Noakhali Science and Technology University
Department of Computer Science and Telecommunication Engineering
2nd Year 2nd Term B.Sc. (Engg.)   Session: 2019-20   Final Examination – January, 2022
Course Code: CSTE 2203   Course Title: Digital Electronics and Pulse Techniques
Time: 3 hours.   Total Marks: 70
[Answer any seven of the following questions. Figures in the right-hand margin indicate full marks]

1. a) By using a 555 IC, design an Astable multivibrator to oscillate at the frequency of 50KHz, duty cycle 63%   5

   b) Draw and explain the internal diagram of a Voltage Controlled Oscillator (VCO) by using 555 IC.   5

2. a) Design an Astable multivibrator using NPN transistors to oscillate at the frequency of 100KHz.   5

   b) Explain the Monostable circuit shown here.   5
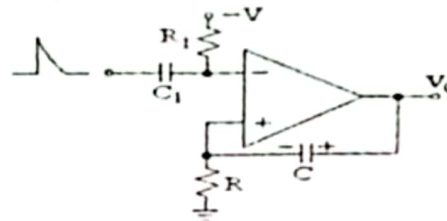
3. a) Explain the Schmitt trigger circuit shown here.   5
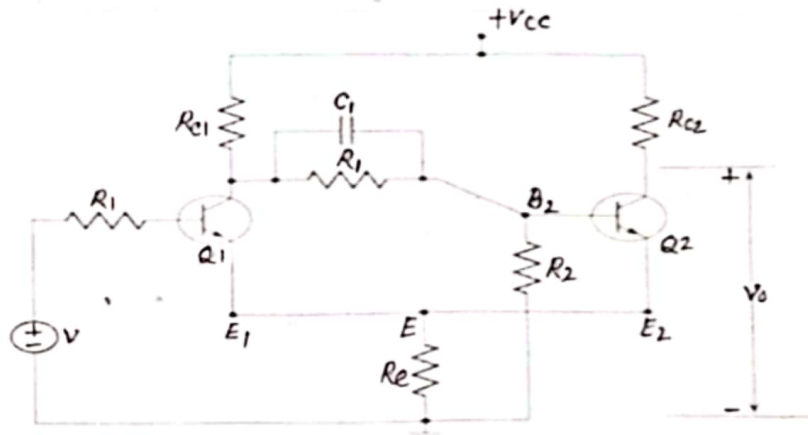
   b) Draw and explain the internal diagram of a TTL NAND gate.   5

4. a) Compare the properties of open collector TTL NAND gate with those of Totem-pole TTL NAND gate.   5

   b) Why the Totem-pole output of TTL NAND gate cannot be tied together?   5

5. a) By using an UJT, design a relaxation oscillator to oscillate at the frequency of 200KHz (approximately). the intrinsic stand-off ratio=0.6   5

   b) Explain the static emitter characteristic curve of UJT.   5

6. a) What is fan-out of logic gate? Draw the logic circuit of fan-out 3 with two inputs NAND gates.   3

   b) Compare the Current-Sourcing and Current-Sinking capabilities between two input NOR gates where one gate is working as driving gate and other working as a load gate. Show these operations with suitable logic circuits.   4

   c) Write the cut-off characteristics of a PNP Transistor switch with circuit diagram.   3

7. a) Design 16kx8 EEPROM and deduce with truth-table.   5

   b) Design a 32x8 RAM combining two 16x4 RAMs and derive operations.   5

8. a) Show the comparison between Clipper and Clamper circuits with appropriate figures   4

   b) Design two simple clipper circuit when diode and resistor are interchanged and explain their operations.   4

   c) If V_i=50V P-P; V_{B1}=15V and V_{B2}=15V of the following figure. Draw the output voltage V_0 with appropriate figure and explain the circuit operations.   2

R

D1 D2

V_i

V_{B1} V_{B2}

V_o
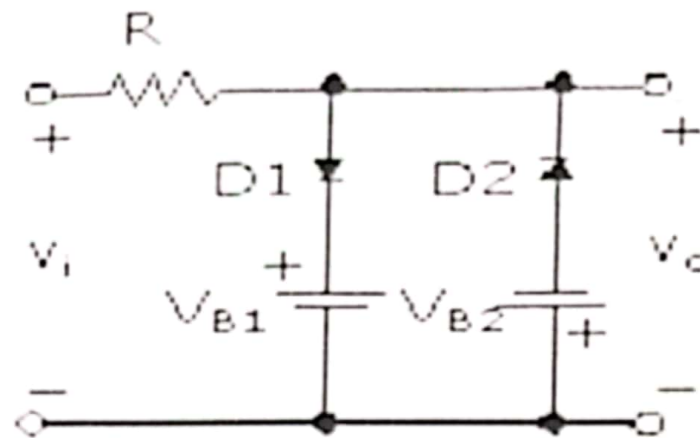
9) a) By using an Op-Amp, design a relaxation oscillator to oscillate at the frequency of 10KHz
   b) Draw the charging and discharging waveforms the capacitor used in the relaxation oscillator by Op-amp.

Course Title: **Digital Electronics and Pulse Technique**
Department of Computer Science and Telecommunication Engineering
Year 2, Term 2, Final Examination (January 2022), Session 2018-19
Course Code: **CSTE 2203**, Full Marks: 70, Time: Three hours
Answer any SEVEN of the following questions.

1. a) Draw and explain the Astable multivibrator by using 555 IC.   5
   b) Draw and explain the internal diagram of a Voltage Controlled Oscillator (VCO) by   5
   using 555 IC.

2. a) Draw the circuit of TTL gate with Totem-Pole output.   3
   b) Explain the CMOS logic gate.   5
   c) Draw the internal diagram of a TTL NAND gate.   2

3. a) Explain the 'Quantization error'. How can you minimize it?   5
   b) Draw and explain a DAC by using Op-amp summing amplifier.   5

4. a) Explain the architecture of static RAM.   6
   b) Write the comparisons among MROM, EPROM and EEPROM.   4

5. a) Compare the properties of open collector TTL NAND gate with those of Totem-pole   5
   TTL NAND gate.
   b) Why the Totem-pole output of TTL NAND gate cannot be tied together?   5

6. a) Why should the RC time constant be large in a clamper circuit?   5
   b) Draw and explain a clipper circuit to clip the **positive** half cycle of a sinusoidal signal.   5

7. a) Show how to move the UTP and LTP in the **negative** direction of the transfer   5
   characteristics of Op-amp?
   b) Design an Op-amp relaxation oscillator for producing freq. f=1.7 KHz, if C=0.1µF and   5
   feedback resistance is 1 KΩ.

8. a) Design a low frequency pulse generator circuit with frequency 3 Hz with 60% duty   5
   cycle. Calculate the time period, resistors and capacitor values as well.
   b) Describe the construction of Miller sweep generator.   5

9. a) By using Op-amp, draw and explain a relaxation oscillator.   5
   b) Draw the charging and discharging waveforms the capacitor used in the relaxation   5
   oscillator by Op-amp.

Noakhali Science and Technology University
Department of Computer Science and Telecommunication Engineering
2nd Year 2nd Term B.Sc. (Engg.) Final Examination April-2017
Course Code: CSTE 2203   Course Title: Digital Electronics and Pulse Technique
Time: 4 hours.   Total Marks: 70

[Answer any seven of the following questions. Figures in the right hand margin indicate full marks]

a) Write down the general characteristics of Op-amp.   04
b) By using an Op-amp, draw and explain a waveform converter circuit to produce triangular waveform pulses.   06

a) Draw and explain a relaxation oscillator by using UJT.   04
b) Draw the circuit diagram of a modified TTL NAND gate and also draw the transfer characteristics curve.   04
c) Describe one application of Schmitt triggers other than their use in relaxation oscillators.   02

a) Decide what to do with unused input pin of an AND gate and that of an OR gate. Explain it briefly.   04
b) Draw the circuit diagram of two bit serial reverse shift register.   02
c) Define: Quantization error, Step size, resolution of ADC and DAC and percentage of resolution.   04

a) What is meant by 45% duty cycle?   02
b) Why is it impossible to obtain 50% duty cycle pulse train in an astable multivibrator by using a 555 IC?   03
c) Draw and explain the internal diagram of 555 IC when it is used as a Monostable multivibrator.   05

a) Write a short note on linear wave shaping.   02
b) Mathematically prove that the output voltage, for a low pass RC circuit, is proportional to the integral of the input voltage.   08

a) Justify the following statement "The resolution of ADC and DAC can be increased by increasing the number of bits in the digital value".   04
b) A five-bit DAC has a current output for a digital input of 10100, an output current of 10 mA is produced. What will the output current be for a digital input of 11101?   06

a) Draw and explain a DAC using op-amp summing amplifier.   06
b) Explain the working principle of a flash ADC.   04

a) What are the basic differences between TTL and CMOS signals?   03
b) Explain, with necessary diagram, the principle of operation of an N-MOS inverter.   04
c) Write the various characteristics of MOS logic gates regarding speed, power utilization and packing density.   03

a) Explain the working principle of a TTL NOT gate.   05
b) Compare the properties of a CMOS switch with those of a BJT switch.   04
c) What is meant by 'Quantization error' of TTL device?   01

Noakhali Science and Technology University
Department of Computer Science and Telecommunication Engineering
2nd Year 2nd Term B.Sc. (Engg.) Final Examination- August, 2016
Course Code: CSTE 2203   Course Title: Digital Electronics and Pulse Technique
Time: 4 hours.   Session: 2013-2014   Total Marks: 70
[Answer any seven of the following questions. Figures in the right hand margin indicate full Marks]

1. a) Draw and explain the working principle of a non-inverting amplifier with op-amp.   3
    b) An op-amp relaxation oscillator has feedback fraction B=0.5, feedback resistor R=10 ohms and charging-discharging capacitor C=0.0022μF. What is the frequency of the output rectangular wave?   (7)

    $T = 2RC \ln \frac{1+B}{1-B}$

2. a) Write the name of 5 logic families.   2
    b) Mention the characteristics of TTL. Draw the basic TTL NAND gate with diode equivalent circuit and describe the operation of TTL NAND gate when two inputs will be LOW.   6
    c) Write the characteristics of ECL and draw only the ECL circuit.   2

3. a) Draw and explain an op-amp Integrator circuit.   5
    b) Draw and explain an op-amp Differentiator circuit.   5

4. a) Explain a special condition for charging a capacitor linearly.   4
    b) By using an op-amp, draw and explain a waveform converter circuit to produce triangular wave from pulses   6

5. a) Explain 32x4 memory operation.   4
    b) Describe the conditions at each input and output when the data word 1110 is to be written into address location 01101   2
    c) Design 64x4 RAM and define its READ and WRITE operations.   (4)

6. a) What is meant by 45% duty cycle? Explain with an example.   4
    b) Draw and explain the internal diagram of 555 IC when it is used as a Monostable multivibrator.   6

7. a) Distinguish between ADC and DAC.   2
    b) Draw R/2R ladder DAC.   2
    c) Describe briefly the Flash ADC with operating table.   6

8. a) Explain the working principle of a TTL NAND gate.   5
    b) Compare a MOSFET switch and a BJT switch.   4
    c) What is meant by 'Fan out' of TTL device?   1

9. a) What is Multivibrator? Write the functions of Multivibrator.   2
    b) Distinguish among Astable, Monostable and Bistable Multivibrators.   3
    c) Explain briefly the operation of an Astable Multivibrator using 555 Timer IC.   5

Department of Computer Science and Telecommunication Engineering
Y-2, T-2, Tutorial-1, Session 2015-16
Course Code: CSTE 2203, (Digital Electronics and Pulse Technique)
Full Marks: 25   **SET B**   Time: 50 minutes
Answer **all** of the following questions.

1) Show that the output frequency of a free-running multivibrator by using 555 IC is as   9

   follows: $f = \dfrac{1.44}{(R_A + 2R_B)C}$, Calculate f when C=10 µF

                                                                                                      9

2) Prove that $T = 2RC \ln \dfrac{1+B}{1-B}$ is the period of the output rectangular wave of an op-amp relaxation oscillator. Where B= feedback fraction. Calculate T when B=0.5

3) By using an Op-amp, draw and explain a relaxation oscillator.   7

Department of Computer Science and Telecommunication Engineering
Y-2, T-2, Tutorial-1, Session 2015-16
Course Code: CSTE 2203, (Digital Electronics and Pulse Technique)
Full Marks: 25 **SET A** Time: 50 minutes
Answer **all** of the following questions.

1) By using an Op-amp, draw and explain a relaxation oscillator. 7

2) Prove that $T = 2RC\ln\dfrac{1+B}{1-B}$ is the period of the output rectangular wave of an op- 9

amp relaxation oscillator. Where B= feedback fraction.

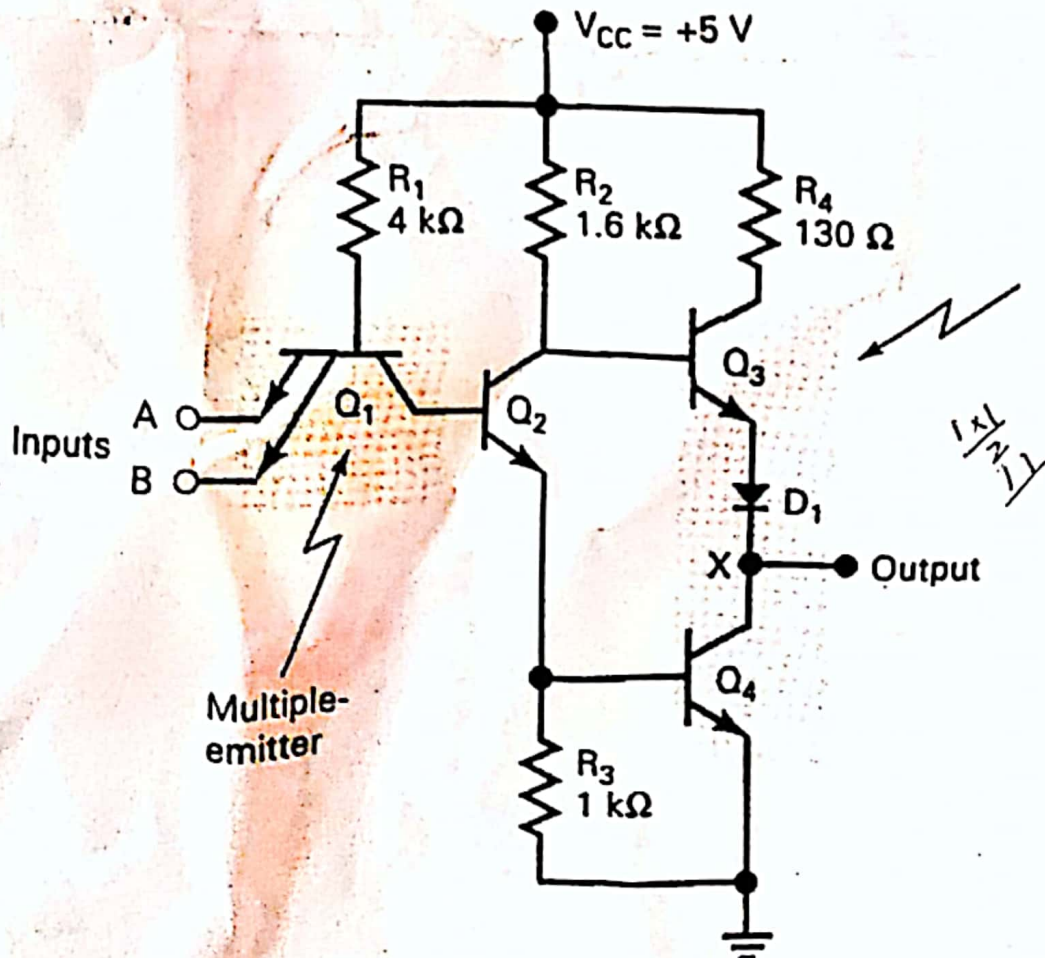3) Show that the output frequency of a free-running multivibrator by using 555 IC is as 9

follows: $f = \dfrac{1.44}{(R_A + 2R_B)C}$

Department of Computer Science and Telecommunication Engineering
Y-2, T-2, CT-1, Session 2017-18
Course Code: CSTE 2203, (Digital Electronics and Pulse Technique)
Full Marks: 25   Time: 50 minutes
Answer **all** of the following questions

1) Explain the following relaxation oscillator. Calculate the oscillating frequency of the   6
oscillator if $R = 1\ K\Omega,\ R_1 = 2\ K\Omega,\ R_2 = 18\ K\Omega,\ C = 0.1\ \mu F$

n-p-n BJT এর
এটা
Astable
Multivibraton..
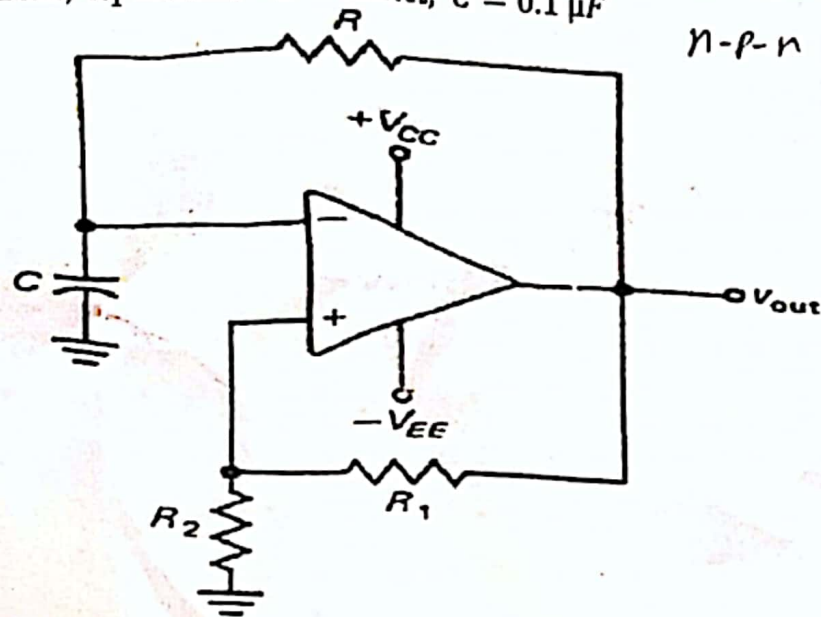
2)   Explain the following TTL circuit by using the logic input either A=0, B=0 or A=1, B=1   6

3. What is the largest output voltage from an 8-bit DAC that produces 2 V for a digital input of 00110010? 6

4. Prove that the output frequency of the following free-running multivibrator is calculated as: $f = \dfrac{1.44}{(R_1 + 2R_2)C}$ 7