B   **180A3**   Total Pages: 2

Register No.: ………………………..   Name: ……………………………………………….

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)
THIRD SEMESTER M.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022
POWER SYSTEMS
(2020 Scheme)

Course Code :   **20EEPST223**

Course Name: **Reactive Power Compensation and Management**

Max. Marks :   **60**   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. State the important parameters that need to be considered while specifying a load compensator.
2. Demonstrate that reactive power balance is achieved at natural loading.
3. What do you mean by compensation by sectioning?
4. Differentiate between voltage sag and voltage swell.
5. Explain the term Equivalent Hours Loss Factor.
6. Explain briefly the Sequential Switch Opening Method.
7. What are the advantages of capacitor banks compared to synchronous condensers?
8. State the deciding factors for the selection of capacitors.

PART B
(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Describe the principle of power factor correction to compensate for the reactive power with the help of the approximate characteristics.   (6)

OR

10. Design an ideal compensator in order to provide power factor correction as well as phase balancing of unsymmetrical loads.   (6)

MODULE II

11. From the fundamental transmission line equation, determine the expression for the electrical length of a transmission line.   (6)

OR

12. Derive the expression for power transmitted along an uncompensated line under load and draw the power-transmission angle characteristic.   (6)

MODULE III

13. Determine the required reactance value of shunt reactor for controlling the open circuit voltage of a transmission line of length 'a'. Draw the current profile of the shunt compensated line at no load. (6)

OR

14. A 400 mi transmission line has per unit reactance of 0.8108 and total shunt capacitive susceptance of 0.8108 p.u. The electrical length is 0.8 rad or 45.86 degrees. If the surge impedance value is 250 Ohms and the series compensating capacitor is chosen so as to compensate 75% of the line reactance, calculate the following: (a) midpoint voltage without shunt reactor, (b) the improvement in maximum power transferred with series compensation. (6)

MODULE IV

15. Develop the solution algorithm for system operations planning. (6)

OR

16. Describe how low system frequency affects thermal and hydel power stations. (6)

MODULE V

17. Describe the objectives of reactive power planning in distribution systems. (6)

OR

18. Explain how the use of tap changing transformers and system efficiency improvement measures can bring about reduction of losses in power systems. (6)

MODULE VI

19. Explain the technical considerations for selecting the capacitor bank voltage level. (6)

OR

20. Describe how different types of capacitors can be placed economically. (6)

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