Register Number: …….

B.E DEGREE EXAMINATIONS: NOV/DEC 2010

Seventh Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE702: Power System Operation and Control

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 =10 Marks)

1. How the capital investment on the plant is reduced with respect to maximum demand?
   a) Demand factor b) Load factor c) Plant use factor d) Diversity factor
2. Which reserve helps to meet the contingencies, maintaining continuity of generation in meeting the load demand?
   a) Hot reserve b) Spinning reserve c) Installed reserve d) Cold reserve
3. In two area system with tie line bias control, the area control error for area 2 is
   a) $\Delta f_2+\Delta Ptie_{12}$ b) $\Delta f_1+\Delta Ptie_{12}$ c) $\Delta f_1+\Delta f_2+\Delta Ptie_{12}$ d) $\Delta f_2+\Delta Ptie_{21}$
4. In Load Frequency Controller, the fine tuning of frequency is done by
   a) Excitation Controller b) Speed Governor c) Secondary Controller d) Primary Controller
5. The synchronous motor under overexcited condition will
   a) Absorb reactive power b) Run above synchronous speed
   c) Provide reactive power d) Run below synchronous speed.
6. In a transmission line, if the voltage at receiving end is greater than sending end the voltage can be controlled by
   a) Shunt Capacitor b) Series Capacitor c) Synchronous Condenser d) Synchronous motor
7. The power plant consists of two units, whose cost data is given by $F1=0.004P1^2+2P1+80$; $F2=0.006P2^2+1.5P2+100$, for the economic load dispatch what will be the value of lambda
   a) Greater than 100 b) Greater than 2 c) Less than 80 d) less than 1.5
8. The reason for constraint in maximum power generation is
   a) Moment of inertia b) Thermal Constraint c) Governor problem d) Production of steam
9. The Southern regional control centre is in
   a) Chennai b) Bangalore c) Hyderabad d) Trivandrum
10. Which one of the following is used in SCADA for communication?
    a) Transmission line b) Satellite Communication c) Data cable d) FM transmission

PART B (10 x 2 = 20 Marks)

11. Define: Maximum demand
12. Differentiate between load curve and load duration curve.
13. What is the role of Control Area centre?
14. Draw the speed governor characteristics with a droop setting of 4% and speed changer set at 50% of rated output.
15. The speed governor is having a regulation of 2.4 Hz/pu MW, The increase in demand creates a steady state error of 0.0235 Hz in frequency response. The load decrease at the rate of 67 Mw/Hz. Calculate the power obtained by a) speed governor action and b) from frequency drop. Assume the capacity of the area is 2000MW
16. What are the different methods of voltage control?
17. What is the difference between unit commitment and Economic Load Dispatch?
18. Write the condition for Economic Load Dispatch without losses.
19. What is meant by State Estimation?
20. What is the difference between Security Assessment?

PART C (5 x 14 = 70 Marks)

21. a) The daily demands of 3 consumers are given below:

Time	Consumer 1	Consumer 2	Consumer 3
12 Midnight to 8 A.M.	No Load	200 W	No Load
8 A.M. to 2 P.M.	600 W	No Load	200 W
2 P.M. to 4 P.M.	200 W	1000 W	1200 W
4 P.M. to 10 P.M.	800 W	No Load	No Load
10 P.M. to Midnight	No Load	200 W	200 W

Represent neatly the load curve and find:

(i) Maximum demand of individual consumer

(ii) Load factor of individual consumer

(iii) Diversity factor and;

(iv) Load factor of the station.

(OR)

b) Describe briefly about the following: (4 + 5 + 5)

(i) Installed reserve (ii) System Voltage control (iii) Load frequency control.

22. a) Explain the working of Automatic Load Frequency Controller with the necessary block diagrams.

(OR)

b) Model the transfer function model of the Tie Line. In block diagram, using the transfer function model, connect two areas using Cohn control strategy.

23. a) With a typical diagram explain the function of Brushless Excitation System. Also draw its transfer function model.

(OR)

b) Describe briefly with neat diagram about regulating transformer for control of voltage magnitude and voltage phase angle.

24. a) The incremental cost curve for a three unit thermal plant are given by

$P1=100+50(IC1)-2(IC1)^2$

$P2=-150+60(IC2)-2.5(IC2)^2$

$P3=-80+40(IC3)-1.8(IC3)^2$

Where ICs are in Rs/MW-Hr and P are in MW. Determine the Optimum Schedule for a load of 400MW

(OR)

b) The input-output curve characteristics of three units are

$H_1 = 510+7.2P_1+0.00142\ P_1^2$ MBtu / hr

$H_2 = 310+7.85P_2+0.00194\ P_2^2$ MBtu / hr

$H_3 = 78+7.97P_3+0.00482\ P_3^2$ MBtu / hr

The fuel cost of unit 1 is 1.1 Rs/MBtu, 1.0 Rs/MBtu for unit 2 and 1.0 Rs/MBtu for unit 3. Total load is 850 MW. Use the participation factor method to calculate the dispatch for a total load of 900 MW.

25. a) List out the functions of Local, State, Regional and National Control Centres.

(OR)

b) With a neat State Transition Diagram explain the system states and different control strategies.

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