BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH. **SEMESTER: II**
BRANCH: EE **SESSION: SP/2025**

SUBJECT: EE565 POWER SYSTEM OPERATION AND CONTROL

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Define the operating states of a power system? Draw the state transition diagram and explain the different operating states for five states model. Differentiate between power system state and operating state of power system.	[5]	1	2
Q.1(b)	With proper block diagrams describe the different restructuring models framed based on energy trading. Compare the pool model and bilateral dispatch model.	[5]	5	2,3
Q.2	A small system consists of 4 identical 500 MVA generating units feeding a total load of 1020 MW. The inertia constant H of each unit is 5.0 on 500 MVA base. The load varies by 1.5 % for a 1 % change in frequency. When there is a sudden drop in load by 20 MW, (i) determine the system block diagram with constant H and D expressed on 2000 MVA base. (ii) Find the frequency deviation, assuming that there is no speed-governing action.	[10]	2	3,4
Q.3(a)	Describe the droop characteristic of a governor. With proper droop characteristics analyze the load sharing between two generators with drooping governor characteristics as 2.4 Hz/pu MW and 3.5 Hz/pu MW.	[5]	2	2,4
Q.3(b)	Explain the basic principle of pool operation and the concept of control area as applicable to pool operation.	[5]	4	2
Q.4(a)	Bring out the difference between optimal operation of generators in thermal stations and optimal scheduling of hydro-thermal systems	[3]	3	5
Q.4(b)	The fuel cost curve of two generators are given as $C_1 = 625 + 35P_{G1} + 0.06P_{G1}^2$ $C_2 = 175 + 30P_{G2} + 0.005P_{G2}^2$ If the total load supplied is 550MW, find the optimal dispatch with and without considering the generator limits: $35\ MW \leq P_{G1} \leq 175\ MW$ $33\ MW \leq P_{G2} \leq 600\ MW$ And also comment about the incremental cost of both cases.	[7]	3	3,5
Q.5(a)	Why is the unit commitment problem important for scheduling thermal units? Compare the unit commitment problem with the economic load dispatch problem.	[5]	3	2,5
Q.5(b)	List the thermal unit constraints and hydro constraints considered for solving unit commitment problem, Why must the spinning reserve be maintained?	[5]	3	1,2

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