Code No: 132AJ **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, January/February - 2024
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, MCT, AE)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is meant by a constant voltage source and a constant current source?	[2]
b)	What is meant by power factor of an AC circuit? What is its minimum value and its maximum value?	[3]
c)	State Thevenin's theorem.	[2]
d)	State Tellegen's and Millman's theorems and write their applications.	[3]
e)	What is meant by ripple factor and give its significance?	[2]
f)	Why a forward biased p–n junction has narrow depletion region and reverse-biased p–n junction has wide depletion region.	[3]
g)	What is meant by quiescent point of a transistor?	[2]
h)	What are the factors responsible for affecting the bias stability of a transistor?	[3]
i)	Why is the FET called a voltage amplifier and the BJT a current amplifier?	[2]
j)	Draw and briefly explain about transfer characteristics of a JFET.	[3]

PART - B

(50 Marks)

2.a) State and explain Kirchhoff's laws with examples.

b) Two impedances Z_1 and Z_2 are connected in parallel across a 230 V, 50 Hz supply. The impedance, Z_1 consists of a resistance of 14 Ω and an inductance of 16 mH (connected in series). The impedance, Z_2 consists of a resistance of 18 Ω and an inductance of 32 mH (connected in series). Calculate the branch currents, line current and total power factor. [5+5]

OR

3.a) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the two resistances.

b) Determine RMS value, average value, form factor of the sinusoidal waveform. [5+5]

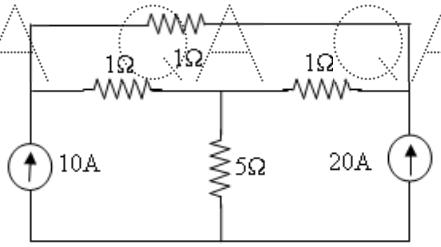
4.a) State and explain reciprocity theorem with example.

b) An R-L-C series circuit has R = 10 Ω, L = 0.1 H, and C = 8 μF. Calculate: (i) resonant frequency, (ii) Q-factor of the circuit at resonance, and (iii) bandwidth. [5+5]

OR

5.a) Draw the locus diagram of a R-L circuit with 'R' variable and explain.

b) Find the current through 5Ω resistor using super position theorem in the network shown in Figure. [5+5]



6.a) With a neat diagram, explain the operation of a full-wave rectifier with center-tapped transformer and draw the input and output waveforms.

b) Explain how a p–n junction can be used to work as a diode. What is the significance of 'barrier potential' in a p–n junction? [5+5]

OR

7.a) Explain the operation of half wave rectifier with the help of circuit diagram. Obtain mathematical expression for the efficiency of the halfwave rectifier and show that its ripple factor is 1.21.

b) A half-wave rectifier circuit has been made using a step-down transformer of turn ratio 10:1. The input voltage is v = 325 sin ωt the diode forward resistance is 25 Ω. A load resistance of 1.2 kΩ has been connected in the circuit. Assuming a secondary winding resistance of the transformer as 1 Ω, calculate the following: (i) rms value of load current (ii) rectification efficiency, and (iii) ripple factor. [5+5]

8.a) Explain the working of CE configuration of a BJT and draw its input and output characteristics.

b) Compare the merits and demerits of CE, CB and CC configurations. [6+4]

OR

9.a) Draw the circuit of a voltage-divider biasing circuit for a common CE configuration and explain. What are the merits of this method over other biasing methods?

b) Draw the h-parameter models of CB, CC, and CE configurations and explain. [5+5]

10.a) Explain the construction and working of a junction field effect transistor. Also explain its characteristics.

b) Explain principle of operation of a silicon control rectifier with its characteristics. [5+5]

OR

11.a) Explain the similarities and dissimilarities between BJT and JFET.

b) Explain the principle of operation and characteristics of Varactor Diode. [5+5]

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