

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	:	DMT 1033	571
COURSE	:	ELECTRONICS I	
SEMESTER / SESSION	:	02 - 2024/2025	
DURATION	:	3 HOURS	

Instructions:

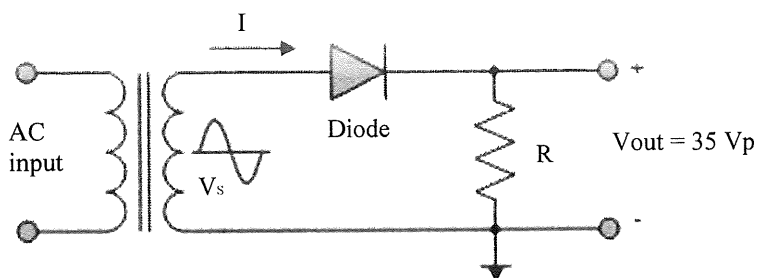
1. This booklet contains **4** questions. Answer **ALL**.
2. All answers should be written in the answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hand and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

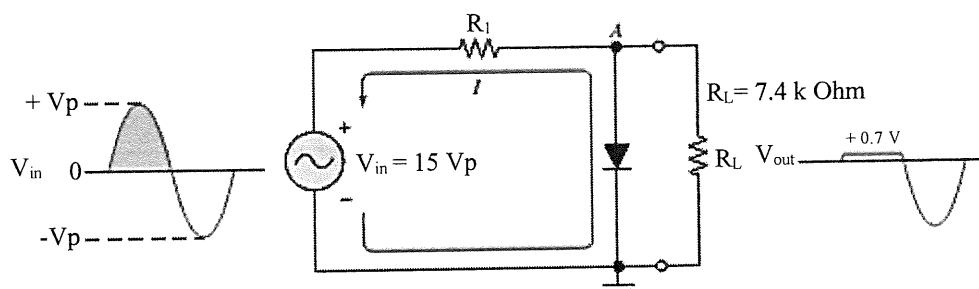
a) The application of the diode in the rectifier circuit is shown in **Figure 1**.

**Figure 1**

- i. State the name of the circuit. (2 marks)
- ii. Give the function of the diode. (2 marks)
- iii. Calculate the average voltage, V_{AVG} . (4 marks)
- iv. Calculate the rms voltage, V_{rms} . (4 marks)

b) Refer to the rectifier circuit in **Figure 2**.

$$R_1 = 2.5 \text{ k Ohm}$$

**Figure 2**

- i. State the name of the circuit. (2 marks)
- ii. Compute the output voltage, V_{out} . (4 marks)

c) The application of the diode in the rectifier circuit is shown in **Figure 3**.

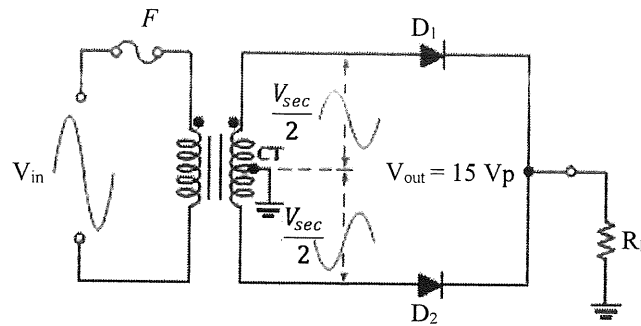
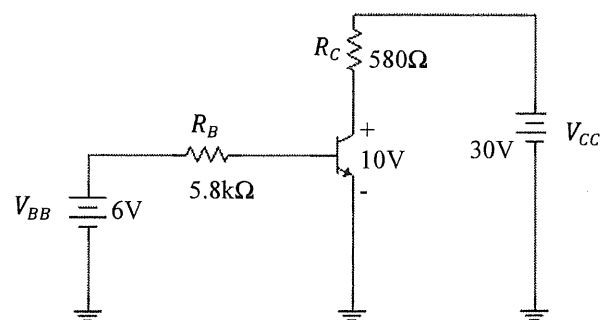


Figure 3

- i. State the name of the circuit. (2 marks)
- ii. Calculate the average voltage, V_{AVG} . (4 marks)
- iii. Calculate the rms voltage, V_{rms} . (4 marks)

QUESTION 2

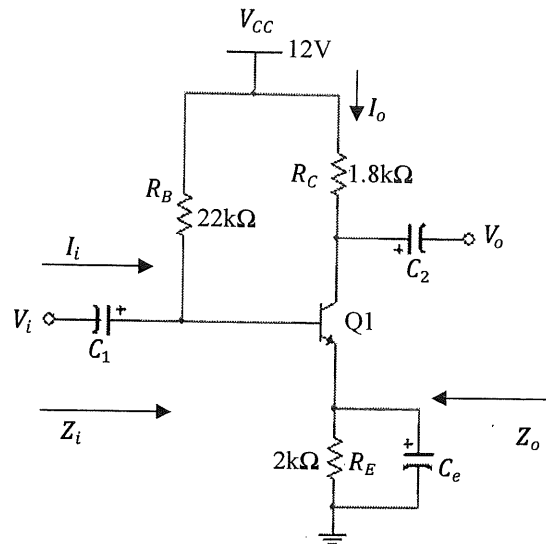
- a) Define a transistor. (3 marks)
- b) List the **three (3)** DC biasing circuits of a Bipolar Junction Transistor (BJT). (3 marks)
- c) Give the **three (3)** states of BJT operation. (3 marks)
- d) Draw the basic construction of an NPN BJT transistor. (6 marks)
- e) Based on the BJT amplifier circuit as shown in **Figure 4**:

**Figure 4**

- i. Calculate the base current, I_B . (4 marks)
- ii. Calculate the collector current, I_C . (4 marks)
- iii. Calculate the emitter current, I_E . (4 marks)

QUESTION 3

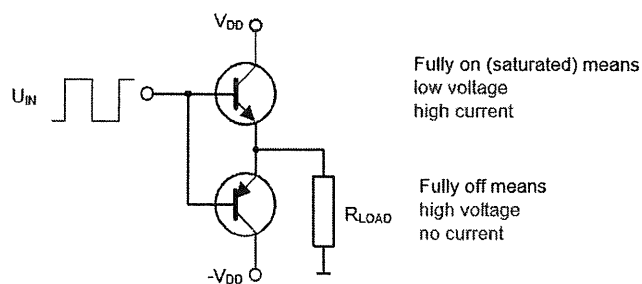
- a) Explain the purpose of DC biasing for a transistor. (3 marks)
- b) Based on the common-emitter amplifier circuit shown in **Figure 5**:
Given $\beta = 120$.

**Figure 5**

- Explain the function of coupling capacitors C_1 and C_2 in the circuit. (4 marks)
- Calculate the base current, I_B . (4 marks)
- Calculate the emitter current, I_E . (4 marks)
- Calculate the emitter resistance, r_e . (4 marks)
- Calculate the input impedance, Z_i . (4 marks)
- Calculate the output impedance, Z_o . (4 marks)

QUESTION 4

- a) The most commonly used audio amplifier classes are A, B, AB, and C.
- Illustrate the input and output signal waveforms of the class A amplifier. (4 marks)
 - Illustrate the input and output signal waveforms of the class B amplifier. (4 marks)
- b) Based on the circuit in **Figure 6**, state the name of the amplifier class. (1 mark)

**Figure 6**

- c) Define a regulator. (4 marks)
- d) Describe the unregulated power supply. (5 marks)

-----End of Questions-----

APPENDIX

1.	Si Diode Voltage	$V_D = 0.7 V$
2.	Half Wave Rectifier Average Voltage	$V_{AVG} = \frac{V_P}{\pi}$
3.	Half Wave Rectifier R.M.S Voltage	$V_{rms} = \frac{V_P}{2\sqrt{2}}$
4.	Full Wave Rectifier Average Voltage	$V_{AVG} = \frac{2V_P}{\pi}$
5.	Full Wave Rectifier R.M.S Voltage	$V_{rms} = \frac{V_P}{\sqrt{2}}$
6.	BJT Currents	$I_E = I_C + I_B$
7.	DC Beta, DC Alpha	$\beta_{DC} = \frac{I_C}{I_B}, \alpha_{DC} = \frac{I_C}{I_E}$
8.	BJT Base-emitter junction forward-biased voltage	$V_{BE} = 0.7 V$
9.	Fixed Biased BJT Base Current	$I_B = \frac{V_{BB} - V_{BE}}{R_B}$
10.	Fixed Biased BJT Collector Current	$I_C = \frac{V_{CC} - V_{CE}}{R_C}$
11.	Emitter-Stabalized Biased BJT Base Current	$I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta + 1)R_E}$
12.	BJT Emitter Current	$I_E = (\beta + 1)I_B$
13.	Emitter Resistance	$R_e = \frac{26 mV}{I_E}$
14.	Impedance Input	$Z_i = R_B \beta r_e$
15.	Impedance Output	$Z_o = R_C$

