B.Sc. Engg. (EE), 1st Semester Date: October 25, 2021

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Semester Final Examination — Winter Semester, A. Y. 2020-2021
Course No.: EEE 4101 — Time: 1.5 Hour (Part 1+2+3)
Course Title: Electrical Circuit I — Full Marks: 75 (Part 1+2+3)

There are **3 (three)** questions. It will be given one after another. Answer **all the** questions. Marks are given in the right margin (in brackets) along with course outcome and program outcome. Assume any data if necessary.

Special note: You will get 3 questions (In 3 parts) one after another. At 2:30 pm (Bangladesh Standard Time), you will get one question through Google classroom. You will have 22 minutes for writing and 8 minutes for uploading. At 3:00 pm, you will get the 2nd question. Same timing rule applies here. You will get the 3rd (final) question at 3:30 pm. Exam will be finished at 4:00 pm (including uploading). Everyone will answer 3 questions. You will upload your answers in the Google classroom (Not in general classroom but in section wise class room). If you are not yet connected to my Google classroom, then join with this code now. Code for section A is **4jm3gye,** code for section B is **jodqw4w** and code for section C is **4pqrvl2.** When you will upload, for every part you have to upload a single PDF merging all the pages. The name of the PDF will be your student ID. You have to enter into zoom room which is allocated for you and you will be monitored using video by the invigilators. As the video will be recorded, it will be scrutinized later and strict action will be taken if anyone is found guilty. Thank you.

Part 1 (22 minutes for writing and 8 minutes for uploading)

1(a): In the following question, M is the last digit of your student ID. If the last digit of your student ID is even then answer question (i) and if the last digit of your student ID is odd then answer question (ii). (10) (CO3) (PO1)

(i) Assume that a sinusoidal voltage, V_m sinωt, is applied to an ideal capacitor. For a steady-state equilibrium, find the expression of current, impedance, power and energy and draw the voltage, current and power in the same diagram.

(ii) Assume that a sinusoidal voltage, V_m sinωt, is applied to an ideal inductor. For a steady-state equilibrium, find the expression of current, impedance, power and energy and draw the voltage, current and power in the same diagram.

1(b): In the following question, M is the last digit of your student ID. If the last digit of your student ID is 0 then the value of M = 10. Find the input voltage of the circuit in Fig. 1(b) if (5) (CO4) (PO1)

$$v_a = 10 * M\ sin(377t + 30°)$$
$$v_b = 5 * M\ sin(377t + 60°)$$
and $f = 60\ Hz$

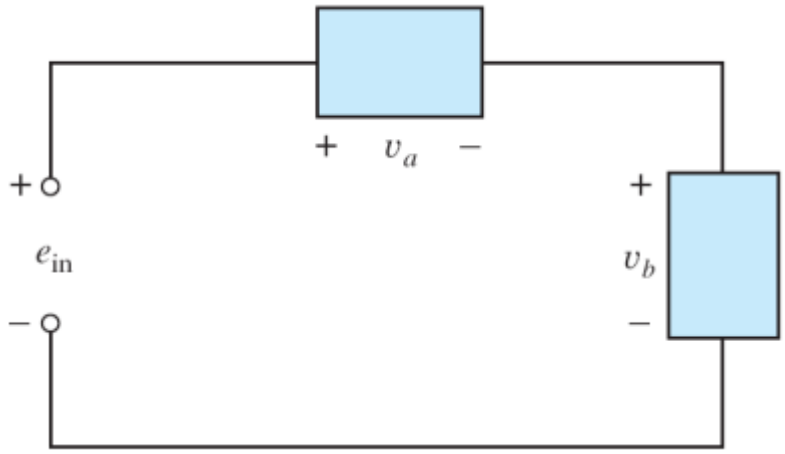

Figure 1(b)

1(c) In the following question, M is the last digit of your student ID. If the last digit of your student ID is 0 then the value of M = 10. Consider a series RLC branch wherein R = 10 ohms, L = 0.10 henry, and C is 200 μF. Assume that the current i = M sin (157t) amperes flows through the RLC branch. (10) (CO3) (PO1)

(i) Write the expression for the voltage drop across R employing numerical coefficients.
(ii) Write the expression for the voltage drop across L employing numerical coefficients.
(iii) Write the expression for the voltage drop across C employing numerical coefficients.
(iv) Add (i), (ii), and (iii) to find the voltage drop across the RLC branch. Express the result as a single sine function of time.