

B.E. / B.Tech. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-V
TE104 / POWSYS1 - Power System-I - Apparatus and Modelling

P. Pages : 2

Time : Three Hours



GUG/S/25/13867

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
 6. Read the question paper carefully (Branch, Semester, Scheme) before attempting the question
 7. Every question has equal weightage
 8. Use of programmable calculator is prohibited.
 9. Assume suitable data wherever necessary.
 10. Draw neat and proper diagram/sketches
 11. Don't use red pen for writing the answers.
 12. Don't write any other comments except answer of questions.

1. a) Differentiate the synchronous and asynchronous grid. Explain asynchronous interconnection in brief. **8**

b) What is Bilk power grid? Explain it in brief. State the advantages and disadvantages of micro grid. **8**

OR

2. a) What is micro grid? Explain it in brief. State the advantages and disadvantages of micro grid. **8**

b) A three phase line has impedance of $0.4+j 2.7$ ohm. The line feeds balanced two three phase loads that are connected in parallel. The first load absorbs 560 kVA at 0.707 power factor lagging. The second load absorbs 132kVA at unity power factor. The line to line voltage at the end of the line is 3810.5 V. **8**

Determine;

1) The magnitude of the line voltage at source end of the line

2) The real and reactive power loss in the line

Real power and reactive power supplied at the sending end of the line.

3. a) Derive the formula for Inductance of solid isolator conductor due to its internal flux linkages only? **8**

b) Define GMD & GMR. How this concept can be used in the calculations of inductance of composite conductor lines. Derive the formula for same. **8**

OR

4. a) State and explain Ferranti effect using phasor diagram. **8**

b) Explain concept of Tap-Changing in transformers. **8**

5. a) Explain various methods to control switching over voltages. 8
- b) What is meant by insulation coordination? Explain its application to power system equipment. 8

OR

6. a) Explain with sketch the various theories of charge generation and discharging a thunder. 8
- b) Derive the mathematical model for lightning discharges and explain them. 8
7. a) Draw and explain zero sequence network in the following cases: 8
- i) y-y transformer bank with one natural grounded.
 - ii) y-y transformer bank with both natural grounded.
 - iii) Delta-Delta transformer bank.
- b) Determine the symmetrical components of current in a three phase system. The original phasors are: 8
- $$I_a = 12 + j8A$$
- $$I_b = 12 - j6A$$
- $$I_c = 12 + j6A$$

OR

8. a) Derive the relationship to determine the interconnection of sequence network for L-L fault. 8
- b) Explain different types of operating principal of protection scheme in brief. 8
9. a) Explain the effects of Wind Generator on the Grid with the help of a simple equivalent circuit and a Phasor diagram. 8
- b) What is the need for interconnection of systems? Explain the merits of connecting HVAC systems by HVDC tie-lines? 8

OR

10. a) With the help of a neat schematic diagram of a typical HVDC converter station explain the functions of various components available. 8
- b) Write short notes on (**Any Two**) 8
- a) Explain the working principle of a solar cell
 - b) Explain the construction of a solar cell with a neat figure
 - c) Write down clearly all the important concepts of Solar cells
