

Total No. of Questions :8]

[Total No. of Printed Pages :2

[2]

Roll No .....

**MMTP-204****M.E./M.Tech., II Semester****Examination, June 2017****Steam and Gas Turbine****Time : Three Hours****Maximum Marks : 70****Note :** i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Draw neat diagrams wherever required.

1. a) Briefly explain the reason for operating a steam power plant based on the Rankine cycles at extremely low condenser pressures.  
b) Draw velocity triangles for impulse turbines. Explain various energy losses in steam turbines.
2. a) What do you understand by the term "feed heaters"? Compare direct contact heaters and surface heaters.  
b) Define Inter-cooling and reheating in steam turbines. State their advantages.
3. a) Compare constant pressure and constant volume gas turbine cycles.  
b) Explain the recent trends in steam turbine sizes and specifications used in India.
4. a) Briefly discuss non reheating cycles. State advantages and disadvantages associated.  
b) Discuss mixed pressure turbines. State applications.
5. a) With neat sketch explain Pulse Jet Engine.  
b) Discuss various pressure losses in gas turbines.

MMTP-204

PTO

6. An Open cycle gas turbine power plant works on Brayton cycle in which the maximum pressure and temperature are limited to 5 bar and 900K. The pressure and temperature of the gas entering in to the compressor are atmospheric. Reheating is used at a pressure of 2.5 bar where are temperature of the gases is increased to its original temperature at turbine inlet. The air flow rate through the plant is 600 kg/min.

Calculate:

- a) Thermal efficiency of plant
- b) Plant capacity in MW. The exhaust pressure of the turbine is also 1 bar.

Assume isentropic compression and expansion.

Take  $C_p = 1 \text{ kJ/kg} \cdot \text{K}$  for air and gases C.V. of fuel = 40,000 kJ/kg.

7. A steam power plant operates on the generative Rankine cycle. Steam is initially superheated to 400°C at 40 bar and is expanded in a high pressure turbine to 5.5 bar. At this point some steam is bled off for use in an open feed water. The remaining steam is then expanded in a low pressure turbine to a condenser pressure of 0.02 bar. Illustrate the cycle on a T-S diagram and assuming 100% isentropic efficiency and that pumping work is negligible, determine the:
  - a) Steam bled off the turbine
  - b) Heat added to the boiler.
  - c) Network output.
  - d) Cycle efficiency
  - e) Boiler's steam generation rate per second given that the plant output is 100 MW.
8. Write short note on following (any two):
  - a) Practical Feed Heating Cycles.
  - b) Heat Accumulators.
  - c) Nozzle control governing
  - d) Constant volume cycles.

MMTP-204

\*\*\*\*\*