



*(KNOWLEDGE FOR DEVELOPMENT)*

**KIBABII UNIVERSITY  
(KIBU)**

**UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS  
FIRST YEAR FIRST SEMESTER**

**FOR THE DEGREE IN  
(INFORMATION TECHNOLOGY)**

**COURSE CODE: BIT 115**

**COURSE TITLE: BASIC ELECTRONICS**

**DATE: 22/02/2021**

**TIME: 2.00 P.M- 4.00 P.M.**

**INSTRUCTIONS**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

### QUESTION ONE (COMPULSORY) [30 MARKS]

- (a) A resistor R, inductor L and Capacitor are connected in series and later in parallel for each case determine the impedance for frequency F [6 marks]
- (b) Differentiate between DC circuits and AC circuits [2 marks]
- (c) Distinguish between passive and active devices [2 marks]
- (d) Explain the formation of PN diode [6 marks]
- (e) Describe the transistor action [6 marks]
- (f) Discuss three transistor configuration [6 marks]
- (g) State two characteristic of operational amplifier [2 marks]
- (h) State any two types of unipolar transistors [2 marks]

### QUESTION TWO [20 MARKS]

- (a) A  $2\text{ k}\Omega$  resistor, a perfect  $0.5\text{ H}$  inductor and a perfect  $2.2\text{ F}$  capacitor are connected, in turn, across a  $5\text{ V}$ ,  $1\text{ kHz}$  supply. For each case calculate the resulting current flow and sketch the relevant phasor diagram. [9 marks]
- (b) A pure inductor is connected across a  $10\text{ V}$ ,  $200\text{ Hz}$  supply, and the current flowing through it is measured as  $0.4\text{ A}$ . Determine the value of its inductance. [3 marks]
- (c) A perfect capacitor is connected across a  $6\text{ V}$ ,  $5\text{ kHz}$  supply, and the resulting current flow is  $88.6\text{ mA}$ . Calculate the capacitance value. [3 marks]
- (d) A coil of wire is tested by connecting it, in turn, to a d.c. supply and then an a.c. supply. The results from these two tests are as follows: d.c. supply of  $10\text{ V}$ ; resulting current flow  $50\text{ mA}$  a.c. supply of  $10\text{ V}$ ,  $100\text{ Hz}$ ; resulting current flow  $32\text{ mA}$  Using the results of these two tests, determine the resistance and inductance values for the coil. [5 marks]

### QUESTION THREE [20 MARKS]

For the transistor amplifier shown in Fig. 1,  $R_1 = 10\text{ k}\Omega$ ,  $R_2 = 5\text{ k}\Omega$ ,  $R_C = 1\text{ k}\Omega$ ,  $R_E = 2\text{ k}\Omega$  and  $R_L = 1\text{ k}\Omega$ .

- (i) Explain operation of amplifier [8 marks]
- (ii) Draw d.c. load line [4 marks]
- (iii) Determine the operating point [4 marks]

(iii) Draw a.c. load line.

[4 marks]

Assume  $V_{BE} = 0.7 \text{ V}$ .

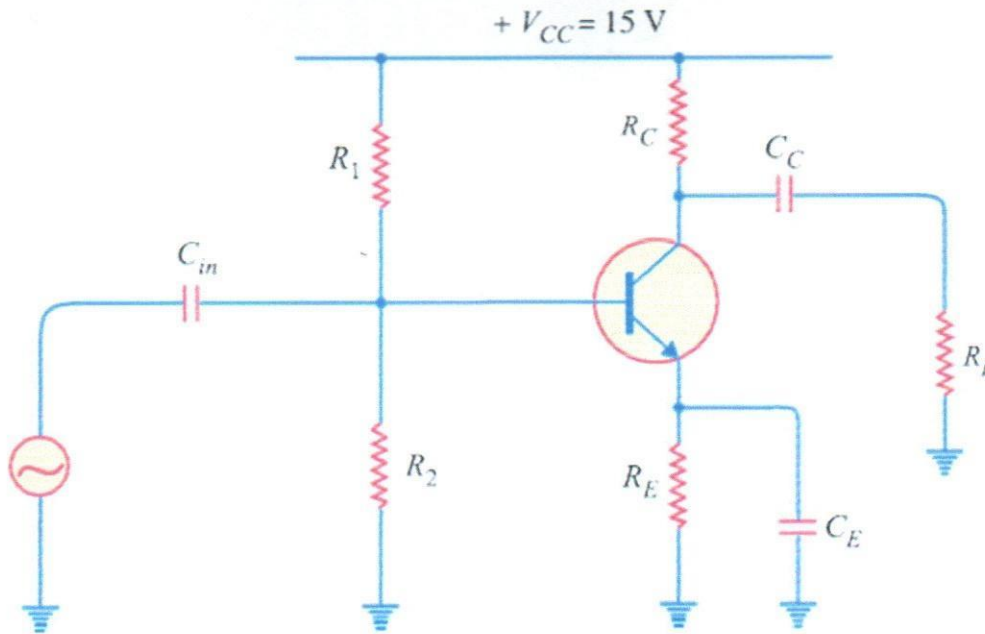


Figure 1: Transistor amplifier

#### QUESTION FOUR [20 MARKS]

- (a) With aid of circuit diagram and waveform explain the operation of diode half wave rectifier [12 marks]
- (b) Calculate the voltage drop  $V_{DC}$  and current  $I_{DC}$  flowing through a  $100\Omega$  resistor connected to a  $240 \text{ V}_{rms}$  single phase half-wave rectifier as (a). Also calculate the average DC power consumed by the load. [8 marks]

#### QUESTION FIVE [20MARKS]

- (a) With the aid of circuit diagram perform the analysis of the OPAM used as an Inverting amplifier and non-inverting amplifier [10 marks]
- (b) With aid of circuit diagram explain the operational of tuned collector oscillator [10 marks]