SRM VALLIAMMAI ENGINEERING COLLEGE

(An autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

ME-POWER SYSTEM ENGINEERING -IISEM

1916204 -Restructured Power System

Regulation – 2019

Academic Year 2019 – 20

Prepared by

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SUBJECT : 1916204-Restructured Power System

SEM / YEAR: ME-PSEE-IISEMESTER / ACADEMIC YEAR 2017-2018

UNIT I - INTRODUCTION TO RESTRUCTURING OF POWER INDUSTRY

Introduction: Deregulation of power industry, Restructuring process, Issues involved in deregulation, Deregulation of various power systems – Fundamentals of Economics: Consumer behaviour, Supplier behaviour, Market equilibrium, Short and long run costs, Various costs of production – Market models: Market models based on Contractual arrangements, Comparison of various market models, Electricity vis – a – vis other commodities, Market architecture, Case study.

PART – A

Q.No	Questions	BT Level	Competence
1	Define deregulation	BT1	Remember
2	What is meant by day ahead market	BT2	Understand
3	What is elastic demand	BT1	Remember
4	Differentiate Total utility and marginal utility	BT5	Understand
5	What is meant by market clearing price	BT1	Remember
6	What is the difference between consumer behaviour and supplier behaviour	BT3	Apply
7	What is the difference between PoolCo model and Bilateral Contract Model	BT1	Remember
8	How are short and long run cost define	BT4	Analyze
9	List out characteristics of monopoly system	BT1	Remember
10	How restructured power system differ from monopoly system.	BT4	Analyze
11	Enumerate the need for restructuring	BT3	Apply
12	Discuss about spot market.	BT2	Understand
13	Differentiate mean elastic and inelastic market in deregulation.	BT2	Understand
14	What is meant by global welfare	BT4	Analyze
15	List the different types of restructuring process.	BT1	Remember
16	What is meant by market power	BT2	Understand
17	Describe the different types of market model.	BT2	Understand
18	What is meant by discriminatory pricing and non-discriminatory pricing	BT6	Evaluate
19	Define market equilibrium	BT3	Apply
20	Point out unbundling in restructured power system.	BT1	Remember
	PART - B		
1	Explain briefly the necessity of restructuring in power industry for deregulated environment	BT2	Understand
2	Explain restructuring process with a neat block diagram of various entities involved in deregulation.	BT4	Analyze
3	Explain Short Run Production cost with suitable example in restructured power system	BT1	Remember
4	Explain Long run Production cost with suitable example in restructured power system	BT1	Remember

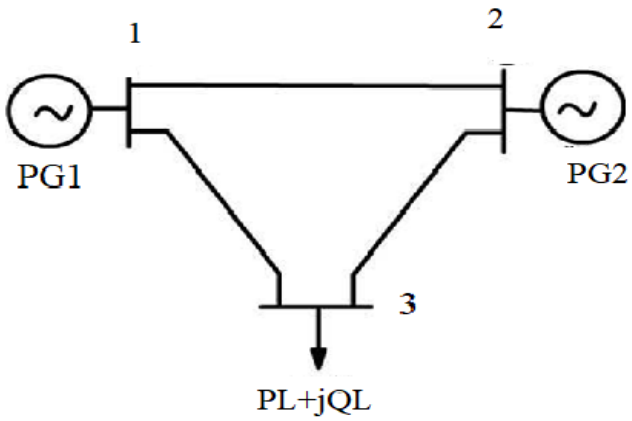
5	Explain different entities involved in deregulated electricity market with suitable block diagram	BT1	Remember
6	Compare various market models in restructured power system with clear explanations	BT4	Analyze
7	With suitable example explain supplier behaviour under deregulation environment	BT6	Create
8	(i) Describe the need for deregulation of various power system(7) (ii) Discuss the issue involved in Deregulation(6)	BT5	Evaluate
9	(i)How are market models classified? And explain the theory related to any one model(7) (ii) Bring the difference between various Market models(6)	BT2	Understand
10	(i) Explain Pool Co restructuring model(7) (ii) Describe day ahead and hour ahead market operation(6)	BT1	Remember
11	Explain with suitable example consumer behaviour under deregulation environment	BT3	Apply
12	(i) List restructuring is needed in power system with detail out(7) (ii) How consumer behavior is differ from supplier behavior in restructured power system(6)	BT6	Create
13	(i) Explain with neat diagram different entities involved in deregulation(7) (ii) Discuss about different types of mark models based on contractual arrangements(6)	BT2	Understand
14	Explain with graph market equilibrium and global welfare in restructure process	BT2	Understand
	PART - C		
1	Analysis market architecture depending upon timeline for various energy markets in restructured power system.	BT4	Analyze
2	Analysis different models for trading arrangement in deregulation environment	BT6	Create
3	Analysis different market models in restructuring environment and select which one is suitable for current power market	BT4	Analyze
4	Summarise what are the ways economics is used in restructuring power system	BT5	Evaluate

UNIT II - TRANSMISSION CONGESTION MANAGEMENT

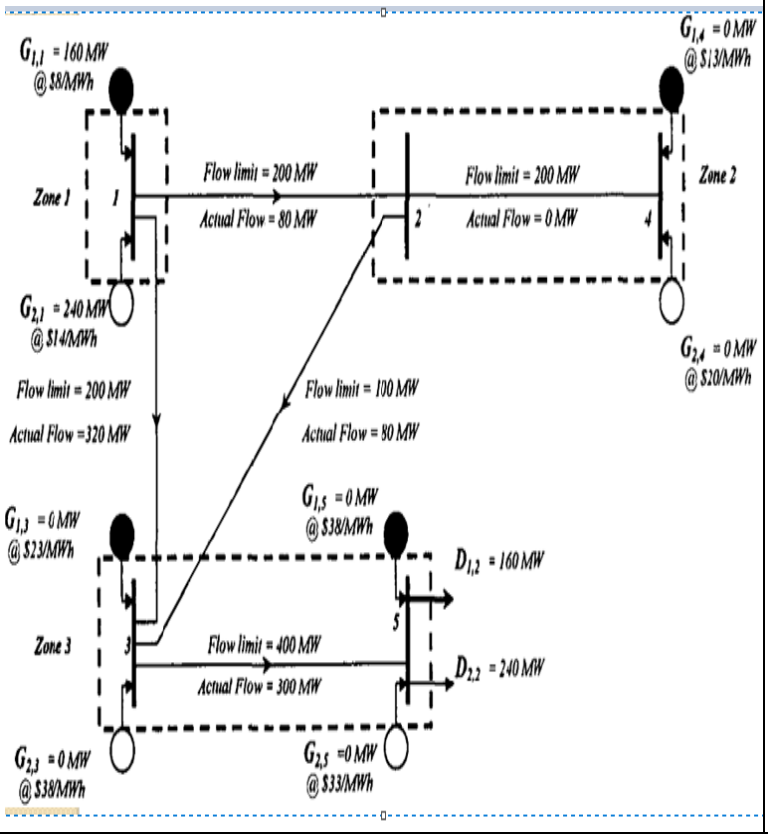
Introduction: Definition of Congestion, reasons for transfer capability limitation, Importance of congestion management, Features of congestion management – Classification of congestion management methods – Calculation of ATC - Non – market methods – Market methods – Nodal pricing – Inter zonal and Intra zonal congestion management – Price area congestion management – Capacity alleviation method – Congestion management using evolutionary approach.

PART - A

Q.No	Questions	BT Level	Competence
1	Define congestion in deregulation	BT2	Understand
2	What is the effect of loop power flow in contract path method based transmission pricing	BT5	Evaluate
3	What is meant by ATC and write importance	BT2	Understand
4	What is meant by a transmission congestion contracts	BT5	Evaluate
5	Write the reasons for transfer capability limitation	BT1	Remember
6	Describe about PTDF & LODF.	BT3	Apply
7	What is the significance to find ATC	BT1	Remember
8	Discriminate between TRM & CRM	BT2	Understand
9	Why congestion management considered to be significant in restructured systems	BT6	Create
10	Summarise the classification in congestion management	BT4	Analyze
11	What is meant by inter zonal congestion management	BT4	Analyze
12	How to prepare Total Transfer Capabilities(TTC) in deregulation system	BT4	Analyze
13	What is meant by nodal pricing	BT5	Evaluate
14	Distinguish between day ahead and block forwards energy market	BT6	Create
15	Point out price area congestion management	BT4	Analyze
16	How to form inter zonal congestion management	BT3	Apply
17	Compare the difference between congestion charges and congestion credit	BT3	Apply
18	Why capacity alleviation method used in restructure power system	BT4	Analyze
19	Point out non market methods of congestion management	BT2	Understand
20	What is meant by intra zonal congestion management	BT1	Remember
	PART - B		
1	Discuss the importance and features of congestion management in deregulated power system	BT4	Analyze
2	Explain congestion management in the power system under regulated environment with suitable example's	BT3	Apply
3	Analysis to calculate ATC using AC power flow analysis with suitable examples in the deregulation environment in the power	BT3	Apply
4	Explain the separation of ownership and operation	BT2	Understand
5	(i) Enumerate the reasons for Transfer capability limitation in restructured power system(7) (ii) Explain the concepts of Congestion Management in restructured power system(6)	BT5	Evaluate
6	Analysis to calculate ATC using DC power flow analysis in the deregulation environment of power system	BT4	Analyze

<table>
<tr><td>7</td><td>Find ATC for all lines using PTDF method
 

<table>
<tr><th>Bus No</th><th>Generation</th><th>Load (MW)</th></tr>
<tr><td>1</td><td>200</td><td>0</td></tr>
<tr><td>2</td><td>700</td><td>100</td></tr>
<tr><td>3</td><td>0</td><td>800</td></tr>
</table>
<table>
<tr><th>From Bus</th><th>To Bus</th><th>Line Reactance (pu)</th><th>Max. Power capacity (MW)</th></tr>
<tr><td>1</td><td>2</td><td>0.1</td><td>600</td></tr>
<tr><td>2</td><td>3</td><td>0.033</td><td>200</td></tr>
<tr><td>3</td><td>3</td><td>0.1</td><td>600</td></tr>
</table></td><td>BT6</td><td>Create</td></tr>
<tr><td>8</td><td>Discuss briefly price area congestion management in the power system under regulation environment</td><td>BT2</td><td>Understand</td></tr>
<tr><td>9</td><td>Explain briefly different methods of capacity alleviation method in the power system under deregulation nature</td><td>BT5</td><td>Evaluate</td></tr>
<tr><td>10</td><td>Discuss briefly nodal pricing of congestion management with suitable example in the power system under deregulation</td><td>BT3</td><td>Apply</td></tr>
<tr><td>11</td><td>Explain nodal pricing using Optimum Power flow based congestion management in the power sector in restructure policy</td><td>BT5</td><td>Evaluate</td></tr>
<tr><td>12</td><td>Formulate the inter-zonal congestion management problems and discuss the significance of control</td><td>BT6</td><td>Create</td></tr>
<tr><td>13</td><td>Explain different methods Non market models price area congestion management</td><td>BT4</td><td>Analyze</td></tr>
<tr><td>14</td><td>Explain with suitable example inter and intra zonal congestion management</td><td>BT3</td><td>Apply</td></tr>
</table>

PART-C			
1	What are the ways the transmission congestion management is used for restructured power system	BT5	Evaluate
2	How the power flow analysis is used for the Congestion management	BT5	Evaluate
3	Apply inter and intra zonal management in restructuring process and find which one best for restructuring process	BT6	Create
4	Consider the 3 area 5 bus system shown below. Solve the inter-zonal congesting using DC load flow model. Assume equal line reactance for all the lines in pu 	BT5	Evaluate

UNIT III - LOCATIONAL MARGINAL PRICES AND FINANCIAL TRANSMISSION RIGHTS

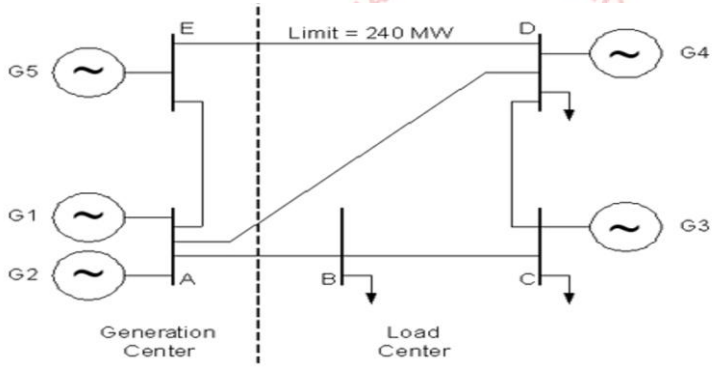
Mathematical preliminaries: - Locational marginal pricing– Lossless DCOPF model for LMP calculation – Loss compensated DCOPF model for LMP calculation – ACOPF model for LMP calculation – Financial Transmission rights – Risk hedging functionality -Simultaneous feasibility test and revenue adequacy – FTR issuance process: FTR auction, FTR allocation Treatment of revenue shortfall – Secondary trading of FTRs – Flow gate rights – FTR and market power - FTR and merchant transmission investment.

PART - A

Q.No	Questions	BT Level	Competence
1	Write about the marginal energy price, marginal congestion and marginal cost price	BT3	Apply
2	What are the different components of LMP	BT1	Remember
3	Discuss on shortage on transmission capacity	BT4	Analyze
4	How transmission congestion costs are reduced	BT5	Evaluate
5	What is role of LMP calculation	BT3	Apply
6	What is Flow gate right	BT2	Understand
7	What is social welfare in deregulation environment	BT2	Understand
8	Describe about FTR	BT4	Analyze
9	What is meant by physical transmission rights	BT1	Remember
10	Write about out of merit	BT1	Remember
11	List out the necessity of secondary market in FTR	BT2	Understand
12	Express about FTR auction	BT1	Remember
13	How to use non market methods of congestion management	BT4	Analyze
14	Explain why secondary trading of FTR	BT2	Understand
15	List out the advantages of DCOPF for calculation LMP	BT2	Understand
16	Define shadow price	BT1	Remember
17	How to apply merchant transmission investment in deregulation	BT6	Create
18	Define market power	BT1	Remember
19	How to prepare DCOPF and ACOPF used in restructure power system	BT6	Create
20	Differentiate between FTR and FGR	BT5	Evaluate

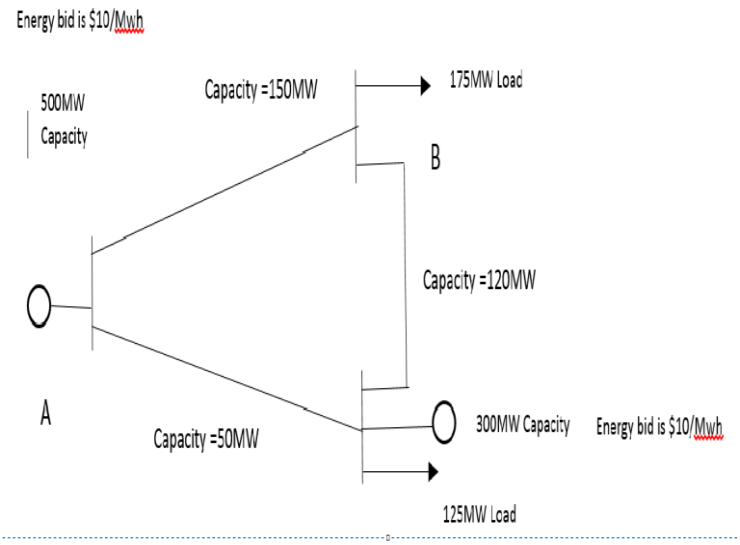
PART - B

1	Discuss the mathematical model DCOPF and ACOPF for LMP calculation in the deregulated market	BT4	Analyze
2	Explain the following the suitable examples (1)FTR auction(3) (2)FTR allocation(3) (3)Secondary trading of FTRs(2) (4)Flow gate right(2)	BT5	Evaluate
3	Explain ACOPF model for LMP calculation in power system in deregulated environment	BT1	Remember
4	Explain lossless and loss compensated DCOPF model for LMP calculation	BT5	Evaluate

5	Explain fundamentals of Locational Pricing (LMP Marginal) in power system in deregulated in nature	BT4	Analyze
6	Discuss briefly about Financial Transmission Rights (FTR) in power system under deregulated environment	BT4	Analyze
7	Describe about simultaneous feasibility test and revenue adequacy of power system in deregulated nature	BT2	Understand
8	Give briefly FTR and market power of deregulated power system and find how to use in deregulated environment	BT6	Create
9	Discuss briefly Flow gate rights in power system and explain where to adopt this system in deregulated nature	BT2	Understand
10	Demonstrate different methods of capacity alleviation method in power system under deregulation	BT6	Create
11	Write briefly FTR merchant transmission investment in power system under dergulation	BT2	Understand
12	In a five bus system have five despatacble generators. The line data the system is given table 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 4th bus is reference 	BT3	Apply

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><tr><th>Generator</th><th>Marginal cost($/Mw)</th></tr><tr><td>G1</td><td>14</td></tr><tr><td>G2</td><td>15</td></tr><tr><td>G3</td><td>30</td></tr><tr><td>G4</td><td>35</td></tr><tr><td>G5</td><td>10</td></tr></table>		
13	Explain FTR auction and FTR allocation	BT1	Remember
14	Consider the three bus shown in figure below. The line AB and AC has equal reactance whereas line BC's reactance twice that of line AC. Determine the LMP at all nodes with and without considering the line limit I 	BT3	Apply
	PART-C		
1	Why LMP calculation is preferred in restructuring process with suitable example in power system under deregulation	BT4	Analyze
2	Compare DCOPF and ACOPF with suitable example and which one more preferable for calculation LMP in deregulated environment in power system	BT4	Analyze
3	What are the factors affecting FTR in restructured power system under deregulation	BT5	Evaluate
4	Which process of FTR is most suitable for restructuring process in deregulated environment in power system	BT5	Evaluate

UNIT IV - ANCILLARY SERVICE MANAGEMENT AND PRICING OF TRANSMISSION NETWORK

Introduction of ancillary services – Types of Ancillary services – Classification of Ancillary services – Load generation balancing related services – Voltage control and reactive power support devices – Black start capability service - How to obtain ancillary service –Co- optimization of energy and reserve services - Transmission pricing – Principles – Classification -Rolled in transmission pricing methods – Marginal transmission pricing paradigm – Composite pricing paradigm – Merits and demerits of different paradigm.

PART - A

Q.No	Questions	BT Level	Competence
1	What are the demerits of marginal transmission pricing paradigm	BT1	Remember
2	What are the different ancillary services required under contingency condition	BT2	Understand
3	List the types of ancillary services	BT1	Remember
4	What is meant by composite price paradigm	BT1	Remember
5	Define ancillary service.	BT1	Remember
6	List out importance of ancillary service in restructured power system	BT1	Remember
7	Distinguish different classification of ancillary service depending up the service requirement	BT4	Analyze
8	Which types of ancillary service depends upon restore the system after blackout.	BT6	Create
9	What is black start capability service	BT2	Understand
10	Why black start capability is used in restructure power system	BT3	Apply
11	How to control reactive power and voltage in ancillary service	BT6	Create
12	Justify why spinning reserve is important in ancillary service	BT5	Evaluate
13	What is power wheeling	BT1	Remember
14	What are the constraints while designing transmission pricing	BT4	Analyze
15	Compare different methods of transmission pricing	BT5	Evaluate
16	Define marginal transmission pricing paradigm	BT1	Remember
17	Distinguish different methods of rolled transmission pricing methods	BT3	Apply
18	Summarise postage stamp in transmission pricing	BT2	Understand
19	What is the difference between energy market and the capacity market	BT4	Analyze
20	How to find price using MW-Mile in transmission pricing	BT5	Evaluate
	PART-B		
1	Compare the role, response time, response duration, and response frequency of different types of Ancillary service	BT4	Analyze

2	Discuss about any two transmission pricing methods used in the deregulated market	BT2	Understand
3	What are called ancillary service? What are its classification? Explain in detail	BT4	Analyze
4	Explain in details about voltage control and reactive power support devices	BT4	Analyze
5	Illustrate the basic principle of marginal transmission pricing paradigm	BT6	Create
6	Describe the classification of Ancillary service and bring out the load generation balancing of related service	BT1	Remember
7	(i) Describe the philosophy Rolled in pricing method(7) (ii) Enumerate the steps involved in Marginal pricing method(6)	BT4	Analyze
8	Describe with details different types of ancillary service in restructured power system	BT5	Evaluate
9	Write briefly load generating balancing in ancillary service under restructured environment in power system	BT3	Apply
10	Formulate the voltage control and reactive power support in ancillary service in power system under deregulated nature	BT6	Create
11	Formulate black start capability in ancillary service in power system under deregulated nature	BT6	Create
12	(i)Write about ancillary service in restructured power system(7) (ii) Explain different method of loss allocation in transmission pricing(6)	BT1	Remember
13	(i)Explain how to relate co-optimization of energy and reserve services in restructured power system(7) (ii) Compare different method of loss allocation in transmission pricing(6)	BT2	Understand
14	(i) Classify different types of transmission pricing(7) (ii) Discuss about marginal transmission pricing(6)	BT3	Apply
PART - C			
1	Analysis different types of transmission pricing in restructure environment in power system	BT4	Analyze
2	Explain why ancillary service is used for renewable energy sources in deregulated power systems	BT5	Evaluate
3	Analysis marginal transmission pricing paradigm in deregulation environment	BT4	Analyze
4	Economically which transmission pricing very suitable restructuring process in deregulation environment in power system	BT6	Create

UNIT V - REFORMS IN INDIAN POWER SECTOR

Introduction – Framework of Indian power sector – Reform initiatives - Availability based tariff -Electricity act 2003 – Open access issues – Power exchange – Reforms in the near future

PART - A

Q.No	Questions	BT Level	Competence
1	What are the consolidations of electricity act	BT1	Remember
2	What is ABT	BT1	Remember
3	Define Electricity Authority transmission pricing	BT1	Remember
4	Define Trans-power annual pricing	BT1	Remember
5	Give the two ISO web sites related to Indian power system	BT1	Remember
6	What is the role of website http://cercind org?	BT4	Analyze
7	State the national Electricity policy	BT1	Remember
8	Give the merits of Indian power exchange for day-ahead market	BT3	Apply
9	How do electricity price index changes	BT5	Evaluate
10	What is meant by CERC	BT2	Understand
11	Describe the salient feature of electricity act 2003	BT2	Understand
12	What does mean open access	BT1	Remember
13	Formulate how ABT is used in restructure power system	BT3	Apply
14	Differentiate NLDC & RLDC in restructure power system	BT4	Analyze
15	What are issues in Indian power sector	BT2	Understand
16	Compare different reforms in Indian power sector	BT3	Apply
17	Measure the salient features of the National Electricity policy	BT5	Evaluate
18	Identify different reforms in Indian power sectors	BT6	Create
19	Which authorities under central government in power sector	BT4	Analyze
20	How availability tariff is used restructure power system	BT6	Create
	PART - B		
1	Discuss about the various challenges and opportunities in the implementation of open access in India	BT5	Evaluate
2	Explain the role of National Load Dispatch Centre (NLDC) and Central Electricity Authority (CEA) as per Indian Electricity act 2003	BT4	Analyze
3	Explain Open Access Issues in Electrical Power systems	**BT1**	**Remember**
4	Explain various Players involved in the Indian Power sector	BT4	Analyze
5	Explain the frameworks of Indian power sector with neat sketch	BT4	Analyze
6	Explain the institutional structure of Indian power sector before and after period of restructuring	BT1	Remember
7	(i)Describe in detail the need for Availabity Based Tariff in restructured power systems(7) (ii) Explain briefly future reforms in Indian power sector(6)	BT5	Evaluate
8	What are the ways to reforms in Indian Power sector under regulated environment in power system	BT5	Evaluate

9	Describe different types of tariff in deregulation environment in power system and specify importance of tariff	BT3	Apply
10	Analyse different Electricity act in deregulation environment in power system and how is used in that act in deregulation environment	BT4	Analyze
11	List out the Electricity act 2003 in deregulation environment	BT1	Remember
12	(i)Explain how to recommended Availability based tariff in restructured power system(7) (ii) Discuss briefly different regulation framework in Indian power sector(6)	BT3	Apply
13	Point out briefly open access issues in Indian power sector	BT1	Remember
14	(i)Why the power exchange is needed in Indian power sector(7) (ii) Discuss about Electricity Industry in last 50 years(6)	BT6	Create
PART-C			
1	Analyse the Indian power sector and write a short note on reforms in the near future	BT6	Create
2	What are the different factors to fix the tariff in restructuring process under deregulation in power system	BT5	Evaluate
3	What are the reforms in future deregulated system in power system ?Explain each reforms which are used future deregulated system	BT5	Evaluate
4	What is Electricity Act and Summarise the importance of electricity act 2003 in deregulation environment in power system	BT6	Create