

5E1362

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B.Tech. V- Semester (Main) Examination, Nov. - 2019
PCC/PEC Electrical Engg.
5EE4-02 Power System - I
(Common for EE,EX)

Time : 3 Hours

Maximum Marks : 120
Min. Passing Marks : 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of Seven from Part B and Four questions out of Five from Part C. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory

(10×2=20)

1. Why transmission lines are 3 phase 3 wire circuits while distribution lines are 3 phase 4 wire circuits?
2. What are standard Transmission and Distribution voltages in India?
3. Why skin effect is absent in DC system?
4. What is difference between feeder and distributor?
5. What is meant by symmetrical fault?
6. What is Ferranti effect?
7. What is the reason for transients during short circuits?
8. What is meant by transposition of line conductors?
9. Define per unit value.
10. What is the drawback in series connected capacitor?

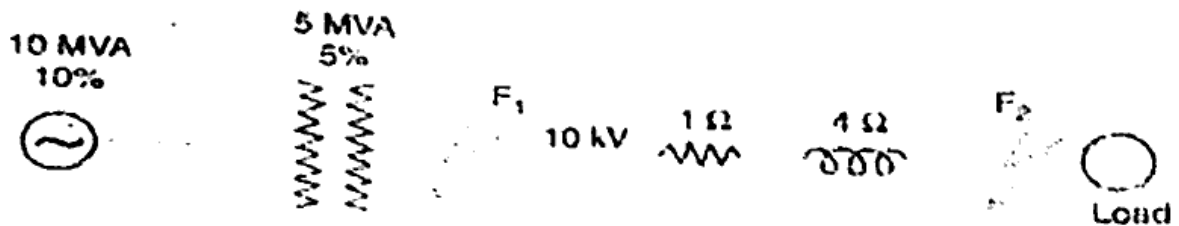
PART - B

(Analytical Problem solving questions)

(5×8=40)

Attempt any five questions

1. a) Describe the various methods for reducing corona effect in an overhead transmission line.
b) A 3 - phase, 220kV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temperature is 40°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take $m_v = 0.85$.
2. Explain different types of distribution systems.
3. Derive an expression for inductance of three phase transmission line.
4. A 3 - phase transmission line operating at 10 kV and having a resistance of 1Ω and reactance of 4Ω is connected to the generating station bus - bars through 5 MVA step - up transformers having a reactance of 5%. The bus - bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short - circuit kVA fed to symmetrical fault between phases if it occurs
 - i) at the load end of transmission line
 - ii) at the high voltage terminals of the transformer



5. With the help of block diagrams explain the operations of standalone and grid interactive Solar PV systems.
6. What is a nominal π circuit? Find the ABCD constants for nominal π circuit.
7. What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in power system?

PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any Four questions

(4×15=60)

1. a) What is the effect of transmission voltage on line performance? Derive mathematical expressions to validate the answer.
b) A single phase AC system supplies a load of 200 kW. If this system is converted into 3 phase 3 wire AC system by running a third similar conductor then calculate the 3 phase load than can now be supplied if the voltage between the conductor is same. Assume power factor and transmission efficiency to be same in both cases.

2. A 3 - phase, 50 Hz transmission line 100 km long delivers 20 MW at 0.9 p.f. lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0.2Ω and 0.4Ω respectively, while capacitance admittance is 2.5×10^{-6} siemen/km/phase. Calculate :
- the current and voltage at the sending end
 - efficiency of transmission. Use nominal T method. (15)
3. , a) Derive an expression for fault current for single line - to - ground fault by symmetrical components method. (7)
- b) The per unit values of positive, negative and zero sequence reactance of a network at fault are 0.08, 0.07 and 0.05. Determine the fault current if the fault is
- double line - to ground
 - Line to line
 - Line to ground (8)
4. - a) Write short notes on
- Distributed Generation
 - Surge Impedance loading. (2×3=6)
- b) A 50 hp induction motor has pf 0.9 & 90% efficiency at full load, at half load 0.6 pf and 70% efficiency. At no load the current is 25% of the full load current and 0.1 pf. Shunt capacitors are installed in circuit to make the line pf 0.8 at half load. Determine the line power factor at
- Full load
 - No load. (9)
5. a) Discuss merits and demerits of HVDC transmission system. (7)
- b) A delta connected load is supplied from a 3 - phase supply. The fuse in the B line is removed and current in the other two lines is 20 A. Find the symmetrical components of line currents. (8)