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

IV B.Tech I Semester Supplementary Examinations, February/March - 2018
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) Define the following
   i) Heat rate curve,
   ii) Cost curve
   iii) Production cost   [6]

   b) Three power plants of a total capacity of 425 MW are scheduled for operation to supply a total load of 310 MW. Determine the optimum generation scheduling if the plants having the following characteristics

   $$\frac{dC_1}{dP_1} = 30 + 0.15P_1, \ 25 \le P_1 \le 125; \quad \frac{dC_2}{dP_2} = 40 + 0.2P_2, \ 30 \le P_2 \le 100$$

   and $\frac{dC_3}{dP_3} = 15 + 0.18P_3, \ 50 \le P_3 \le 200$.   [9]

2 A system having two plants 1 and 2 connected to buses 1 and 2 respectively as shown in below figure 2. There are two loads and a network of four branches. The ref bus with a voltage of $1.0\angle 0^o$ p.u is shown on the diagram. The branch currents and impedances are :

   $I_a = 3 - j\,0.8$ p.u. $Z_a = 0.01 + j\,0.03$ p.u
   $I_b = 1.2 - j\,0.3$ p.u $Z_b = 0.015 + j\,0.06$ p.u.
   $I_c = 1 - j\,0.2$ .u. $Z_c = 0.01 + j\,0.04$ p.u.
   $I_d = 2.6 - j\,0.9$ p.u. $Z_d = 0.01 + j\,0.04$ p.u

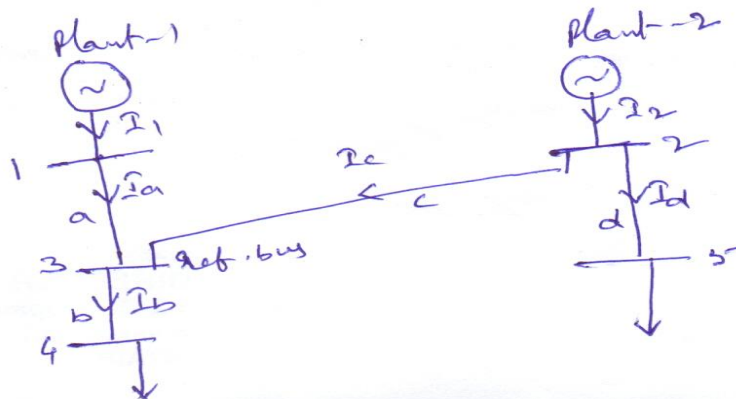
Figure 2

Determine the B- coefficients of the system.   [15]

3 a) What is the need of hydro –thermal coordination?   [5]

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b) A load is feeded by two plants, one is thermal and other is a hydro plant. The load is located near the thermal plant. The characteristics of the plants are

$F_T = 0.04P_T^2 + 30P_T + 20$ Rs/hr , $w_H = 0.0012P_H^2 + 7.5P_H$ m^3/Sec

$\gamma_H = 2.5 \times 10^{-3}$ Rs/m^3 and $B_{22} = 0.0015$ (MW)$^{-1}$

Find the power generation of both plants and load connected, when λ = 25 Rs./ MWh.   [10]

4 a) Explain the constraints for Unit Commitment solution method.   [10]
   b) What are the advantages of dynamic programming method?   [5]

5 a) Describe the necessity of keeping frequency constant.   [5]
   b) Obtain the mathematical modeling of speed governing system.   [10]

6 a) Obtain the mathematical modeling of tie line power in an interconnected system and its block diagram.   [8]
   b) Two generating stations A and B have the capacities 400MWand 700MW respectively are inter-connected by a short line. The percentage speed regulations from no-load to full load of the two stations are 2 and 3 respectively. Find the power generation at each station and power transfer through the line if the load on bus of each station is 200MW.   [7]

7 Explain the combined load frequency control and economic dispatch control with neat block diagram.   [15]

8 a) What are the advantages and disadvantages of different types of compensating equipment for transmission systems?   [8]
   b) What is the need of flexible alternating current transmission system in now a days?   [7]