Code No: **R1641023** **R16** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Jan/Feb - 2022

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) Write the significance of the daily load curve? [3]
   b) Write short notes on the Run-off river plant. [3]
   c) List out the solution methods of unit commitment problem. [2]
   d) Write the role of kinetic energy in the load frequency control. [2]
   e) Write short notes on the power pool operation. [2]
   f) Write about the need of FACTs controllers. [2]

PART–B *(4x14 = 56 Marks)*

2. a) Explain how the incremental fuel cost curve is derived from input output curves. [7]
   b) The cost curves of two generators are approximated by following second order polynomials: [7]
   $C_1=0.2P_{G1}^2+22\ P_{G1}+\alpha_1$ and $C_2= 0.2P_{G2}^2+32\ P_{G1}+\alpha_2$. Where $\alpha_{1\ and}\ \alpha_2$ are constants. If the total demand on the generators is 220MW, find the optimum generator settings? How many rupees per hour would the operator will lose if the generators were operated about 12% of the optimum settings.

3. a) Explain in detail about the static and dynamic optimization problems of hydro thermal system. [7]
   b) Discuss about the general mathematical formulation of long term hydro thermal scheduling. [7]

4. a) Discuss in detail about the differences between unit commitment and economic load dispatch problems. [7]
   b) Compare the priority list scheme and shut down sequence with an example. [7]

5. a) Draw and explain the load-speed characteristics of governor with steam turbines. [7]
   b) Explain the steady state analysis of single area with speed changer position as constant? [7]

6. a) Derive the composite block diagram of two area power system. [7]
   b) Two inter connected area-1 and area-2 have capacity of 2000MW and 550MW respectively. The incremental regulation and damping torque coefficient for each area on its own base are 0.4 and 0.8 p.u respectively. Find the steady state change in system frequency from a nominal frequency of 50Hz and the change in steady state tie line power following a 740MW change in the load of area-1. [7]

7. a) Draw and explain the circuit model and phasor diagram of un compensated system? [7]
   b) A 44.7kW induction motor has a power factor of 0.75 and efficiency of 0.88 at full load, power factor of 0.4 and efficiency of 0.5 at one fourth load. At no load the current is 10% of the full load current and power factor of 0.2. The compensators are used to make the line power factor 0.7 at half load. With the inclusion of the compensating devices, find the line power factor at full load and at no-load? [7]