M.Tech.

POWER SYSTEM PLANNING

SUBJECT CODE :PEE - 523/ELE - 519 (Elective - IV)

Paper ID : [E0496]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours   Maximum Marks : 100

Instruction to Candidates:

1)   Attempt any **Five** questions.

2)   **All** questions carry equal marks.

Q1)   Discuss the importance of load forecasting in power system planning. Give salient features of various forecasting techniques. Which method of load forecasting would you suggest for long term and why? Discuss in detail.

Q2)   Formulate the optimal hydrothermal scheduling problem considering the inequality constraints on the thermal generation and water storage employing penalty functions. Find out the necessary equations and gradient vector to solve the problem.

Q3)   Give the concept of optimal unit commitment. Discuss the reliability based generation system. What is meant by unit maintenance schedules? How does the X/R ratio of a distribution line have a bearing on voltage regulation and losses?

Q4)   Consider the following three IC curves :

$$P_{G1} = -100 + 50 \, (IC)_1 - 2 \, (IC)_1^2$$
$$P_{G2} = -150 + 60 \, (IC)_2 - 2.5 \, (IC)_2^2$$
$$P_{G3} = -80 + 40 \, (IC)_3 - 1.8 \, (IC)_3^2$$

where ICs are in Rs/MWh and P_{GS} are in MW. The total load at a certain hour of the day is 400 MW. Neglect transmission loss and develop a computer programme for optimum generation scheduling within and accuracy of $\pm \, 0.05$ MW.

Q5)   Describe the importance and execution of transmission system planning on long term basis. How automatic transmission planning is realised using interactive graphics.

Q6) Explain the design philosophy for the selection of various types of busbar arrangements in sub-stations. Which arrangement will you select for a remote rural area sub-station supplying a 10 MVA load through two 33/11 kV transformers? Give complete justification for your answer.

Q7) State a few strategic goals for the power distribution vision for 2020 AD in India. Three loads each having an impedance of $20 + j15$ ohms, are connected in star to a 3-phase, 3-wire, 400 V, 50 Hz supply. Determine :

(a) Line current.

(b) Power supplied.

(c) Power factor.

(d) If 3 capacitors each of same capacitance are connected in delta at the load terminals, find the capacitance of each capacitor to obtain as resultant power factor of 0.95 lagging.

Q8) Write short notes on :

(a) Distribution automation.

(b) Design of distribution sub-station.

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