

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-V Examination-Nov/Dec.-2011

Subject code: 151906

Date: 03/12/2011

Subject Name: Conventional Power Engineering

Time: 2.30 pm -5.00 pm

Total marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) Describe a modern coal based thermal power plant , giving its layout, (7)
Inputs , outputs, various circuits and systems.
- (b) Explain the ideal and actual Brayton cycles with T-S diagrams. (7)
Derive expressions for air standard efficiencies for both cases.
- Q.2 (a) A gas turbine power plant operates between temperatures 15 C and (7)
1100 C . Calculate the following: (i) The optimum pressure ratio for
the cycle for maximum power output, (ii) Compressor work, Turbine
work, Shaft work and Work Ratio, and (iii) Plant efficiency.
Take for air , $C_p = 1.005 \text{ kJ/kg-K}$ and $k = C_p / C_v = 1.4$.
- (b) Explain the processes in simple Rankine Cycle on p-v and T- S (7)
diagrams and derive an expression for thermal efficiency.
Name the significant parameters to improve thermal efficiency
of the power plant.?
- OR
- (b) Explain the principle of conversion of nuclear energy into electrical (7)
energy in atomic power plant? Also, compare the merits and demerits
of nuclear power plants with the coal-based thermal power plants.
- Q.3 (a) What is governing of water turbines? Discuss briefly methods used (7)
in the governing of Pelton turbines.
- (b) What is compounding of steam turbines? Describe pressure-velocity (7)
compounding of steam turbines.
- OR
- Q.3 (a) List different systems used in the working of a diesel power plant. (7)
Describe with diagrams its (i) Lubrication System and (ii) Cooling System
- (b) Give classification of hydraulic turbines. Describe working of a Kaplan (7)
turbine with diagrams, showing its components and velocity triangles.
- (PTO)

Q.4 (a) Describe the significance of load curves in planning and determining the sizes of Units in power plants. Define base load, intermediate load and peak loads, with load curves. (7)

(b) Explain the working of open-cycle and closed – cycle gas turbine power plants with suitable diagrams. Which fuels can be used in these plants? (7)

OR

**Q.4 (a) Describe CANDU type nuclear reactor with the help of suitable diagram. (7)
Give names of various nuclear fuels used in nuclear power plants.**

(b) What are classifications of steam turbines ? Explain the working of Curtis type impulse turbine with suitable velocity diagrams. (7)

**Q.5 (a) A power plant has following annual factors: (7)
(i) Utilisation Factor = 0.60, (ii) Capacity factor = 0.50, (iii) Load factor = 0.70
It has peak load of 20000 kW.**

Find : (i) Annual energy generation, (ii) Reserve capacity, and (iii) Time period the plant was utilized in the year.

(b) What are advantages and disadvantages of diesel power plants over other types? Describe working of a diesel power plant with suitable diagrams. (7)

OR

(a) Define “degree of reaction” of steam turbines. Derive an expression for calculating degree of reaction in terms of velocities. Give a brief comparison of impulse and reaction steam turbines? (7)

**(b) Suppose you are Minister for Power in the Government of Gujarat. (7)
Discuss your plans to increase electric power generation in the State, taking into account the resources available within the State.**
