

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No. : 17343 S N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade

B.E. (E.E.E.) VII-Semester Supplementary Examinations, May/June-2023

Power System Operation and Control (PE-I)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What are Loss coefficients? Write the expressions for loss coefficients?	2	1	1	1,2,3,12
2.	What is incremental cost in economic load dispatch problem?	2	1	1	1,2,3,12
3.	Compare the economic load dispatch with unit commitment in power systems?	2	2	2	1,2,3,12
4.	What is spinning reserve?	2	1	2	1,2,3,12
5.	What the Tie-line Bias control?	2	1	3	1,2,3,12
6.	What is Automatic Voltage Regulator?	2	1	3	1,2,3,12
7.	Compare rotor angle stability from voltage stability in power systems?	2	2	4	1,2,3,12
8.	What is the significance of damping coefficient of generator in power systems?	2	2	4	1,2,3,12
9.	Discuss the disadvantages of low power factor in power systems?	2	2	5	1,2,3,12
10.	What are the advantages of FACTS controllers in power systems?	2	1	5	1,2,3,12
Part-B (5 × 8 = 40 Marks)					
11. a)	Explain the mathematical modeling of an economic load dispatch problem without considering transmission losses?	4	2	1	1,2,3,12
b)	The incremental fuel cost in rupees per MWh for a plant consisting of two units are: $\frac{dC_1}{dP_{G1}} = 0.2P_{G1} + 40$ $\frac{dC_2}{dP_{G2}} = 0.25P_{G1} + 30$ Assume that both units are operating at all times, and total load varies from 40 MW to 250 MW, and the maximum and minimum loads on each unit are to be 125 and 20 MW, respectively. Then, Calculate, (i) How will the load be shared between the two units as the system load varies over the full range? (ii) What are the corresponding values of the plant incremental costs?	4	3	1	1,2,3,12

12. a)	Discuss all the constraints required to be considered while solving the Unit Commitment (UC) problem?	3	2	2	1,2,3,12																													
b)	<table border="1"> <thead> <tr> <th rowspan="2">Unit</th> <th colspan="2">Capacity (MW)</th> <th colspan="2">Cost curve parameters (c=0)</th> </tr> <tr> <th>Min.</th> <th>Max.</th> <th>a (Rs/MW²)</th> <th>b (Rs/MW)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>12</td> <td>0.77</td> <td>23.5</td> </tr> <tr> <td>2</td> <td>1</td> <td>12</td> <td>1.6</td> <td>26.5</td> </tr> <tr> <td>3</td> <td>1</td> <td>12</td> <td>2</td> <td>30</td> </tr> <tr> <td>4</td> <td>1</td> <td>12</td> <td>2.5</td> <td>32</td> </tr> </tbody> </table> <p>From the generators given above, determine the most economical units to be committed for a load of 30 MW using Priority list method?</p>	Unit	Capacity (MW)		Cost curve parameters (c=0)		Min.	Max.	a (Rs/MW ²)	b (Rs/MW)	1	1	12	0.77	23.5	2	1	12	1.6	26.5	3	1	12	2	30	4	1	12	2.5	32	5	4	2	1,2,3,12
Unit	Capacity (MW)		Cost curve parameters (c=0)																															
	Min.	Max.	a (Rs/MW ²)	b (Rs/MW)																														
1	1	12	0.77	23.5																														
2	1	12	1.6	26.5																														
3	1	12	2	30																														
4	1	12	2.5	32																														
13. a)	Explain how the PI-controller will improve the system frequency variations in steady state with the help of block diagram?	5	4	3	1,2,3,12																													
b)	A 100 MVA synchronous generator operates on full load at frequency of 50Hz. The load is suddenly reduced by 50 MW. Due to time lag in governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time If H = 5 kW-sec/kVA of generator capacity.	3	3	3	1,2,3,12																													
14. a)	Explain how the swing equation is helpful in assessing the transient stability of power system, when there is a sudden change in the mechanical input?	5	3	4	1,2,3,12																													
b)	Explain how the voltage stability can be analyzed using P-V Curve?	3	3	4	1,2,3,12																													
15. a)	Explain the necessity for compensating the reactive power in a power system?	4	2	5	1,2,3,12																													
b)	Explain the operation of FACTS controllers: (i) TCSC and (ii) STATCOM?	4	1	5	1,2,3,12																													
16. a)	With a neat flow chart, explain the economic load dispatch problem considering transmission losses?	4	2	1	1,2,3,12																													
b)	Draw the flowchart of dynamic programming based optimal Unit Commitment problem?	4	3	2	1,2,3,12																													
17.	Answer any <i>two</i> of the following:																																	
a)	Develop Turbine speed-governing model for a load frequency control in a single-area system?	4	3	3	1,2,3,12																													
b)	Using Equal Area Criterion, obtain the expressions for critical clearing angle (δ_{cr}) and critical clearing time (t_{cr})?	4	2	4	1,2,3,12																													
c)	Explain the power factor improvement in power systems using static capacitor method with phasor diagram?	4	2	5	1,2,3,12																													

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	38.75%
iii)	Blooms Taxonomy Level - 3 & 4	41.25%