

510502/510602

Roll No. \_\_\_\_\_

Total No. of Pages: 3

**510502/510602**

**B. Tech. V - Sem. (Main/Back) Exam., (Academic Session 2021- 2022)**

**Electrical Engineering**

**SEX4-02/5EE4 - 02/ Power System - I**

**Common With EEE & EE**

**Time: 3 Hours**

**Maximum Marks: 120**  
**Min. Passing Marks:**

**Instructions to Candidates:**

**Part – A: Short answer questions (up to 25 words)  $10 \times 2$  marks = 20 marks.**  
*All ten questions are compulsory.*

**Part – B: Analytical/Problem solving questions  $5 \times 8$  marks = 40 marks.**  
*Candidates have to answer five questions out of seven.*

**Part – C: Descriptive/Analytical/Problem Solving questions  $4 \times 15$  marks = 60 marks.**  
*Candidates have to answer four questions out of five.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)*

1. NIL

2. NIL

**PART – A**

- ~~1/2~~ Q.1 What is the need of grounding the neutral in power system? [2]
- ~~1/2~~ Q.2 What are the issues in connecting the renewable energy system to the grid? [2]
- ~~2~~ Q.3 Define critical disruptive voltage and critical visual voltage. [2]
- ~~2~~ Q.4 What is meant by insulation co-ordination? [2]
- Q.5 What is the necessity of maximum power point tracking in PV system? [2]

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- Q.6 What is grid interactive inverter? State its significance. [2]
- Q.7 What are the factors which affect corona? [2]
- Q.8 What are the two basic requirements for the firing pulse generation of HVDC values? [2]
- Q.9 What do you mean by symmetrical and unsymmetrical spacing? [2]
- Q.10 What role do micro grids play during a power outage? [2]

### PART – B

- Q.1 A balanced star connected load takes 150 A from a balanced 3-phase, 4-wire supply. If the fuses in two of the lines are removed, find the symmetrical components of the line current before and after the fuses are removed. [8]
- Q.2 Explain the switching operation in an R-L circuit. Also explain sub-transient period, transient period and steady-state period. [8]
- Q.3 Discuss in detail the grid system characteristics and explain with a neat diagram the stand alone and grid integrated solar system. [8]
- Q.4 Explain the significance of “ $\alpha$ ” operator. Also show that the power in a three phase circuit can be completed from symmetrical component. [8]
- Q.5 Draw the single phase model of negative and zero sequence impedance of synchronous machine. Also discuss zero sequence networks of transformer. [8]
- Q.6 Why grading is required in cables? Also discuss different methods of grading the cables. [8]
- Q.7 Discuss line commutated converters with the help of schematic diagram. [8]

### PART – C

- Q.1 (a) Define positive, negative and zero sequence components in 3 phase systems with suitable example. [7½]
- (b) Explain about sequential components in unloaded generator. [7½]

- Q.2 (a) Explain the per unit system for analyzing power system problem. Discuss the advantages of this method over the absolute method of analysis. Show that per unit equivalent impedance of a two winding transformers is same whether it is referred to its high voltage side or the low voltage side. [7½]
- (b) Define surge impedance. Explain, how it is evaluated for an overhead line and underground cable? [7½]
- Q.3 (a) Draw Bewley lattice diagram for an open circuited transmission line having following parameters  $R = 0.5\Omega$  per km,  $G = 10 \times 10^{-7}S$  per km, length of line =  $l = 400$  km. Initial value of voltage at sending end is 2 p.u. [7½]
- (b) Using Bewleys lattice diagram represent the voltage and current wave form of a bifurcated line. <https://www.btubikaner.com> [7½]
- Q.4 (a) A three phase line delivers 3600 kW at a power factor 0.8 lagging to a load. If the sending end voltage is 33 kv, determine - [7½]
- (i) Receiving end voltage
- (ii) Line current
- (iii) Transmission efficiency.
- The resistance and reactance of each conductor is 5.31  $\Omega$  and 5.54  $\Omega$  respectively.
- (b) What are ACSR conductor? Explain advantages of ACSR conductor when used for overhead lines. [7½]
- Q.5 (a) What is a circuit breaker? Also discuss the various types of circuit breaker used for the protection of power system. [7½]
- (b) Explain phenomenon of current chopping and its effect on circuit interruption. What measures are taken to reduce it? [7½]