

Total No. of Questions : 12]

SEAT No. :

P1143

[Total No. of Pages : 2

[4659] - 501

**B.E. (Mechanical) (Semester - I)**  
**GAS TURBINES & JET PROPULSION**  
**(2003 Pattern)**

*Time : 3 Hours]*

*[Maximum Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Unit - I**

- Q1)** a) Discuss Fanno lines and Fanno relations for perfect gases. [10]  
b) Explain shocks in converging and diverging lines. [8]

OR

- Q2)** a) Explain the following terms. [10]  
i) Stagnation temperature and pressure  
ii) Mach number, Mach cone and Mach angle.  
b) Discuss operations of nozzles under varying pressure ratios. [8]

**Unit - II**

- Q3)** a) Derive expression of thermal efficiency of Brayton cycle of gas turbine. [6]  
b) Discuss Gas turbine with reheat and inter cooling. [10]

OR

- Q4)** a) Compare gas turbine with steam turbine. [6]  
b) Discuss gas turbine with intercooling and regeneration. [10]

**Unit - III**

- Q5)** Discuss choking and stalling characteristics of centrifugal and axial compressors. [16]

*P.T.O.*

OR

**Q6)** Write short notes on the following :

- a) Slip factor.
- b) Prewhirl losses and
- c) Surging for centrifugal compressors.

**SECTION - II**

**Unit - IV**

- Q7)** a) What do you understand by blade and stage efficiency? Derive an expression for blade efficiency for simple impulse turbine. [10]
- b) Explain briefly the performance graphs of a reaction turbine. [8]

OR

- Q8)** a) Discuss compounding of multistage impulse turbine with the help of neat diagrams. [10]
- b) Discuss losses in impulse turbines. [8]

**Unit - V**

- Q9)** a) Explain in detail combustion theory applied to a gas turbines combustion system. [8]
- b) Describe briefly the factors affecting the combustion chamber design. [8]

OR

- Q10)** Write short notes on : [16]
- a) Flame tube cooling
  - b) Fuel injection
  - c) Ignition
  - d) Fuel
  - e) Pollution

**Unit - VI**

- Q11)** a) Explain clearly the various efficiencies associated with a propulsion device. [8]
- b) Write a note on rocket propellants. [8]

OR

- Q12)** a) Write a short note on turbojet engines. [8]
- b) Write a short note on turboprop engines. [8]

