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

Mid-Semester Examination   Summer Semester, A. Y. 2022-2023
Course No.: EEE 4281   Time: 90 Minutes
Course Title: Electrical Circuits and Machines   Full Marks: 75

There are **3 (three)** questions. Answer all 3 (three) 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.

---

1. a) State the theorem of superposition for DC circuit analysis. Clarify the reason(s) for implementing this theorem. Describe the steps to obtain the total response of a linear circuit using the superposition theorem.   12 (CO1, PO1)

   b) Determine the unknown current from the circuit shown in Figure 1 using any suitable circuit analysis technique.   13 (CO1, PO1)
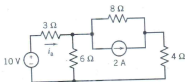
Figure: 1

2. a) According to Faraday's law of induction, the variations in magnetic flux with time produces current. From the following three figures as shown in Figure 2a, illustrate the working principle to produce induced current due to variation in magnetic fields.   12 (CO3, PO3)
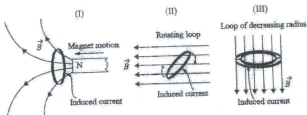
Figure: 2a

   b) Determine the output voltage in the phasor domain (Vo) from Figure 2(b).   13 (CO2, PO2)
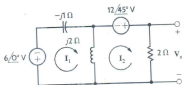
Figure: 2(b)

3. a) China Southern Power Grid Company is the fifth largest power generation company in the world. The company recommended Chinese government to start remodeling of transmission line systems in major cities. Before this recommendation, the company itself implemented an internal technical survey and asked expert opinion of engineers regarding the choice of poly-phase electrical connection over single phase. Assume that, you are an engineer of this company, state your preferred opinion and justify your answer.

12
(CO4,
PO4)

b) As an engineer, you are required to design and analyze the circuit for domestic applications as shown in Figure 3. Determine the line voltage, line current, phase voltage, and phase current of the source and load, respectively. (all the symbols have their usual meaning)
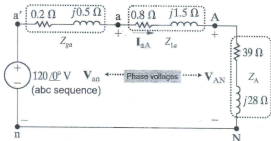
13
(CO4,
PO4)

Figure: 3