



(KNOWLEDGE FOR DEVELOPMENT)

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS
FIRS YEAR SECOND SEMESTER**

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

COURSE CODE: BIT 115

COURSE TITLE: BASIC ELECTRONICS

DATE: 29/09/2021

TIME: 8.00 A.M-10.00 A.M

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO

QUESTION ONE (COMPULSORY) [30 MARKS]

- (a) A resistor R of 2000 ohms, inductor L of 0.5 Henries and Capacitor 0.5 Microfarads are connected in series and later in parallel for each case determine the impedance for frequency F (6 marks)
- (b) Distinguish between active devices passive devices (2 marks)
- (c) Explain any two application of a PN diode (4 marks)
- (d) With aid of diagram describe the transistor action (6 marks)
- (e) Explain the operation of the Operational Amplifier (6 marks)
- (f) Explain any two factors that explain bandwidth of an amplifier (2 marks)

QUESTION TWO [20 MARKS]

- (a) A $8\text{ k}\Omega$ resistor, a perfect 1.5 H inductor and a perfect 1.2 F capacitor are connected, in turn, across a 5 V, 5 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 V, 400 Hz supply, and the current flowing through it is measured as 0.2 A. Determine the value of its inductance. (3 marks)
- (c) A perfect capacitor is connected across a 12 V, 20 kHz supply, and the resulting current flow is 44 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 V; resulting current flow 1 mA a.c. supply of 10 V, 2000 Hz; resulting current flow 3 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, $R_1 = 40\text{ k}\Omega$, $R_2 = 20\text{ k}\Omega$, $R_C = 1\text{ k}\Omega$, $R_E = 1\text{ k}\Omega$ and $R_L = 2\text{ k}\Omega$.

- (i) Explain operation of the 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 $V_{BE} = 0.8\text{ V}$.

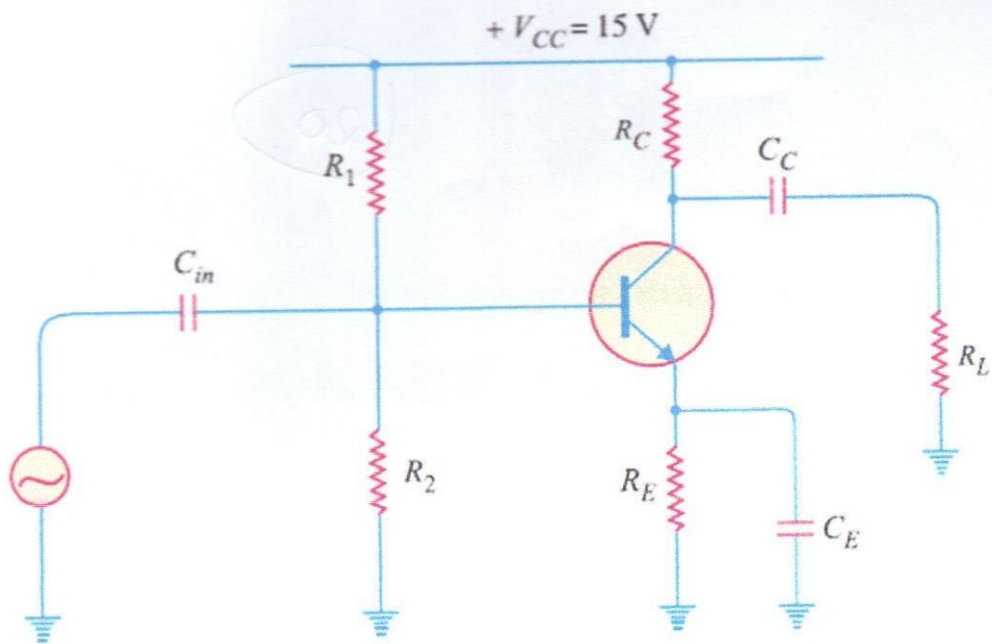


Figure 1: Transistor amplifier

QUESTION FOUR [20 MARKS]

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

QUESTION FIVE [20 MARKS]

- With the aid of circuit diagrams derive the output expression of the OPAM used as an non Inverting amplifier (5 marks)
- With the aid of circuit diagram explain the working of tuned collector oscillator (10 marks)
- Derive the expression for voltage gain of an amplifier with negative feedback (5 marks)