

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. (a) What is meant by fire tube boilers and what are the types as well as demerits of fire tube boilers?
(b) Explain the super heater in thermal plants. [8+8]
2. (a) Discuss briefly the ratio-active pollution of environment by nuclear power plant.
(b) Describe the different types of fuels used in a nuclear power plant and discuss the problems of nuclear waste disposal. [6+10]
3. (a) Discuss the classification of distribution systems.
(b) A 300m ring distributor has loads as shown in figure 3b, where distances are in meters. The resistance of each conductor is 0.2Ω per Km and the loads are tapped off at points B, C and D as shown. If the distributor is fed at A at 240V, find voltages at B, C and D. [8+8]

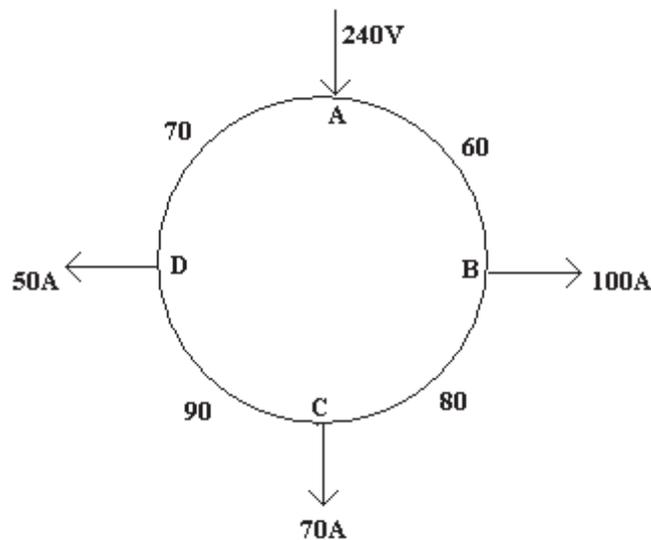


Figure 3b

4. A single phase line (ABC) of length 2 Km having resistance and reactance (go and return) as 0.06 and 0.1 ohms / Km. A is the feeding point, B is the mid point of the line taking a load of 100A at 0.9 p.f. leads and C is the far end taking a load of 120 A at UPF. The voltage at the 'C' is 230V. Find the voltage at the sending end and the phase angle difference between the voltages of two ends. If
(a) power factors of the loads are with reference to far end voltage

- (b) Power factors of the loads are with reference to the voltages at the load points. [8+8]
5. (a) Explain the main and transfer bus bar system with circuit diagram.
 (b) What is the difference between single bus bar with and without sectionalization arrangement? [8+8]
6. (a) What are the different methods used for voltage control of a power system?
 (b) A 12KV, 500KVA load is supplied at a p.f. of 0.8 lagging by a 3-phase transmission line whose voltage is to be maintained at 33 KV at both ends. Determine the capacity of the synchronous condenser to be installed for voltage regulation. Given that the line resistance and reactance per phase are 4Ω and 12Ω respectively. [8+8]
7. (a) Define the terms : plant capacity factor and plant use factor and explain their importance in an electric supply system.
 (b) A generating station has the following daily load cycle
- | | | | | | | |
|-------------|-----|------|-------|-------|-------|-------|
| Time(hrs) : | 0-6 | 6-10 | 10-12 | 12-16 | 16-20 | 20-24 |
| Load (MW) : | 40 | 50 | 60 | 50 | 70 | 40 |
- Draw the load curve and find
- maximum demand
 - units generated per day
 - average load and load factor. [8+8]
8. (a) Describe the desirable characteristics of a tariff.
 (b) A steam station with an installed capacity of 120 MW has the following data:
 Maximum demand = 100 MW; Average Load factor = 0.75
 Capital cost = Rs. 800/ kW installed
 Interest and depreciation = 12%
 Operational cost = Rs. 1×10^6 per annum.
 Maintenance cost ($\frac{2}{5}$ fixed, $\frac{3}{5}$ variable) = Rs. 6.5×10^5 p.a.
 Cost of fuel = Rs. 35 per metric ton
 Calorific value of fuel = 6,500 K. cal / kg
 Generator efficiency = 96% Thermal efficiency of turbine = 28% Boiler efficiency = 75% Overall thermal efficiency = 20%
 Determine the total fixed costs, total variable costs and the cost / kW generated. [8+8]
