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Daffodil International University

Department of Electrical and Electronic Engineering
Faculty of Engineering
Midterm Examination, Fall – 2026

Course Code: 0713-315
Section: A, B, C, D, E, R
Full Marks: 25

Course Title: Power System Analysis
Level-Term: L3-T2
Exam Date: 31 October, 2026

Teacher's Initial: DRA, AI, SMP
Time: 1.5 Hours

Read the Question Carefully and Answer Three Questions from Four
Q1 is Mandatory

(All terminologies shall be interpreted in their conventional sense. Assume any required values wherever necessary. Candidates are advised to present concise and relevant solutions — unnecessary elaboration may result in the deduction of marks)

Q1. ***(a)*** **Define** per unit system and mention an advantage of using this system. CO-1 C2 2

(b) A motor is rated at **30 MVA, 18 kV**, with power factor of **0.6 leading** based on its own rated values. The motor is connected to a power system with base values of **50 MVA and 20 kV**. **Determine** the per-unit impedance of the motor on the new system base values. CO-1 C3 2

(c) For the following power system, draw an equivalent impedance diagram showing all impedances in per-unit system on a 50 MVA base. Consider 20 kV as the voltage base for the generator. CO-1 C3 7

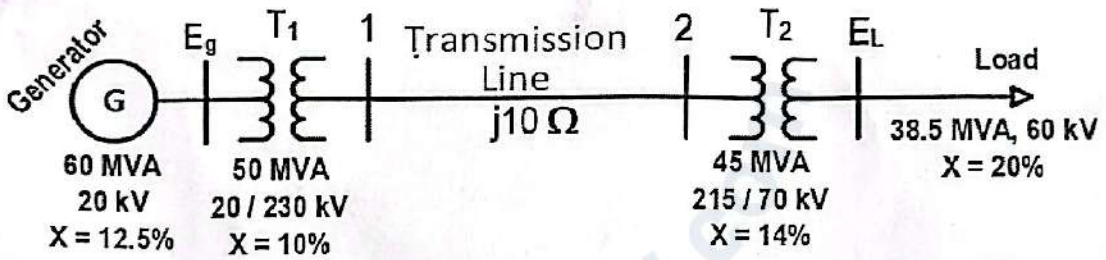


Figure: 1

Q2. ***Figure***: 2 contains an SLD of a Four-bus power system where impedances are given in per unit. With the assistance of admittance diagram, write the KCL equations for all buses, find diagonal and off-diagonal elements and achieve Y_{BUS} matrix. CO-2 C3 7

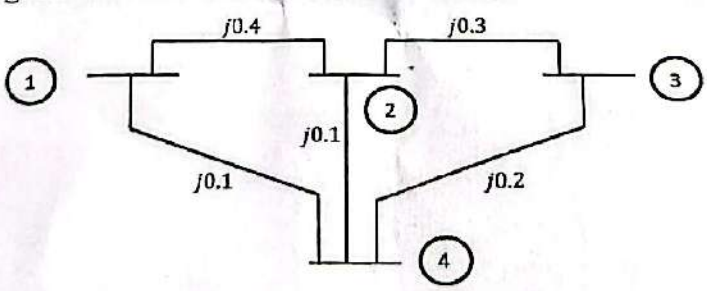


Figure: 2

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Q3. For the given power system in figure below, the line impedances are marked in per unit on 100 MVA base. Using the Gauss-Seidel method, **calculate** the approximate phasor values of the voltages at load buses 2 and 3 (P-Q buses) after performing two iterations. CO-2 C3 7

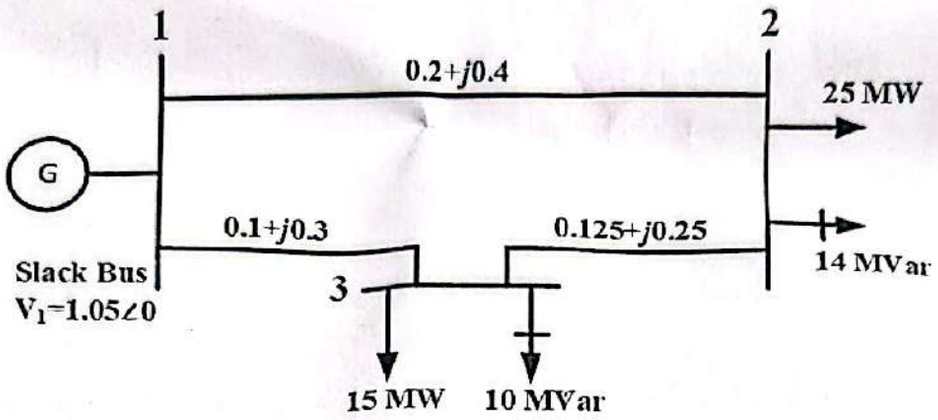


Figure: 3

Q4. *(a)* **Define** Swing Bus, PQ bus and PV bus in a power system and also mention their alternative names. CO-2 C2 2

(b) **Eliminate** bus 3 from the given bus admittance matrix and form new bus admittance matrix by applying Kron method. CO-2 C3 5

$$\begin{bmatrix} -j9.8 & 0.0 & j4.0 & j5.0 \\ 0.0 & -j8.3 & j2.5 & j5.0 \\ j4.0 & j2.5 & -j14.0 & j8.0 \\ j5.0 & j5.0 & j8.0 & -j18.0 \end{bmatrix}$$