Code No: **R41024** **R10** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, March - 2017

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Draw incremental fuel cost curve and explain it. [8]

b) 150 MW, 220 MW and 220 MW are the ratings of three units located in a thermal power station. Their respective incremental costs are given by the following equations:

dc1/dp1 = Rs(0.11p1 + 12);

dc3/dp3 = Rs(0.1p3 + 13);

dc2/dp2 = Rs(0.095p2 + 14)

Where P1, P2 and P3 are the loads in MW. Determine the economical load allocation between the three units, when the total load on the station is

i) 350 MW

ii) 500 MW. [7]

2 a) Give algorithm for economic allocation of generation among generators of a thermal system taking into account transmission losses. Give steps for implementing this algorithm and also derive necessary equations. [7]

b) Discuss about the optimum generator allocation without line losses. [8]

3 a) Explain the hydro-thermal coordination and its importance. [7]

b) A two-plant system having a steam plant near the load centre and a hydro plant at a remote location. The load is 520MW for 15 hrs a day and 330 MW, for 9 hrs a day.

The characteristics of the units are

$C_1 = 120 + 45\, P_{GT} + 0.075\, P_{GT}^2$ Rs./hr

$w_2 = 0.6\, P_{GH} + 0.00283\, P_{GH}^2$ m^3/sec

Loss co-efficient, $B_{22} = 0.001\ MW^{-1}$

Find the generation schedule, daily water used by hydro plant and daily operating cost of thermal plant for γ_j =80 Rs./ m^3-hr [8]

4 a) Using dynamic programming method, how do you find the most economical combination of the units to meet a particular load demand? [7]

b) What do you mean by unit commitment problem and discuss various constraints related to UCP. [8]

5 a) Write the Necessity of keeping frequency constant in power system. [7]

b) Two power stations A & B are inter connected by tie line and an increase in load of 250 MW on system B causes a power transfer of 150 MW from A to B. When the tie line is open the frequencies of system A is 50 c/s and of system B is 49.5 c/s. Determine the values of K_A & K_B which are the power frequency constants of each generator. [8]

6 a) Obtain the dynamic response of load frequency controller with integral control action in two area load frequency control system. [7]

b) Two control areas connected by a tie line have the following characteristics.
Area 1 Area 2
R=0.01 pu R=0.02 pu
D=0.8 pu D=1.0 pu
Base MVA=2000 Base MVA=500
A load change of 100 MW (0.2 pu) occurs in area 1. What is the new steady state frequency and what is the change in the tie line. Assume both areas were at nominal frequency (60 Hz) to begin. [8]

7 a) Obtain an expression for steady state response of a load frequency controller with integral control. How it is different from without integral control. [7]

b) Discuss the merits of proportional plus integral load frequency control of a system with a neat block diagram. [8]

8 a) Explain about shunt and series compensation for transmission systems. [7]

b) The load at the receiving end of a three-phase, overhead line is 30 MW, power factor 0.85 lagging, at a line voltage of 33 kV. A synchronous compensator is situated at the receiving end and the voltage at both ends of the line is maintained at 33 kV. Calculate the MVAr of the compensator. The line has resistance 5 Ω per phase and inductive reactance (line to neutral) 20 ohm per phase. [8]