UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET		
COURSE CODE	:	DEI 1013
COURSE	:	ELECTRONICS
SEMESTER / SESSION	:	01 - 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 6 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

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

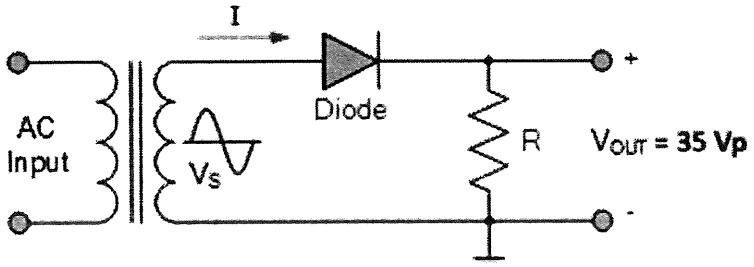

Figure 1

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**.

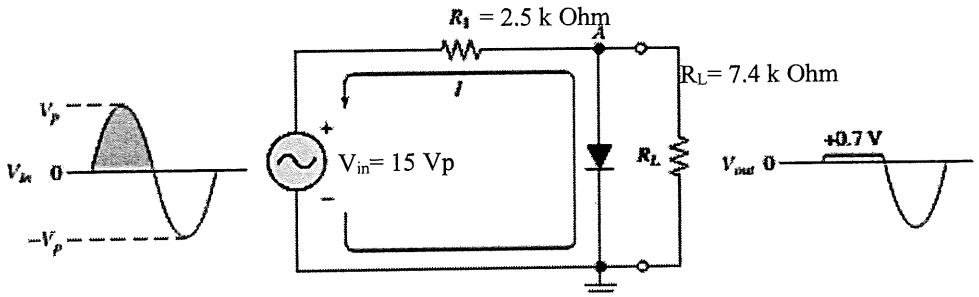

Figure 2

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.**

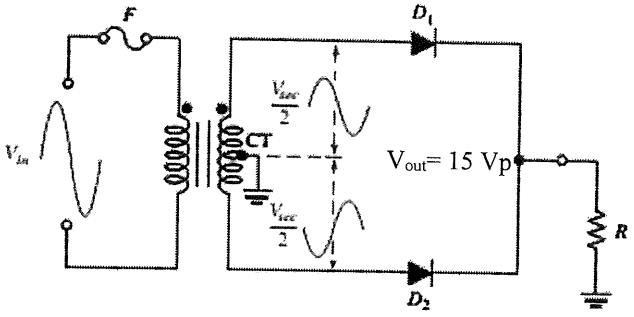

Figure 3

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**:

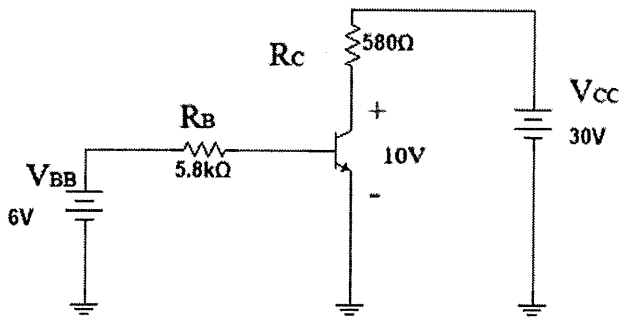

Figure 4

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 of a transistor.

(3 marks)

b) Based on the common-emitter amplifier circuit shown in **Figure 5**:
Given $\beta = 120$.

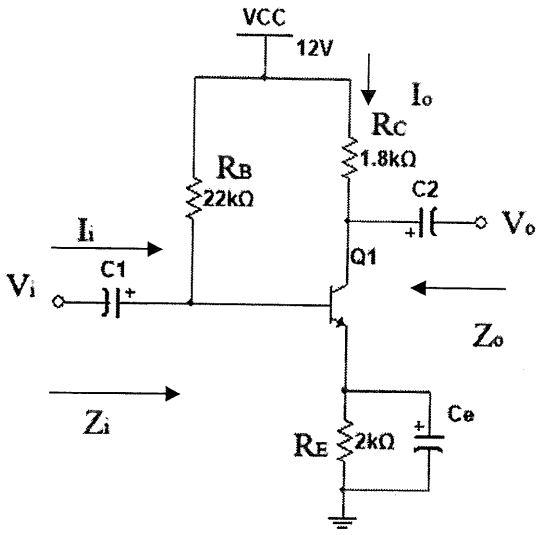

Figure 5

i) Explain the function of coupling capacitors C_1 and C_2 in the circuit.

(4 marks)

ii) Calculate the base current, I_B.

(4 marks)

iii) Calculate the emitter current, I_E.

(4 marks)

iv) Calculate the emitter resistance, r_e.

(4 marks)

v) Calculate the input impedance, Z_i.

(4 marks)

vi) Calculate the output impedance, Z_o.

(4 marks)

QUESTION 4

a) The most commonly used audio amplifier classes are A, B, AB, and C.

i) Illustrate the input and output signal waveforms of the class A amplifier. (4 marks)

ii) 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)

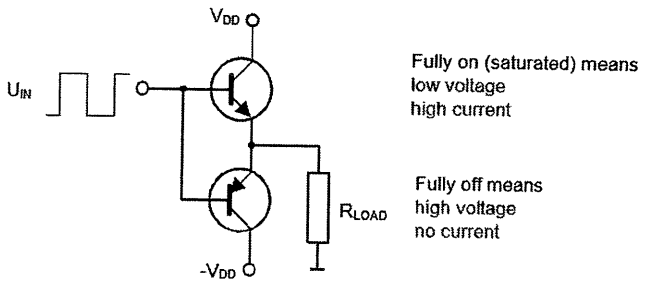

Figure 6

c) Define a regulator. (4 marks)

d) Describe the unregulated power supply. (5 marks)

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