

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

Mid-Semester Examination
 Course No.: PHY 4241
 Course Title: Physics II

Summer Semester, A. Y. 2022-2023
 Time: 90 Minutes
 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) Define an electric circuit. Identify the difference between active elements and passive elements with examples. 6
(CO1, PO1)
- b) i. The current flowing past a point in a device is shown in Figure 1b(i). Calculate the total charge through the point. 19
(CO2, PO2)



Figure 1b(i)

ii. Obtain the circuit in Figure 1b(ii) to a single resistor at terminals a-b.

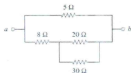


Figure 1b(ii)

2. a) i. Discuss the difference between a linear resistor and a nonlinear resistor. 12
(CO1, PO1)
- ii. A resistor absorbs an instantaneous power of $30\cos^2 t$ mW when connected to a voltage source $v = 15\cos t$ V. Find the current through the resistor and the resistance of the resistor.
- b) i. Obtain I and V_{ab} in the circuit of Figure 2b. 13
(CO2, PO2)



Figure 2b

3. a) Calculate v_1 and v_2 in the circuit of Figure 3a using nodal analysis.



Figure 3a

12.5,
(CO2,
PO2)

- b) Use mesh analysis to obtain i_1 , i_2 and i_3 in the circuit of Figure 3b.

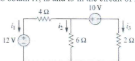


Figure 3b

12.5
(CO2,
PO2)