B.Sc. in EEE, 3rd Semester   Date: October 04, 2023
DTE, 1st Semester   Time: 2:30 pm to 4:00 pm

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Mid Semester Examination   Winter Semester, A. Y. 2022-2023
Course No.: EEE 4301 / EEE 4395   Time: 1.5 Hours
Course Title: Electrical Power Transmission and Distribution   Full Marks: 75

There are 3 (three) questions. Answer all 3 (three) questions. The symbols have their usual meanings.
Programmable calculators are not allowed. Marks of each question and corresponding COs and POs are
written in the brackets.

1. a) Discuss the relative merits and demerits of underground and overhead systems.   [6+3+3]
      Explain briefly the following systems of distribution :   (CO1,
         (i)   Radial system, and   PO1)
         (ii)   Ring main system.

   b) A 3-phase ring distributor ABCD fed at A at 11 kV supplies balanced loads of 40 A   [7+6]
      at 0.8 p.f. lagging at B, 50 A at 0.707 p.f. lagging at C and 30 A at 0.8 p.f. lagging at (CO2,
      D, the load currents are referred to as the supply voltage at A. The impedances per PO2)
      phase of the various sections are:
      Section AB = (1 + j 2) Ω; Section BC = (2 + j 3) Ω;
      Section CD = (1 + j 1) Ω; Section DA = (3 + j 4) Ω.
      Calculate the currents in various sections and station bus-bar voltages at B, C, and D.

2. a) State the necessity of using isolators on both sides of the circuit breaker. Why do we   [3+3+9]
      use C.T. in the relay circuit? Discuss the different types of bus-bar arrangements used   (CO1,
      in sub-stations. Illustrate your answer with suitable diagrams.   PO1)

   b) In a 3-phase, 4-wire, 400/230 V system, a lamp of 100 watts is connected to one phase   [5+5]
      and neutral, and a lamp of 150 watts is connected to the second phase and neutral. If   (CO2,
      the neutral wire is disconnected accidentally, determine the voltage across each lamp.   PO2)

3. a) Give the comparison of outdoor and indoor sub-stations. Sketch the key diagram of a   [6+5]
      typical 11 kV/400 V indoor sub-station.   (CO1,
                                                                                            PO1)

   b) A 2-wire radial d.c. distributor AB, 900 meters long is fed at A at 400 V, and loads   [7+7]
      of 50 A, 100 A, and 150 A are tapped off from C, D, and E which are at a distance of   (CO2,
      200 m, 500 m, and 800 m from point A respectively. The distributor is also loaded   PO2)
      uniformly at the rate of 0.5 A/m. If the resistance of the distributor per meter (go and
      return) is 0.0001 Ω, calculate the voltage for the following locations:
         (i)   at point B, and
         (ii)   at point D.