why ideal cycle is not possible in practice? 7

- b) Explain the term feed heaters and surface heaters with a neat sketches. 7
4. a) Why reheat cycle is not used for low pressure boilers? 7  
 b) List various advantages and disadvantages of reheating. 7
5. Sketch the mixed pressure turbine and explain its working. 14
6. a) Show that the propulsive efficiency of turbojet engine is given by  $\eta_p = \frac{2}{1 + \frac{V_j}{V_o}}$  where  $V_j$  is jet exit velocity and  $V_o$  is the velocity of the aircraft. 7
- b) Describe with a sketch a turbojet engine and explain its thermodynamic cycle. 7
7. In an open cycle gas turbine plant a two stage compressor with intercooler and regenerator is employed. The air is drawn in at a pressure and temperature of 1.01325 bar and 22°C. The pressure ratio at each stage is 3 and the isentropic efficiency of compressor is 82%. The effectiveness of intercooler is 78%. The maximum temperature in the cycle is 697°C. The gases are expanded in a turbine to 1.01325 bar. The effectiveness of regenerator is 78%. The isentropic efficiency of turbine is 80%. Determine the thermal efficiency of the plant. Take  $C_p = 1.005$  kJ/kgk and  $\gamma = 1.4$  14
8. Write short note on any two: 14  
 i) Heat Accumulators  
 ii) Governing of steam Turbine  
 iii) Representation of actual process on T-s and h - s diagram for regenerative cycle.