B.Sc. in CSE, 2nd Semester

Date: 29th May, 2024
Time: 10:00 am-01:00 pm

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

Final-Semester Examination   Summer Semester, A. Y. 2022-2023
Course No.: PHY 4241   Time: 3 hours
Course Title: Physics II   Full Marks: 150

There are 6 (six) questions. Answer all 6 (six) 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.

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1. a) Explain why capacitors and inductors are called storage elements.   13
                                                                                          (CO2,
                                                                                          PO2)
   The voltage across a 200-mH inductor is given by
   $v(t) = 3t^2 + 2t + 4$ V   for $t > 0$.
   Determine the current $i(t)$ through the inductor. Assume that $i(0) = 1$ A.

   b) Calculate the equivalent inductance for the inductive ladder network in Figure 1b.   12
                                                                                          (CO2,
                                                                                          PO2)

Figure 1b

2. a) An initially uncharged 1-mF capacitor has the current shown in Figure 2a across it.   12
   Calculate the voltage across it at $t = 2$ms and $t = 5$ ms.   (CO2,
                                                                                          PO2)

Figure 2a

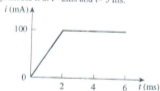   b) Determine v_c, i_L, and the energy stored in the capacitor and inductor for the circuit   13
   shown in Figure 2b under dc conditions.   (CO2,
                                                                                          PO2)

Figure 2b

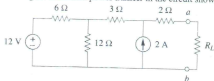3. a) Find the value of R_L for maximum power transfer in the circuit shown in Figure 3a.   **20 (CO2, PO2)**

Figure 3a

b) Find the maximum power transfer that takes place in the circuit shown in Figure 3a.   **05 (CO2, PO2)**

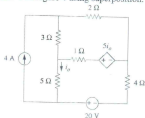4. Find i_o in the circuit shown in Figure 4 using superposition.   **25 (CO2, PO2)**

Figure 4

5. a) Find the amplitude, phase, period, and frequency of the following sinusoids   **10 (CO2, PO2)**
   i) $v(t) = 12 \cos(50\,t + 10°)$
   ii) $30 \sin(4\pi t - 75°)$

b) Determine the input impedance of the circuit shown in Figure 5b at an angular frequency of 10 rad/s.   **15 (CO2, PO2)**

Figure 5b

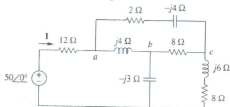6. Find current I in the circuit shown in Figure 6.   **25 (CO2, PO2)**

Figure 6