

510602/510502

Roll No. _____

Total No. of Pages: 3

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B. Tech. V - Sem. (Main / Back) Exam., May - 2023

Electrical Engineering

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) 10×2 marks = 20 marks.
All ten questions are compulsory.

Part - B: Analytical/Problem solving questions 5×8 marks = 40 marks.
Candidates have to answer five questions out of seven.

Part - C: Descriptive/Analytical/Problem Solving questions 4×15 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

- Q.1 What are the standard transmission and distribution voltages in India? [2]
- Q.2 Draw a single line diagram showing a typical distribution system. [2]
- Q.3 Classify overhead transmission lines. [2]
- Q.4 What is Ferranti effect? [2]
- Q.5 What are the methods adopted to reduce corona? [2]

- Q.6 What is a 3-Phase unsymmetrical fault? Write the different types of unsymmetrical faults that can occur on a 3-phase system. [2]
- Q.7 What is per unit system in power system analysis? [2]
- Q.8 What is neutral grounding? [2]
- Q.9 Distinguish between AC and DC transmission system based on the effect of inductance and capacitance. [2]
- Q.10 Name the generators that are mostly used in Wind energy conversion systems. [2]

PART - B

- Q.1 Explain clearly the concept of reactive power in single phase and three phase circuits. [8]
- Q.2 Explain clearly the 'skin effect' and 'proximity effect' when referred to overhead lines. [8]
- Q.3 What do you understand by long transmission lines? How capacitance effects are taken into account in such lines? [8]
- Q.4 Explain the actions required to reduce the number of outages caused by lightning. [8]
- Q.5 Describe the principle of operation and application of SF6 circuit breaker. How does this breaker essentially differ from an air blast breaker? [8]
- Q.6 Explain the concept of distance protection and differential protection schemes. Also, write the applications of each protection scheme. [8]
- Q.7 State the principle of PMSG. What are the merits of PMSG for wind energy conversion systems? [8]

PART - C

- Q.1 100-km long, 3-phase, 50-Hz transmission line has following line constants: [15]
Resistance/phase/km = 0.1Ω Reactance/phase/km = 0.5Ω ;
Susceptance/phase/km = $10 \times 10^{-6} \text{ S}$
If the line supplies load of 20 MW at 0.9 p.f. lagging at 66kV at the receiving end, calculate by nominal π method:
- (i) Sending end power factor
 - (ii) Regulation
 - (iii) Transmission efficiency
- Q.2 Explain clearly what you mean by compensation of line and discuss in detail about the different methods of compensation. [15]
- Q.3 A balanced star connected load takes 90 A from a balanced 3-phase, 4-wire supply. If the fuses in the Y and B phases are removed, find the symmetrical components of the line currents : [15]
- (i) before the fuses are removed
 - (ii) after the fuses are removed
- Q.4 Write a detailed note on 'Solar PV System' based on :
- (i) I-V & P-V characteristics of solar panels (characteristics) [8]
 - (ii) Power electronics interfacing of PV to the grid [7]
- Q.5 (i) Three identical coils, each of resistance 10Ω and inductance 42mH are connected (a) in star and (b) in delta to a 415V , 50 Hz , 3-phase supply. Determine the total power dissipated in each case. [7]
- (ii) What is Bewley's Lattice Diagram? Describe advantages of Bewley's Lattice Diagrams. [8]
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