M.E. (Electrical) 2nd Semester Final Examination 2014

Power System Planning

(EE 1020)

Time: 3 Hrs. **Full Marks**: 70

Two marks are reserved for neatness in each group

GROUP-A

Answer any FOUR questions.

1. a) What do you mean by Power System Planning? Clarify power system planning activities with reference to different time horizons.
   b) Are the planning activities in a developing countries depend on economic policy of the county or some other factors? Name some important restrictions imposed on electrical power industries. [2+2+4 +3]

2. What are the costs involved in Generation Planning. Draw the flow chart of cost evaluation techniques. [7 +4]

3. a) What is meant by Mixed Economy ? State the framework of Mixed Economy. State the planning process followed in a Mixed Economy System.

   b) Why are various social instruments and measures set up in case of Mixed Economy? [(2 + 2 + 2) + 5]

4. Justify the use of BASE load, MID-RANGE and PEAK load units to meet the load demand.
   Explain the capacity Resource Planning. Give the flow chart. [6+3+2]

5. State the reasons of un-bundling of Indian electricity sector. State the status of Indian Power industries before and after reform. Justify the formation of Electricity Regulatory Commission (ERC). [4 +4+3]

6. State the importance of LOAD FORECASTING from planning point of view. Justify your answer with proper reasoning. What are the factors on which the installed capacity of a power system depends? [3+4+4]

GROUP-B

Answer any TWO questions

7.a) Explain the different type of outages in reliability analysis. [5]
   b) 'The hazard rate curve of many physical components is often referred to as a bath tub curve"- Justify the statement with proper explanations to the different regions of the curve. [6]

8.a) Explain the following terms in relation to a single component repairable system where the failure density function follows an exponential distribution.

i) MTTF ii) MTTR iii) MTBF
Why the numerical values of MTTF and MTBF are usually very similar? [4+1]

b) Draw the state space diagram for a two component repairable system. Write the state probabilities of the system by simple independent combinations. Hence show that for a two component series system $r_s \approx \lambda_1 r_1 + \lambda_2 r_2 / \lambda_s$ and for a two-component parallel system $\lambda_p \approx \lambda_1 \lambda_2 (r_1 + r_2)$. [*Symbols have their usual meanings*] [3+3]

9. Explain Continuous Markov Process in reliability analysis and use it to find out the probability of availability and non-availability of a single repairable component whose failure rate (λ) and repair rate (μ) are characterized by exponential distributions. [11]

10.a) Explain the need of power system load forecasting. What are the different classifications of load forecasting in terms of the planning horizon? What are the different categories of load forecasting techniques? [2+1+2]

b) "Electricity load pattern is principally a time series"- Justify the statement with proper explanation regarding decomposition of the series on four major components. Explain the ARIMA method of load forecasting technique. [3+3]

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