Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Summer-2026

Course Code: 0713-121
Section: A, B
Full Marks: 40

Course Title: Electrical Circuits II
Level-Term: L1-T2
Exam Date: August 23, 2026

Teacher's Initial: MSA, KNA
Time: 2 Hours

Question no. 1 is COMPULSORY. Answer ANY FOUR from the remaining Questions.

Q1. The switch in the circuit of Fig. 1 closes at t = 0, after being open for a long time. **Calculate** the transient current $i_3(t)$, if $V_s = 120\sqrt{2}\ sin\ (100\pi t + 30°)$ V. CO-3 C(3) 8

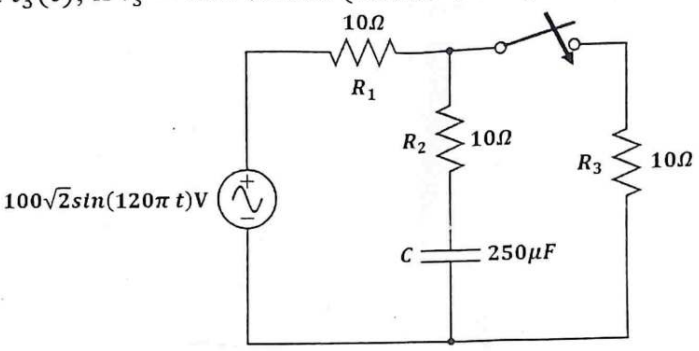

Fig. 1

Q2. The energy stored in the coupled inductors of the circuit diagram shown in Fig. 2 is given by $\frac{1}{2}L_1 i_1^2 + \frac{1}{2}L_2 i_2^2 - Mi_1 i_2$. **Derive** an expression for the maximum possible value of M from the limiting value of the energy, and define *coupling coefficient* (k) from your derived expression. What is the range of coupling coefficient? CO-2 C(2) 8

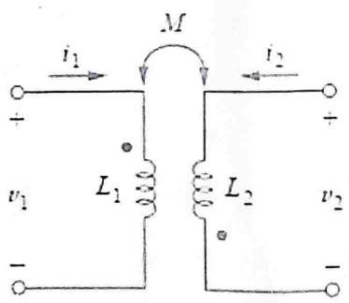

Fig. 2

Q3. **Explain** mathematically what type of filter the circuit in Fig. 3 works as. **Illustrate** the ideal and actual frequency response of this filter, labeling important point(s). CO-2 C(2) 8

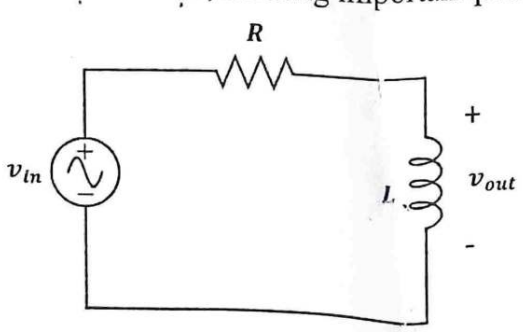

Fig. 3

Q4. **(a)** Resonant frequency and quality factor of a RLC series resonant circuit is 10 rad/s and 20, respectively. **Determine** R, L, and C. Also, determine the amplitude of the currents at ω_o and ω_1, ω_2. CO-2 C(3) 4

(b) A parallel resonant circuit has $R = 100k\Omega$, $L = 20mH$, and $C = 5nF$. Calculate ω_o and ω_1, ω_2, Q and B. 4

Q5. **(a)** For the Y-Δ circuit in Fig. 5(a), **determine** the line currents, and average power delivered to the load. CO-2 C(3) 4

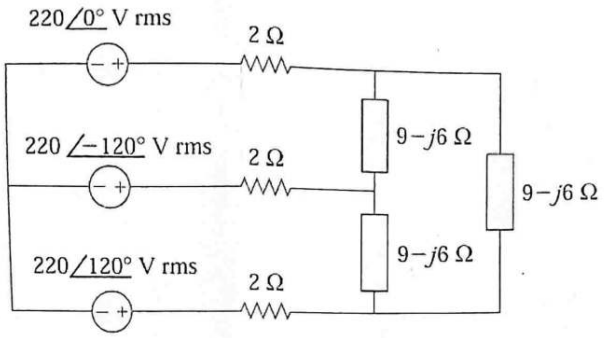

Fig. 5(a)

(b) A three-phase Δ-connected motor draws 10 kVA at a power factor of 0.8 lagging. If the three-phase system has an effective line voltage of 400 V with *abc* phase sequence, **find** the line current. 4

Q6. Determine the currents i_1, and i_2 in the circuit of Fig. 6. **Calculate** the energy stored in the coupled coils at time $t = 1s$, if $v_s = 120\ cos\ 10t$ V. CO-2 C(3) 8

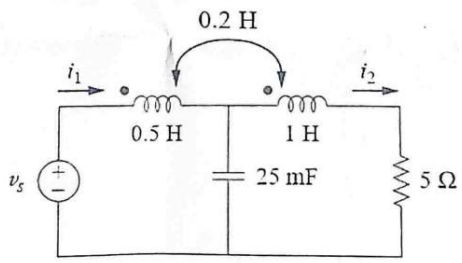

Fig. 6

Q7. The unbalanced Δ-load of Fig. 7 is supplied by balanced line-to-line voltages of 230 V in the positive sequence. Find: (i) the line currents I_a, I_b, I_c, and (ii) the total power absorbed by the load. CO-2 C(3) 8

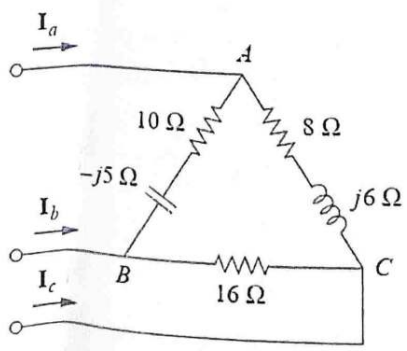

Fig. 7