

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

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Mid-Semester Examination
Course No.: EEE 4201
Course Title: Electrical Circuit II

Summer Semester, A.Y. 2020-2021
Time: 90 Minutes
Full Marks: 75

Marks in the margin indicate full marks. It is an open book exam. Students are not allowed to use any keyboard and mobile during the examination time. Assume suitable values for any missing data.

All questions must be answered

1. a) Name the type of circuits for which the corresponding power triangle will be located in all 4 (four) quadrants of the x-y plane. 04
- b) Why does the apparent power not obey the law of conservation of ac power but the other powers do? 04
- c) What is the primary advantage of constant instantaneous power of a balanced 3 – ϕ system? 04
- d) Imagine you have an AC network which can be solved by any network theorem of your choice. Which are the characteristics your network must fulfill for this to happen? 04
- e) What are the benefits of phasor representation over graphical representation? 04
- f) Explain the concept of linearity with the help of a suitable example. 04
- g) “Power factor correction (PFC) is beneficial for both the power companies and consumers”← Justify the statement with the help of necessary circuit and phasor diagrams. 04
- h) Sketch the vector diagrams of the phase voltages, phase currents, line voltages, and line currents of a balanced wye-delta connection with $Z_{\Delta} = 1 \angle idd^{\circ}$ where, *idd* = *twice the value of the last 3 digits of your student number*. Include necessary expressions wherever necessary. 12

2. a) For the circuit in Fig. 2(a), $V_s = 8 \sin(4t + id)$ V where, $id = \text{last three digits of your student number}$. Determine the value of V_{th} . 05

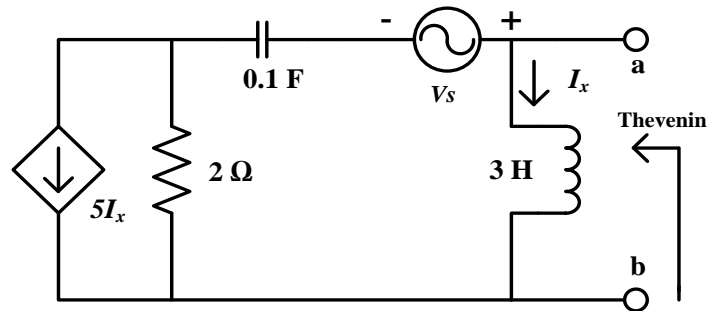


Fig. 2(a)

- b) What is the significance of the factor $e^{j\omega t}$ in a phasor? Does this factor appear in an actual phasor representation of a sinusoidal? If yes, how? If not, why? 05
- c) Why do we need to use dot convention instead of the passive sign convention in determining the polarity of mutually inductive voltage? 05
- d) What do you understand by the positive and negative phase sequence of an $3 - \phi$ $3 - w$ system? What is their significance? 05
- e) What is your recommended technique for solving a poly-phase system having more than one frequency components? Justify your recommendation. 05
- f) Explain the significance of reflected impedance and impedance matching in communication engineering. 05
- g) In ladder shaped phase-shifters, the phase-shift contribution from each segment is not equal. Explain the reasons with appropriate circuit diagrams. 05