

MANMOHAN TECHNICAL UNIVERSITY

Office of the Controller Examinations

2083 Bhadra Exam (2026 August) Model Question

School: Engineering	Level: Master	Time: 3 Hours
Program: M.Sc.P.S.E.	Year/Part: I/I	Full Marks: 50
Subject: EG802EE – Distribution System Design and Operation		Pass Marks: 25

✓ Candidates are required to give their answers in their own words as far as practicable.

✓ The figures in the margin indicate Full Marks.

✓ Assume suitable data if necessary.

GROUP A (Attempt any FIVE Questions)

[5x3=15]

1. Discuss the technical and economic considerations involved in selecting single-phase and three-phase distribution transformers for distribution systems.
2. Why are underground distribution systems generally preferred in urban areas? Discuss their technical and economic implications.
3. A radial feeder supplies the following loads:

Load Point	Load (kVA)	Distance from Source (km)
A	150	2
B	200	5
C	300	8

Determine the MVA-km moment of the feeder. Briefly explain the significance of the MVAkm moment in conductor selection.

4. Explain the need for small-area load forecasting in distribution networks. How does it differ from system-wide load forecasting in terms of planning objectives?
5. Discuss the factors that influence the reliability of a radial distribution system
6. Explain how distribution automation benefits both electric utilities and consumers in modern distribution systems.

GROUP B (Attempt Any SEVEN Questions)

[7x5=35]

1. Explain the importance of selecting an appropriate primary distribution voltage for a distribution system. Discuss how this choice affects the number of substations, distribution transformer ratings, LT feeder lengths and associated losses, and the reliability of power supply.
2. Assuming a uniformly distributed load along the length of a distribution feeder, derive the expressions for the feeder voltage drop and power loss. Clearly state the assumptions involved and comment on the practical significance of the derived expressions
3. Discuss the major causes of technical losses in distribution systems and explain practical measures for reducing transformer losses with suitable examples.
4. A 33/11-kV distribution substation supplies three outgoing feeders having the following maximum demands:

- Feeder A = 6 MW □ Feeder B = 5 MW
- Feeder C = 4 MW

The diversity factor is 1.35.

- Determine the maximum diversified demand at the substation.
 - Estimate the minimum transformer rating by considering a suitable design margin.
 - Discuss the factors governing transformer capacity selection for distribution substations.
- Explain the technical and economic considerations involved in conductor selection for primary distribution systems. Compare ABC and covered conductors for suitable applications.
 - Explain the coordination of protective devices in a radial distribution system using circuit breakers and auto-reclosers with the help of a suitable feeder arrangement.
 - A distribution feeder supplies 1,200 consumers. During one year, the feeder experienced six sustained interruptions, each affecting all consumers. The total customer interruption duration was 1,800 consumer-hours. Calculate (a) SAIFI, (b) SAIDI, and (c) CAIDI. Interpret the significance of the obtained reliability indices.
 - Explain the role of a Distribution Management System (DMS) in modern smart grids. Discuss a method for service restoration in an automated distribution system.

∞∞ **The End** ∞∞