b) The following are data for three units in a power plant : **(15)**

Unit 1 : Max. load = 600 MW,

the cost function is

$C_1 = 561 + 7.92\ P_1 + 0.001562\ P_1^2$ Rs/h

Unit 2 : Max. load = 400 MW,

the cost function is

$C_2 = 310 + 7.85\ P_2 + 0.00194\ P_2^2$ Rs/h

Unit 1 : Max. load = 200 MW,

the cost function is

$C_3 = 93,6 + 9.564\ P_3 + 0.005784\ P_3^2$ Rs/h

Obtain the priority list for the Unit commitment problem.

Reg. No. :

Question Paper Code : 41009

30/04/18 FN

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Sixth Semester

Electrical and Electronics Engineering

EE6603 : POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

Time : Three Hours Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Write the implications of high diversity factor and list any two methods employed to increase the diversity factor.
2. State the factors affecting the load forecasting.
3. List the components of speed governing mechanism.
4. Distinguish between primary and secondary feedback loops in Load Frequency Control.
5. State the main objectives of Reactive power and Voltage control in power systems.
6. Outline the role of synchronous generators adopted for generation and absorption of reactive power.
7. Relate the necessary condition for the existence of minimum cost-operating for the thermal power system.
8. Compare unit commitment and economic dispatch problems.
9. State the Weighted Least Square Criterion.
10. List the basic functions of EMS.

PART – B (5×13=65 Marks)

11. a) i) Classify broad categories of system loads and describe its load characteristics. (7)

ii) A power plant supplies the following loads with maximum demand as below : (6)

Type of load	Individual Maximum Demand (MW)
Industries	100
Domestic	15
Commercial	12
Agriculture	20

The maximum demand on the power station is 110 MW. The total units generated in the year is 322×10^6 kWh. Determine the load factor and Diversity factor.

(OR)

b) i) Compare load curve and load duration curves. (6)

ii) Demonstrate the basic approach of quadratic curve fitting technique of load forecasting with a suitable example. (7)

12. a) i) What is the need of a governing mechanism ? Illustrate with neat diagram the operation of a speed governing mechanism. (7)

ii) Analyze the governor speed-droop characteristics, the basics of load sharing between two synchronous machines in parallel. (6)

(OR)

b) The two system connected by a tie line describe the following characteristics :

Area 1	Area 2
R = 0.01 pu	R = 0.02 pu
D = 0.8 pu	D = 1.0 pu
Base MVA = 500	Base MVA = 500

A load change of 100 MW (0.2 pu) occurs in area 1. What is the new steady state frequency what is the change in tie flow ? Assume both area were at nominal frequency (60 Hz). (13)

13. a) i) Discuss the events which affect the speed and probability of voltage collapse in power system operation strategy. (4)

ii) Explain with neat block diagram the excitation system and it modeling with relevant transfer functions. (9)

(OR)

b) Explain with neat diagrams and V-I characteristics, the basic operations of TCR and TSC. (13)

14. a) The cost characteristics of two units in a plant are (13)

$$C_1 = 0.4P_1^2 + 160P_1 + K_1 \text{ Rs./h}$$

$$C_2 = 0.45p_1^2 + 120P_1 + K_2 \text{ Rs./h}$$

where P_1 and P_2 are power output in MW. Find the optimum load allocation between the two units, when the total load is 162.5 MW. What will be the daily loss if the units are loaded equally ?

(OR)

b) i) Determine the simple shut-down algorithm used in priority List scheme. (6)

ii) Outline the steps for forward dynamic programming approach for solving the unit commitment problems. (7)

15. a) Construct with neat schematic diagram, the information flow between various functions in an operational energy control centre computer system. (13)

(OR)

b) Discuss with neat state transition diagram outlining the various operating state transitions and control strategies in Power system. (13)

PART – C (1×15=15 Marks)

16. a) The incremental cost of three units in a plant are : (15)

$IC_1 = 0.8\,P_1 + 160$ Rs / MWh;

$IC_2 = 0.9\,P_2 + 120$ Rs / MWh; and

$IC_3 = 1.25\,P_3 + 110$ Rs /MWh

Where P_1, P_2 and P_3 are power output in MW. Determine the optimum load allocation when the total load is 242.5 MW. Using Participating Factors, determine the optimum scheduling when the load increased to 250 MW.

(OR)