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PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations - March 2026

Date: 12- 03- 2026

Time: 09:30am - 11.00am

School: SOE	Program: B.Tech-EEE	
Course Code: EEE3025	Course Name: Power System Operation and Control	
Semester: VI	Max Marks:50	Weightage: 25%

CO - Levels	C01	C02	C03	C04	C05
Marks	26	24	-	-	-

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

5Q x 2M=10M

1	Explain the equal incremental cost criterion for generators.	2 Marks	L2	C01
2	A power station supplies 72,000 kWh of energy in 30 days. Maximum demand is 150 kW. Find the average load and load factor.	2 Marks	L3	C01
3	Explain diversity factor with proper example.	2 Marks	L2	C01
4	Illustrate the need for load-frequency control under varying load conditions.	2 Marks	L2	C02
5	An interconnected power system has an equivalent speed regulation of $Req = 3 \text{ Hz/pu MW}$. If a load increase of 0.15 pu occurs, determine the steady-state frequency deviation.	2 Marks	L3	C02

Part B

Answer the Questions.

Total Marks 40M

6.	a.	<p>Total load demand $P_D = \square\square\square$ MW</p> <p>Generator limits (MW):</p> $200 \leq P_1 \leq \square\square\square, \square\square\square \leq P_2 \leq \square\square\square, \square\square\square \leq P_3 \leq \square\square\square$ <p>Fuel cost functions (\$/h):</p> $C_1 = \square\square\square + \square.\square P_1 + \square.\square\square\square P_1^2$ $C_2 = \square\square\square + \square.\square P_2 + \square.\square\square\square P_2^2$ $C_3 = \square\square\square + \square.\square P_3 + \square.\square\square\square P_3^2$ <p>Find the output of the generators and incremental cost.</p>	10 Marks	L3	CO1																																	
b.		<p>Explain with the help of a neat block diagram the hierarchical control structure of a power system. Describe the functions of generating unit controls, system generation control, and transmission controls.</p>	10 Marks	L3	CO1																																	
Or																																						
7.	a.	<p>Explain the Energy Management System (EMS) used in power system operation with a neat block diagram.</p>	10 Marks	L2	CO1																																	
b.		<p>Determine the priority list method using full load average production cost for the data given below:</p> <table border="1" data-bbox="395 1328 1126 1536" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Unit No.</th> <th colspan="2">Loading Limits</th> <th colspan="3">Fuel Cost Parameter</th> <th rowspan="2">Fuel Cost (Ki)</th> </tr> <tr> <th>Min (MW)</th> <th>Max (MW)</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100</td> <td>400</td> <td>0.006</td> <td>7</td> <td>600</td> <td>1.1</td> </tr> <tr> <td>2</td> <td>50</td> <td>300</td> <td>0.01</td> <td>8</td> <td>400</td> <td>1.2</td> </tr> <tr> <td>3</td> <td>150</td> <td>500</td> <td>0.008</td> <td>6</td> <td>500</td> <td>1.0</td> </tr> </tbody> </table>	Unit No.	Loading Limits		Fuel Cost Parameter			Fuel Cost (Ki)	Min (MW)	Max (MW)	a	b	c	1	100	400	0.006	7	600	1.1	2	50	300	0.01	8	400	1.2	3	150	500	0.008	6	500	1.0	10 Marks	L3	CO1
Unit No.	Loading Limits			Fuel Cost Parameter			Fuel Cost (Ki)																															
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1	100	400	0.006	7	600	1.1																																
2	50	300	0.01	8	400	1.2																																
3	150	500	0.008	6	500	1.0																																
8.	a.	<p>Explain the schematic of load frequency control and excitation voltage regulators of a turbo generator and explain.</p>	10 Marks	L2	CO2																																	
b.		<p>Two thermal generating units are operating in parallel at 60 Hz to supply a total load of 700 MW. Unit 1, with a rated output of 600 MW and 4% speed-droop characteristic, supplies 400 MW, and Unit 2, which has a rated output of 500 MW and 5% speed droop, supplies the remaining 300 MW of load. If the total load increases to 800 MW, determine the new loading of each unit and the common frequency change before any supplementary control action occurs. Neglect losses.</p>	10 Marks	L3	CO2																																	

Or					
9.	a.	Explain with a block diagram the load frequency for a single/isolated area power system.	10 Marks	L2	CO2
	b.	<p>Two thermal generating units are operating in parallel at a nominal frequency of 50 Hz to supply a total load of 900 MW. Unit-1 has a rated capacity of 700 MW with a 5% speed-droop characteristic and is initially supplying 500 MW. Unit-2 has a rated capacity of 600 MW with a 4% speed-droop characteristic and is initially supplying 400 MW. Suddenly, the total system load increases to 1050 MW. Determine:</p> <ol style="list-style-type: none"> 1. The change in system frequency before any supplementary control action takes place. 2. The new power output of each generating unit. 	10 Marks	L3	CO2