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

IV B.Tech I Semester Supplementary Examinations, November - 2016

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) Explain the following terms with reference to power plants:
Heat input – power output curve, Heat rate input, Incremental input, Generation cost and Production cost. [8]

b) A power system consists of two 100MW units whose input cost data are represented by equations below
$C1 = 0.04\ P1^2 + 22P1 + 800$ Rs/hr
$C2 = 0.045\ P2^2 + 15P2 + 1000$ Rs/hr
If total received power PR = 150 MW. Determine
i) The load sharing between units for most economic operation
ii) The corresponding costs of operations. [7]

2 a) Give various uses of general loss formula and state the assumptions made for calculating Bmn coefficients. [8]

b) The incremental fuel cost for two plants are
dC1 /d PG1 = 0.075 PG1 + 18 Rs./MWh
dC2 / d PG2 = 0.08 PG2 + 16 Rs./MWh
The loss coefficients are given as
B11=0.0015/MW, B12 = -0.0004/MW and B22= 0.0032/MW for λ=25 Rs./MWh.
Find the real power generations, total load demand and the transmission power loss. [7]

3 a) Describe the objective function to minimize the cost of generation of hydro thermal scheduling. [7]

b) Explain the short term Hydro-thermal scheduling problem with necessary expressions. [8]

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4 a) Explain the priority list method of solving unit commitment Problem. State merits and limitations of this method. [8]

b) Explain the Forward Dynamic Programming method of solving unit commitment problem with neat flow chart. [7]

5 a) A 100 MVA Synchronous generator operates at 50 Hz, runs at 3000 rpm under no load. A load of 25 MW is suddenly applied to the machine. Due to the time lag in the governor system the turbine commences to open after 0.6 sec. Assuming inertia constant H= 5 MW- sec per MVA of generator capacity, calculate the frequency of the system before steam commences to increase to meet the new load. [7]

b) Explain the dynamic response of single area load frequency control. [8]

6 a) Briefly explain the various frequency control strategies used to regulate the power system frequency. [7]

b) Two control areas have the following characteristics:
Area-1: Speed regulation = 0.02 pu
Damping coefficient = 0.8 pu
Rated MVA = 1500
Area-2: Speed regulation = 0.025 pu
Damping co-efficient = 0.9 pu
Rated MVA = 500
Determine the steady state frequency change and the changed frequency following a load change of 120MW occurs in area-1. Also find the tie-line power flow change. [8]

7 A power system consists of two 100MWunits whose input cost data are represented by equations below
C1 = 0.04 P_1^2 +22P1+800 Rs/hr
C2 = 0.045 P_2^2 +15P2 +1000 Rs/hr
If total received power PR = 150 MW. Determine
(a) The load sharing between units for most economic operation
(b) The corresponding costs of operations. [15]

8 a) What is load compensation? Discuss objectives of compensation in power system. [7]

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