

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)
IV B.Tech II Semester Supplementary Examinations, May - 2024
POWER SYSTEM OPERATION AND CONTROL
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 hours

Max. Marks: 70 M

Answer ONE Question from each Unit
 All Questions Carry Equal Marks

Q. No.	Questions	BTL	CO	Marks
UNIT – I				
1.	a) The incremental costs in Rs. per. M.W.Hr. for two units in a plant are given by the $\frac{dF_1}{dP_1} = 1.0P_1 + 200 : \frac{dF_2}{dP_2} = 1.2P_2 + 160;$ Minimum and maximum generation on each unit are to be 20MW and 125MW respectively. Determine the economic allocation between the units for a total load of 150MW.	K3	CO1	7 M
	b) Draw and explain the characteristics between Btu/kWh verses power output of a thermal power station.	K2	CO1	7 M
OR				
2.	a) The fuel cost of two units are given as follows: $C1 = C1(PG1) = 1.1 + 28P_{G1} + 0.4P_{G1}^2 \text{ Rs./hr}$ $C2 = C2(PG2) = 1.7 + 38P_{G2} + 0.4P_{G2}^2 \text{ Rs./hr}.$ If the total demand on the generators is 220MW, find the economic load scheduling of the two units.	K4	CO1	7 M
	b) Derive transmission loss formula in terms of B- coefficients	K3	CO1	7 M
UNIT – II				
3.	a) Explain the importance of scheduling of hydro units in the hydro thermal systems.	K2	CO2	7 M
	b) Describe the priority list scheme of solution for unit commitment problem.	K2	CO2	7 M
OR				
4.	a) Describe the dynamic programming method of solution for unit commitment problem.	K2	CO2	7 M

	b)	Explain in detail about the startup cost consideration of unit commitment problem with an example?	K2	CO2	7 M
UNIT – III					
5.	a)	Obtain and explain the block diagram representation of a generator load model with necessary equations.	K3	CO3	7 M
	b)	Derive and explain the mathematical modelling of speed governing system with relevant equations.	K3	CO3	7 M
OR					
6.	a)	Obtain the block diagram of an isolated power system from governor, turbine and load models.	K3	CO3	7 M
	b)	Elaborate the incremental power balance of control area with necessary expressions.	K2	CO3	7 M
UNIT – IV					
7.	a)	Two inter connected area 1 and area 2 have the capacity of 2100MW and 528MW respectively. The incremental regulation and damping torque coefficient for each area on its own base are 0.3p.u and 0.7p.u respectively. Find the steady state change in the system frequency from a nominal frequency of 50Hz and the change in steady state tie line power following a 770MW change in the load of area 1.	K3	CO4	7 M
	b)	Explain in detail about the objective's procedure and outcomes of economic dispatch control.	K2	CO4	7 M
OR					
8.	a)	Describe and analyze the static response of two area system of controlled case with necessary equations.	K2	CO4	7 M
	b)	Analyze the power flow out from control area one of two control areas interconnected through tie line.	K4	CO4	7 M
UNIT – V					
9.	a)	Explain the objectives of load compensation.	K2	CO5	7 M
	b)	A 3 phase 50Hz, 440V motor develops 120HP, the power factor being 0.6 lagging and efficiency is 92%. A bank of capacitors is connected in delta across the supply terminals and the power factor is raised to 0.97 lagging. Each of the capacitance units is built of four similar 110V capacitors. Find the capacitance of each capacitor.	K3	CO5	7 M
OR					
10.	a)	Explain the characteristic features of various compensating equipment for the transmission lines.	K2	CO5	7 M
	b)	Analyze the power factor correction with the application load compensation.	K4	CO5	7 M