

II B.Tech II Semester Regular Examinations, Apr/May 2008

POWER SYSTEMS-I
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Draw the complete schematic diagram of a coal fired thermal power plant. Label each component. Discuss briefly the function of each component. [16]
2. (a) What are the functions of moderator and control rods in a nuclear power plants.
(b) Distinguish between thermal and fast reactors. Classify each according to moderator, coolant and fuel utilized. [8+8]
3. (a) Distinguish between primary and secondary distribution systems with suitable examples.
(b) A 2-wire DC distributor AB, 600m long as loaded as under:

Distance from A (mts) :	150	300	350	450
Loads (Amps) :	100	200	250	300

The feeding point A is maintained at 440V and that of B at 430V. If each conductor has a resistance of 0.01Ω per 100m, calculate

 - i. the currents supplied from A to B
 - ii. the power dispatched in the distributor. [8+8]
4. A three-phase distribution system power is supplied at 11 kV (line voltage) and balanced load of 50 A/phase at 0.8 lagging p.f and 70 A at 0.9 lagging p.f are taken at Q and R respectively. The impedance of the feeders are $PQ = (5+j9)\Omega$, $QR = (6+j10)\Omega$ and $RP = (4+j8)\Omega$. Calculate the voltage at Q and R and the current in each branch. Power factors are assumed with respect to voltage at P. [16]
5. Briefly discuss the classification of substations. [16]
6. (a) Why Voltage control and p.f. correction are necessary in power systems? What are the disadvantages of low voltage and low p.f. of the system
(b) A 400V, 50 cycles, three phase line delivers 207 kW at 0.8 p.f.(lag). It is desired to bring the line p.f. to unity by installing shunt capacitors. Calculate the capacitance if they are
 - i. star connected
 - ii. delta connected. [8+8]
7. (a) Define the following:
 - i. Connected load
 - ii. maximum demand

iii. demand factor.

(b) A power supply is having the following loads.

Type of load	Max.demand(KW)	Diversity of group	Demand factor
Domestic	15,000	1.25	0.7
Commercial	25,000	1.2	0.9
Industrial	50,000	1.3	0.98

If the overall system diversity factor is 1.5, determine

i. the maximum demand

ii. connected load of each type.

[8+8]

8. (a) Discuss the flat rate and block rate tariffs.

(b) A power station has an installed capacity of 20,000KW. The cost of the station is Rs. 1,200/kW. The fixed costs are 13% of the cost of investment on full load at 100% load factor, the variable costs of the station per year is 1.5 times the fixed costs. Assume that there is no reserve capacity of the plant and that are variable costs and proportional to energy production. Find the cost of generation per KWh at load factor of 100% and 20%. Comment on the results.

[8+8]
