

Total number of printed pages-6

1 (Sem-1/FYUGP) ECT41MN/(B)

2025

**ELECTRONICS AND COMMUNICATION
TECHNOLOGY**

(Minor)

Paper : ECT4100104MN

(SET-B)

(Basic Electronic Circuit & Systems)

Full Marks : 45

Time : 2 hours

***The figures in the margin indicate
full marks for the questions.***

1. Choose the correct answer : $1 \times 5 = 5$
- (a) The electrons which revolve in the outermost orbit of an atom are called _____ electrons.
- (b) A semiconductor in an extremely pure form is known as an semiconductor.
- (c) The process of deliberately adding impurities to a pure semi conductor is called _____.

(d) rectifier is a circuit which converts ac voltage into dc voltage.

(e) OP-AMP amplifier the between *two* input signals.

2. Write very short answer of the following questions : (*any five*) 2×5=10

(a) State Kirchhoff's voltage law and current law.

(b) What is depletion region ?

(c) Draw diagrams of a forward biased and a reversed biased *p-n* junction.

(d) Mention *two* applications of a *p-n* junction diode.

(e) What are the values of ripple factor and efficiency of rectifier ? ✓
1 & 1.2

(f) Mention *two* differences between *p-n* junction diode and Zener diode.

(g) If a transistor collector current is 1 mA and base current is 10 mA determine its α and β .

(h) Define the terms CMRR and input offset voltage.

(i) Draw the symbol and pin diagram of an OP-AMP.

(j) What is the meaning of the term 'virtual ground' ?

3. Answer the following questions : **(any four)**

5×4=20

(a) Explain briefly with example how the value of a resistor can be calculated using color code ?

- (b) Find the total resistance of the circuit of fig.1 (all resistances are in ohms) between the terminals A-B.

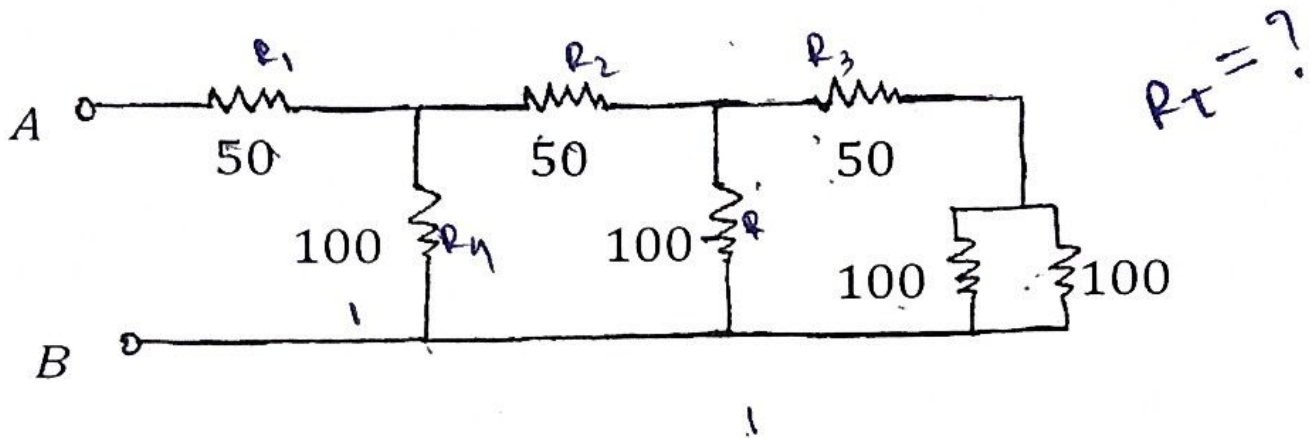


fig.1

- (c) Draw the characteristic curve of a forward biased $p-n$ junction diode and explain briefly. $2+3=5$
- (d) Draw the characteristic curve of a Zener diode and explain briefly. $2+3=5$
- (e) Draw the circuit diagram of a half-wave rectifier with its input-output waveforms. Explain briefly the working principle. $2+3=5$
- (f) What are α and β of a transistor? Establish a relation between the two. $2+3=5$

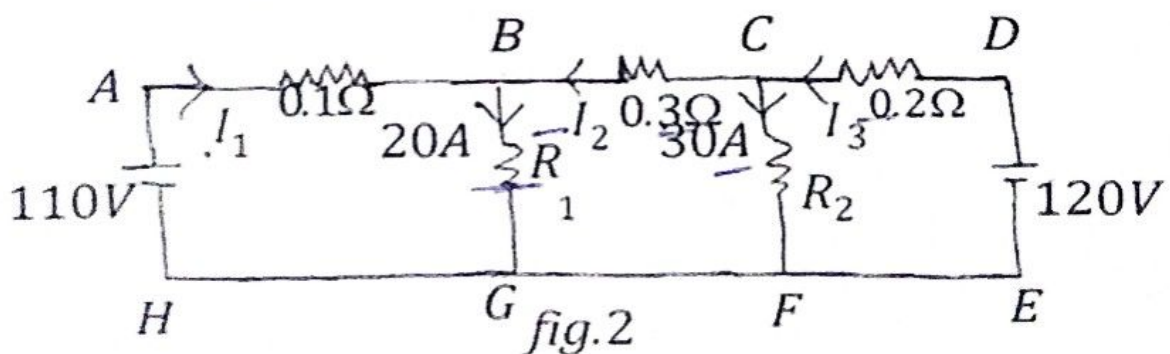
(g) Draw the common emitter characteristics of a transistor showing clearly its different regions and give a brief explanation of it. 2+3=5

(h) What is an inverting amplifier? Draw its circuit diagram using OP-AMP. Also write down its output voltage equation.

In the circuit of inverting amplifier, $R_1 = 100K\Omega$ and $R_f = 600K\Omega$. What is the output voltage for an input of $V_i = -3V$? 3+2=5

4. Answer the following questions : **(any one)** 10×1=10

(a) Determine the values of R_1 , R_2 and I_1 , I_2 and I_3 for the circuit shown in fig.2.



b) Draw the circuit diagram of a bridge rectifier and explain its operation.

What is the necessity of using filter circuit with a rectifier circuit ?
What will be the effect of using a capacitor filter with a bridge rectifier circuit ?

Can you use Zener diode for voltage regulation purpose ? If yes, explain shortly.

$$5+3+2=10$$

c) Explain the working of p-n-p transistor.

Draw the different transistor circuit configurations.

Define operation point and de load line of a transistor.

$$5+3+2=10$$

d) Design a summing amplifier using OP-AMP and derive an equation for the output voltage.

Mention three characteristics of an ideal OP-AMP.

$$2+5+3=10$$
