R09

Code No: D0704

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
POWER SYSTEM RELIABILITY
(ELECTRICAL POWER SYSTEMS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1.a) Define LOLP and LOLE.
b) Explain how loss of load probability can be estimated using load duration curve.

2.a) A load is served by two independent transmission lines A and B under two-weather environment. Draw the state diagram and explain how the probability of failure of power supply to the load can be calculated.
b) Discuss various performance indices that are used for the composite system reliability analysis.

3. Consider the radial distribution system with circuit breaker, lateral distributor protection and disconnects as shown in figure 1.

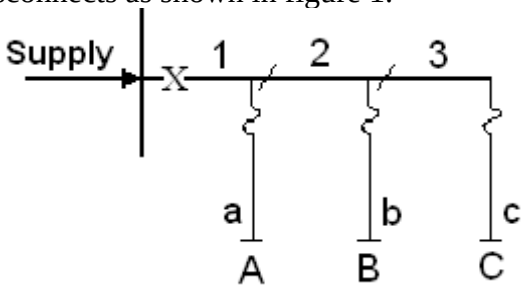

figure 1

The failure rates and repair times of various components and the number of customers and average load connected to each load point are given below:

Component	λ (f/yr)	r (hrs)
Section		
1	0.20	5
2	0.10	5
3	0.10	5
Distributor		
a	0.30	5
b	0.20	5
c	0.20	5

Load Point	Number of Customers	Average load connected (KW)
A	1000	5000
B	800	4000
C	700	3000

Evaluate the basic reliability indices and additional interruption indices for the system.

4. Write short notes on:
(a) Two weather environment - weighted average rate model.
(b) Decompositions method.

5. Develop the state space model of four identical units having capacity of 50 MW each and unavailability of 0.04. Mark the various transitional rates of combined capacity state model if failure rate of each unit is 0.4 failures/ year and 9.6 repairs per year. Hence evaluate the cumulative probability and cumulative frequencies of various combined capacity states.

6.a) Explain the concept and evaluating techniques of probabilistic array method.

b) Explain the factors effecting the emergency assistance available though inter connections.

7.a) Explain the concept of modified PJM method and write advantages over original PJM method.

b) Illustrate the need to consider short circuits and their effect on subsequent switching in substations.

8.a) Explain how loss of load probability can be estimated using Load duration curve.

b) The daily peak distribution of load is described by the relative frequency diagram shown in Figure 2. Consider that there are three units of 20 MW each and one unit of 40 MW, each having a forced outage Rate of 0.04. Compute the loss of load probability of the system.

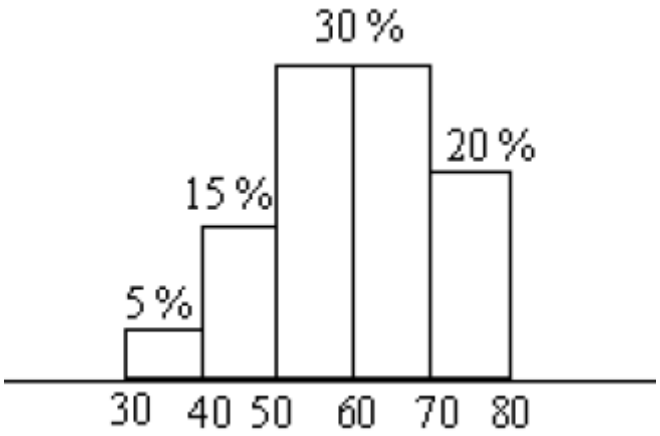

Figure 2

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