BRAC University
Dept. of Computer Science and Engineering

Quiz 2: **20 min**
Full Marks: **10**
SET **A**

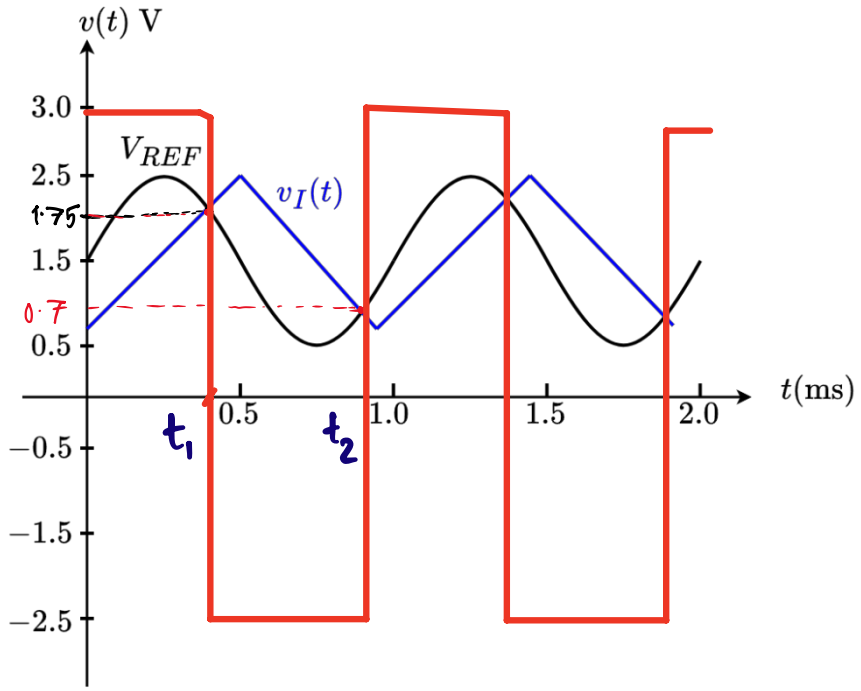
Semester: Fall 2023
Course Code: CSE251
Section:
Course Name: **Electronic Devices and Circuits**

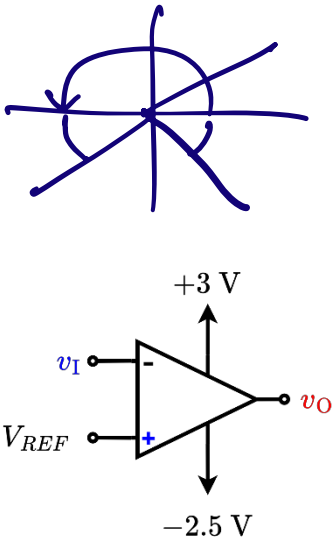
Name: _____

Student ID: _____

- ✓ No washroom breaks. Phones must be turned off. Using/carrying any notes during the exam is not allowed.
- ✓ At the end of the exam, the **exam script** must be returned to the invigilator.
- ✓ Marks allotted for each question are mentioned beside each question.
- ✓ Write your answers inside the indicated boxes (where applicable). If you run out of room for an answer, please continue on the back of the page".
- ✓ Symbols have their usual meanings.

Question 1[CO2] 4 Marks





Assume that the Op-amp on the right is ideal. The wave shapes of v_I and V_{REF} are shown on the adjacent graph.

- **Draw** the waveshape of the output voltage of the op-amp $v_O(t)$ on the graph provided above. Indicate the time (t) in which switching would occur in $v_O(t)$.

$$v_I = 1.5 + \sin\left(\frac{2\pi}{1} \times t_1\right) = 1.75$$

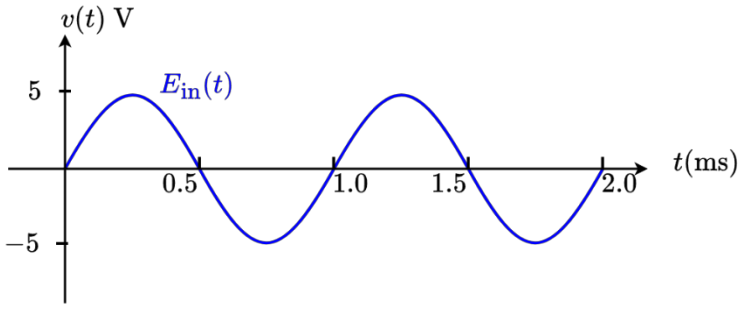
$$\therefore t_1 = 0.5 - \frac{1}{2\pi}\sin^{-1}(1.75 - 1.5)$$

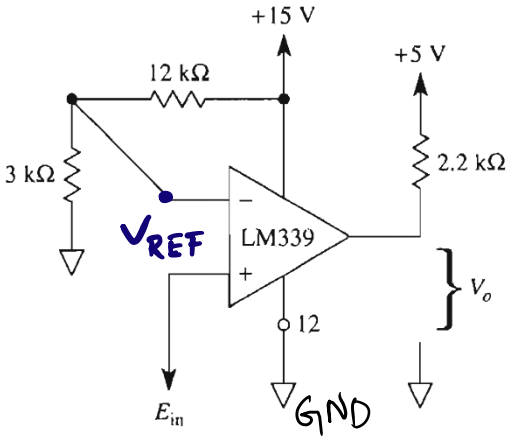
$$= 0.45 \text{ ms}$$

$$t_2 = 1 + \frac{1}{2\pi}\sin^{-1}(0.7 - 1.5)$$

$$= 0.85 \text{ ms}.$$

Question 2 [CO2] 6 Marks



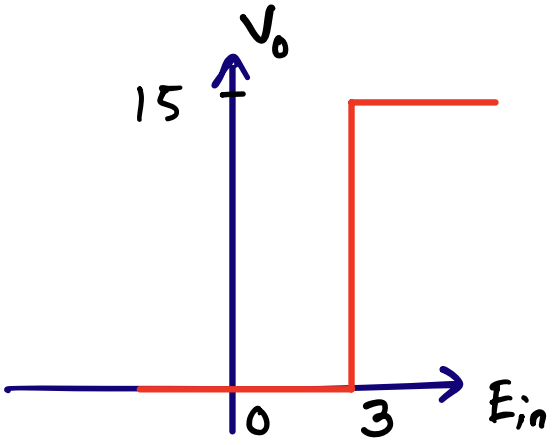


Assume that the Op-Amp on the right is ideal. Answer the following questions.

i. Sketch accurately the graphs of V_O vs E_{in}.

ii. Sketch accurately the graphs of V_O vs t. Find out the time (t) in which switching would occur in $V_O(t)$.

(i)



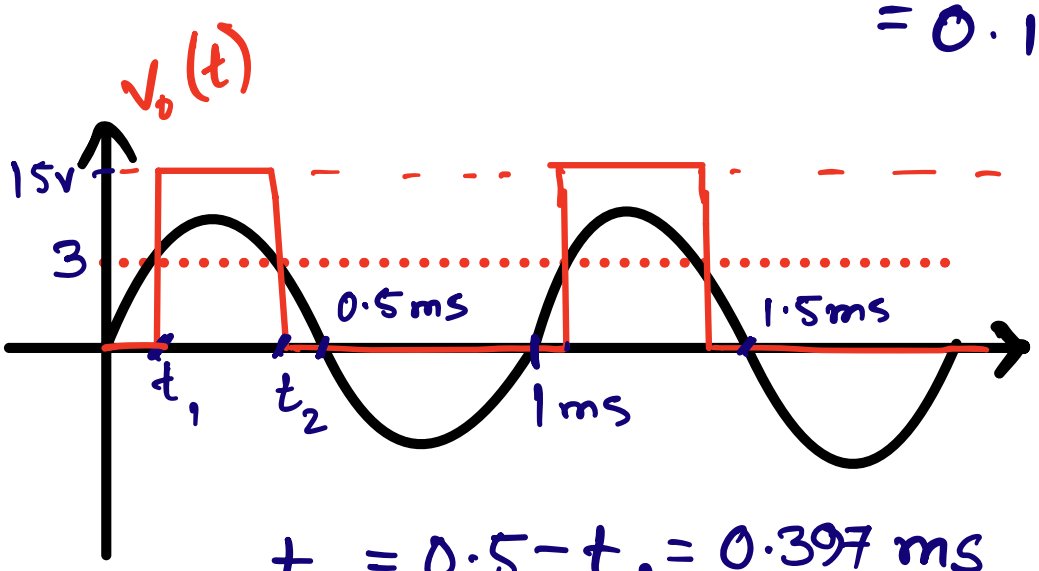
$V_{REF} = \frac{3}{15} \times 15\ V$

$= 3V$

$t_1 = \frac{1}{2\pi} \sin^{-1}\left(\frac{3}{5}\right)$

$= 0.1024\ ms$

(ii)



$t_2 = 0.5 - t_1 = 0.397\ ms$