



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Mid-Term Examination, Summer – 2026

Course Code: 0713-213
Section: A/B/C/D/E/F/G
Full Marks: 25

Course Title: Energy Conversion I
Level-Term: L2-T1
Exam Date: July 4, 2026

Teacher's Initial: DRA / PA/ RS
Time: 1.5 Hours

Attempt to Answer all 3 Questions

- Q1. a) Draw the phasor diagram of a *inductively* loaded transformer with winding resistance and but no magnetic leakage reactance** CO-1 [3]
C(3)
- b) The core of a 100-kVA, 11500/550 V, 50-Hz, 1-ph, core type transformer has a cross-section of 22 cm × 22 cm. Determine (i) the number of H.V. and L.V. turns per phase and (ii) the e.m.f. per turn if the maximum core density is not to exceed 1.5 Tesla. Assume a stacking factor of 0.9.** CO-1 [4]
C(3)
- Q2. a) Explain the purpose of Short-Circuit Test in a Transformer with necessary diagrams and associated equations.** CO-1 [3]
C(2)
- b) A transformer has a primary winding of 840 turns and a secondary winding of 200 turns. When the load current on the secondary is 75 A at 0.85 power factor lagging, the primary current is 20 A at 0.9 power factor lagging. Calculate the no-load current of the transformer and its phase with respect to the voltage.** CO-1 [5]
C(3)
- Q3. Answer any 2 (Two) from the following questions:**
- a) A 50-kVA, 4,500/220 V transformer has $R_1 = 4.45 \Omega$, $R_2 = 0.009 \Omega$. The values of reactances are $X_1 = 5.2 \Omega$ and $X_2 = 0.017 \Omega$. Compute for the transformer (i) equivalent resistance as ref. to primary (ii) equivalent resistance as ref. to secondary (iii) equivalent reactance as ref. to both primary and secondary (iv) equivalent impedance as ref. to both primary and secondary (v) total Cu loss of the transformer.** CO-2 [5]
C(3)
- b) The data refer to a 1-phase transformer are: Turn ratio 19.5:2; $R_1 = 30 \Omega$; $X_1 = 100 \Omega$; $R_2 = 0.08 \Omega$; $X_2 = 0.25 \Omega$. No-load current = 1.3 A, leading the flux by 30° . The secondary delivers 210 A at a terminal voltage of 500 V and p.f. of 0.8 lagging. Determine the primary current and applied voltage.** CO-2 [5]
C(4)
- c) Obtain the equivalent circuit of a 250/520-V, 50-Hz, single-phase transformer from the following test data :
O.C Test : 250 V, 1.2 A, 80 W – on L.V. side
S.C. Test : 22 V, 12 A, 110 W – on H.V. side
Find the equivalent circuit of the transformer and calculate the secondary terminal voltage when delivering a load current of 15A at pf of 0.8 lagging, the primary voltage being 250V.** CO-2 [5]
C(4)