BANGLADESH UNIVERSITY OF BUSINESS AND TECHNOLOGY (BUBT)
Faculty of Engineering and Applied Sciences
Department of Computer Science and Engineering
Program: B.Sc. in CSE
EEE 211: Electronic Devices and Circuits
(Section: 1 & 2; Shift: Day; Intake: 47)

Mid Term **Fall 2021-22** **Total Marks: 30** **Time: 2 hrs**

Course Instructor: Mohammad Nowshed Al Nur

Instructions:

- Answer all the questions. Q1 includes 5 (five) short questions in total with 1 (one) mark each.
- The marks on the right-hand side in square brackets indicate marks for that question only.
- *Please attach your answer script in PDF format in Google Classroom.*
- Please do not forget to name the PDF file as: **MID_ID_Name.pdf**
  (Example: MID_15162108019_Mehedi Hasan.pdf**)**
- Upload the answer script in right position / orientation.

CO1: Learn about the basic concepts of different electronic devices like diode, BJT, Op-Amp and MOSFET. **[PO1]**

1. a) Given a diode current of X mA and ideality factor=1, find reverse saturation current I_s if the applied voltage is 0.5 V and the temperature is room temperature (25°C). Take X=1+last digit of your student ID. **[1]**

b) In the reverse-bias region the saturation current of a silicon diode is about X μA (at T =20°C). Determine its approximate value if the temperature is increased 40°C. Take X=1+last digit of your student ID. **[1]**

c) Why do we get a forward voltage drop across a practical diode? Explain briefly. **[1]**

d) Given a diode current of 6 mA, thermal voltage of 26 mV, ideality factor of 1 and reverse saturation current of 1 nA, find the applied voltage across the diode V_D. **[1]**

e) From the I-V characteristics of zener diode, briefly explain how zener diodes operate as voltage regulators. **[1]**

CO2: Design and analyze rectifiers and voltage regulators using diodes. **[PO2]**

2. Sketch v_o versus time for the circuit in Fig. Q2. Take R= 1 kΩ. Replace X with the last digit of your Student ID. **[5]**

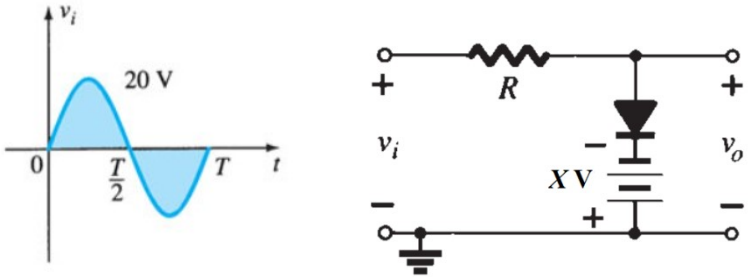

Fig. Q2

3. **(i)** Sketch v_o versus time for the circuit in Fig. Q3. The input is a sine wave given by $v_i = 10$ sinωt V. Assume the diodes to be ideal. **(ii)** Determine the rms value of the output voltage. Replace X with the last digit of your Student ID. **[5]**

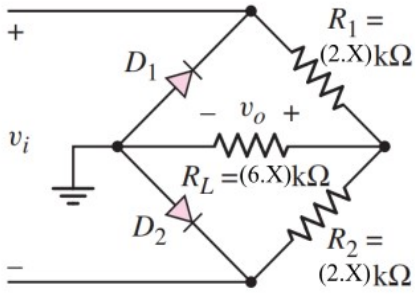

Fig. Q3

4. Sketch v_o versus time for the circuit in Fig. Q4. Take R= 1 kΩ. Replace X with the last digit of your Student ID. **[5]**

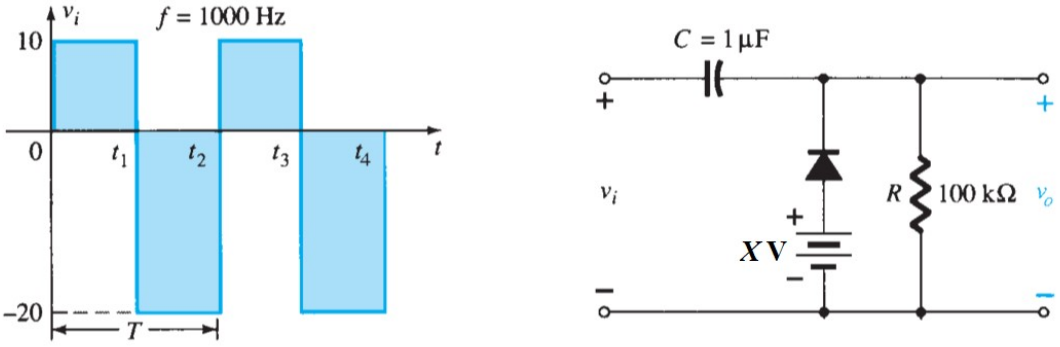

Fig. Q4

5. Consider the circuit shown in Fig. Q5. Assume each diode to be silicon diodes. Determine, the resistances R_1, R_2, and R_3 such that I_{D1} = 0.2X mA, I_{D2} = 0.3X mA, and I_{D3} = 0.5X mA. Replace X with the last digit of your Student ID. **[5]**

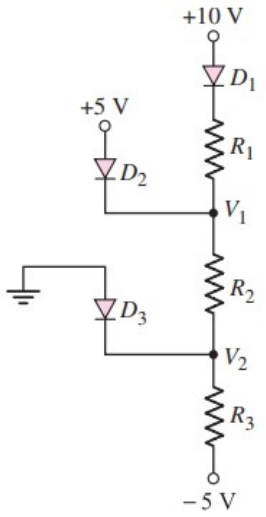

Fig. Q5

6. For the circuit shown in Fig. Q6, find the maximum and minimum values of zener diode current for the range of input voltage, +80V ≤ V_i ≤ +120 V. Take X=1+last digit of your student ID. **[5]**

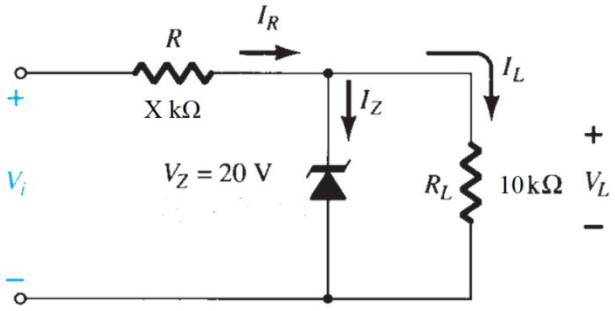

Fig. Q6