B.Sc. in EEE, 8th Semester 24 February 15, 2023
Time: 02:00pm-03:30pm

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

Mid-Semester Examination | Summer Semester, A. Y. 2021-2022
Course No.: EEE 4841 | Time: 90 Minutes
Course Title: Microwave Engineering | 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.

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1. a) Formulate equations for the voltage and current of an ideal transmission line carrying microwave signals. Assume the transmission line to be a coaxial cable. **20 (CO1, PO1)**

   b) Compare the wave equation of voltage (of the transmission line specified in **question 1.a**) and the wave equation of a TEM wave. **05 (CO2, PO2)**

2. a) For the section of the transmission line in **Figure 2(a)**, calculate the reflection coefficient and transmission coefficient at the point of load. [$\beta=\frac{\pi}{3}$ rad/cm, ab= $\frac{1}{2}$cm]. **15 (CO2, PO2)**

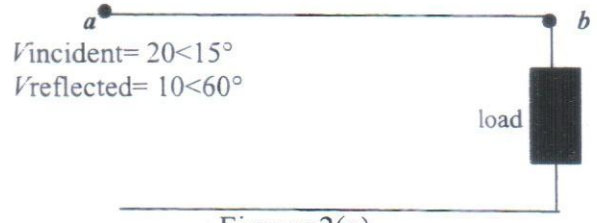

Figure: 2(a)

State the performance of the line in terms of power loss.

   b) Determine the main reason behind power loss in a microwave-carrying transmission line and describe its detrimental effects. Name some parameters that are used to analyze the status of power flow in such lines. **10 (CO1, PO1)**

3. a) Formulate an expression for the voltage reflection coefficient in terms of impedances only. **10 (CO1, PO1)**

   b) For the section of the transmission line in **Figure 3(b)**, find out the reflection coefficient at the point of load, using Smith chart. [$\beta=\frac{\pi}{3}$ rad/cm, ab= $\frac{1}{2}$cm, load impedance=100+j40 Ω, characteristic impedance= 50 Ω]. **15 (CO2, PO2)**

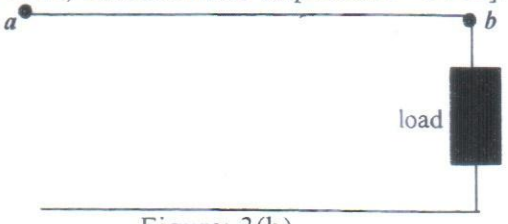

Figure: 3(b)