

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

EVENING

[Total No. of Pages: 02]

Uni. Roll No.

07 JAN 2023

Program/ Course: B.Tech./EE

Semester: 5th

Name of Subject: Power System-I (Apparatus and Modeling)

Subject Code: PCEE-109

Paper ID: 16461

Time Allowed: 3 Hours

Max. Marks: 60

NOTE:

1. Parts A and B are compulsory
2. Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3. Any missing data may be assumed appropriately

Section – A

[Marks: 02 each]

1.
 - a. Differentiate between Bulk Power Grid and Micro grid.
 - b. What is meant by bundled conductors and what are their advantages?
 - c. Define the term Skin effect and Ferranti effect.
 - d. Compare underground cables system with overhead transmission system.
 - e. Briefly describe the working of voltage source convertor in DC Transmission line.
 - f. Explain the term Restriking voltage and Recovery voltage in circuit breaker.

Section – B

[Marks: 04 each]

2. Discuss the evolution of power system and present scenario in power systems.
3. With the help of schematic diagram, explain structure of power system.
4. Show relation that the insulation resistance of cable is varies inversely as the length.
5. Derive an expression to determine the Inductance of a Single Phase two-wire line.
6. In a 3-phase, 4 wire system, the current in R, Y and B lines under abnormal conditions of loading are as under:

$$\vec{I}_R = 100 \angle 30^\circ A ; \quad \vec{I}_Y = 50 \angle 300^\circ A ; \quad \vec{I}_B = 30 \angle 180^\circ A$$

Calculate the positive, negative and zero sequence currents in the R-line and return current in the neutral wire.

7. Explain principles of Arc Extinction in circuit breaker. Discuss different methods of arc extinction.

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Section – C

[Marks: 12 each]

8. With the help of diagram explain the working of Air Blast Circuit Breaker and Sulphur Hexafluoride (SF_6) Circuit Breaker. Also discuss ratings and their applications.

OR

A balanced 3-phase load of 30 MW is supplied at 132 kV, 50 Hz, and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor is $(20 + j52)$ ohms and the total phase neutral admittance is 315×10^{-6} siemen. Using nominal T Method, determine : (i) The A, B, C and D constants of the line (ii) Sending end voltage (iii) Regulation of the line.

9. Derive an expression to determine the voltage regulation of medium transmission lines by using Nominal T-Method. Also draw its phasor diagram also.

OR

A 66 kV single-core lead sheathed cable is graded by using two dielectrics of relative permittivity 5 and 3 respectively; thickness of each being 1 cm. The core diameter is 2 cm. Determine the maximum stress in the two dielectrics.

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