Dec. 20

Total Pages—5

(Set-L)

M.Tech-1st

Opera. & Control of Restruc. Power Sys.

Full Marks : 70

Time : 3 hours

Answer any **six** questions including **Q. No. 1** which is compulsory.

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

(*a*) State and explain Lagrange function with suitable example.

(*b*) Write the expression for real power price based on the marginal cost at a bus.

(*c*) What are the various structures of the power pools ?

(*d*) What do you mean by the Birds in a competitive power market ? Show them graphically.

(Turn Over)

(*e*) Explain the Broker's profit function.

(*f*) Discuss the payment structure in the UK power pool.

(*g*) How can you mathematically express the transaction price in Postage Stamp method ?

(*h*) How are transmission/security constraints handled in PJM market ?

(*i*) Explain Counter Trading. Why it is done ?

(*j*) Describe Black Start Capability service.

2. (*a*) Discuss the basic OPF model. What are the characteristic features of OPF ? Why it is essential for analysis of competitive electricity markets ? 5

(*b*) Enlist the benefits obtained from a competitive electricity market. What are the after effects of deregulation ? 5

3. (*a*) Starting from fundamentals derive the Kuhn-Tucker's conditions of optimality.

Write the co-ordination equations also. What are the significances of Lagrange multipliers ? 5

(*b*) For a multi-area joint dispatch problem derive the Lagrangian. For a large and negative value associated with γ what do you conclude ? 5

4. (*a*) Explain the role of ISO in a competitive power system operation environment. Bring out the differences between Pool and Bilateral markets. 4

(*b*) With the help of a suitable diagram explain the double-auction power pool market. Formulate the social welfare function and derive the optimal condition. 6

5. (*a*) Describe the Energy Brokerage System and derive the pricing formula. 4

(*b*) Four power systems have sent their buy/sell offers to the broker as shown in the Table

below. Calculate the maximum pool savings and benefits in terms of Rupees for each participants. 6

Utility Selling Energy	Incremental Cost (R/MWh)	MWh for sale	Utility Buying Energy	Decremental Cost (R/MWh)	MWh for sale
S1	25	100	B1	35	50
S2	30	100	B2	45	150

6. (*a*) What is power wheeling ? Explain wheeling rate. Describe the classification of point-to -point transmission transactions. 4

(*b*) Discuss the concept of incremental cost based transmission pricing. With the help of a block diagram explain the tariff mechanism in Sweden. 6

7. (*a*) Describe various methods for congestion management in deregulation. Name the economic instruments for handling congestion. Explain market splitting concept. 5

(*b*) With the help of a suitable diagram explain the reactive power definitions in the Australian market. Discuss the basic voltage control scheme adopted in NEMMCO. 5

8. Write short notes on any *two* of the following : 5 + 5

(*i*) Payment for Lost Opportunity cost

(*ii*) Demand side bidding mechanism in UK

(*iii*) MW-Mile method.
