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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 8018**

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE / JULY 2024

Second Semester

Power Systems Engineering

P23PS205 – RESTRUCTURED POWER SYSTEM

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

**PART – A**

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	List out the characteristics of a monopoly system.	2	K1	CO1
2.	Define stranded cost. How it influences the profit in competitive markets?	2	K1	CO1
3.	What are the reasons for congestion in a power system network?	2	K2	CO2
4.	Summarize the steps involved in estimating available transfer capacity (ATC) of a power industry using rated system path(RSP).	2	K3	CO2
5.	List out the advantages of DCOPF for calculation of LMP.	2	K2	CO3
6.	Differentiate between FTR and FGR.	2	K2	CO3
7.	List the different ancillary services that are required under contingency conditions.	2	K1	CO4
8.	What are the constraints while designing pricing of transmission network?	2	K1	CO4
9.	Mention the responsibilities of PJM ISO to maintain the reliability of the transmission grid.	2	K1	CO5
10.	List the salient features of Electricity Act 2012.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Describe the need for deregulation of power systems.	7	K2	CO1
	ii. Discuss the various issues involved in Deregulation.	6	K2	CO1
(OR)				
b)	i. How power system market models are classified? Explain the theory related to any one model.	7	K2	CO1
	ii. Describe day ahead and hour ahead market operation.	6	K2	CO1
12. a)	Explain the following:			
	i. Market Approach to manage congestion.	7	K3	CO2
	ii. Congestion pricing methods.	6	K3	
(OR)				
b)	Explain in detail the objective, control variables and constraints during the formation of Intra Zonal Congestion sub-problem and discuss the status of inter zonal lines flow in to it.	13	K3	CO2
13. a)	i. Explain the fundamentals of deregulated Locational Pricing (LMP Marginal) in power system.	7	K2	CO3
	ii. Explain the following with suitable examples.	6	K3	CO3
	a. FTR auction.			
	b. FTR allocation.			
(OR)				

- b) In the Fig:1 shown below, a five bus system have five generators. The line data the system is given Table.1 The marginal cost of all generators are given Table.2. The loads are inelastic and are 300 MW each. Find LMP for all generators using DCOPF method. Assume 4<sup>th</sup> bus is reference. 13 K5 CO3

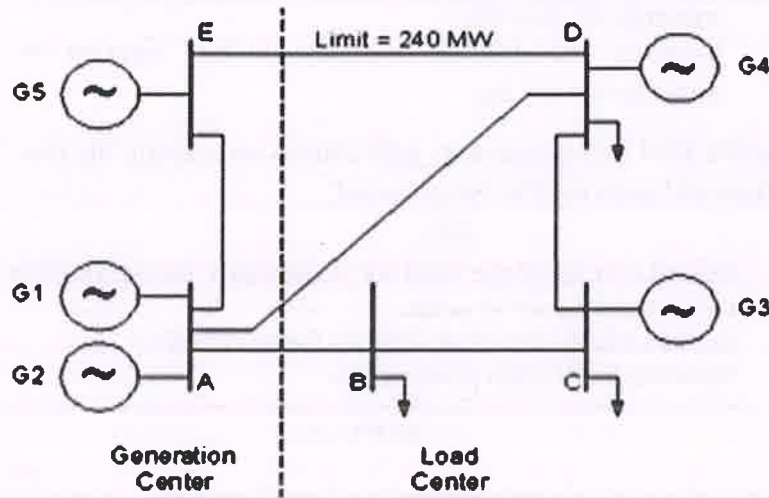


Fig: 1

Table:1

Line Data	A-B	A-D	A-E	B-C	C-D	D-E
R (%)	0.281	0.304	0.064	0.108	0.297	0.297
X (%)	2.81	3.04	0.64	1.08	2.97	2.97
Limit (MW)	999	999	999	999	999	240

Line data of 5 bus system

Table:2

Generator	Marginal cost(\$/Mw)
G1	14
G2	15
G3	30
G4	35
G5	10

14. a) i. Compare the role, response duration and response frequency of different types of ancillary services. 7 K2 CO4  
 ii. Explain in detail about the voltage control and reactive power support devices. 6 K1 CO4  
 (OR)
- b) i. Describe the philosophy rolled in pricing methods of transmission network. 7 K1 CO4  
 ii. Compare the different methods of loss location in transmission pricing. 6 K2 CO4
15. a) Describe PJM ISO interactions with entities and explain the two markets and tasks in PJM ISO proposal. 13 K4 CO5  
 (OR)
- b) i. Describe in detail the need for Availability Based Tariff in restructured power systems. 7 K3 CO5  
 ii. Explain briefly the future reforms for an effective framework of Indian power sector. 6 K3 CO5

PART – C

(1 x 15 = 15Marks)

- | Q.No.  | Questions  | Marks | KL | CO  |
|--------|--|-------|----|-----|
| 16. a) | For the following 3-bus system shown in Fig:2, answer the followings:<br>1. Define Herfindahl -Hirschman Index (HHI).<br>2. Estimate HHI in terms of percent basis and per unit basis for the following 3-bus system.<br>3. Maximum sharing of Generator-3 of total generation in percentage.<br>4. Analyse monopoly situation in this bus system. | 15    | K5 | CO1 |

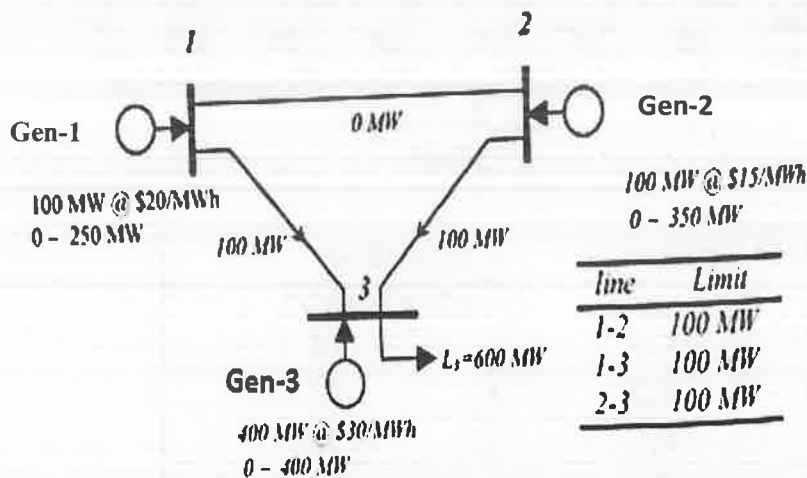


Fig:2  
 (OR)

- b) For the TTC values and directions given in Fig:3 estimate the ATC values for the initial line, path reservations and path ATC for the following.

ATC 1 → 2

ATC 3 → 1

ATC 4 → 1

ATC 4 → 2

ATC 4 → 3

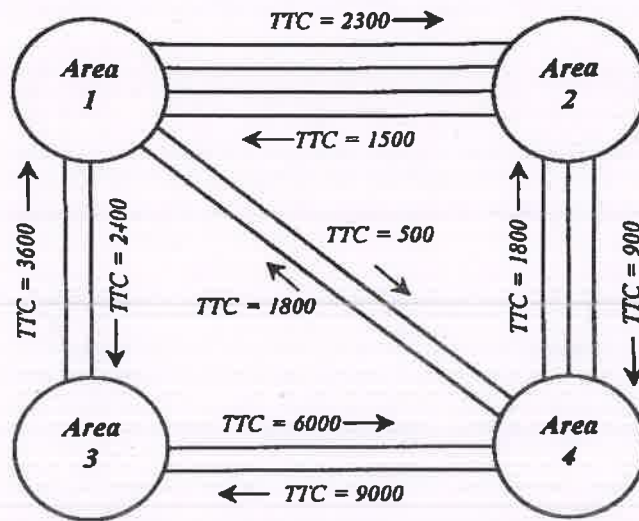


Fig:3