

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING  
TELANGANA  
DIPLOMA EXAMINATION (C-18) , C-18-REGULAR-FEB-2021  
SEMESTER III , SEMESTER END EXAM



**18EE-302C**  
Electrical Circuits

**6336**

Exam Date: 22-02-2021

Duration: 3 Hours [09:30 AM To 12:30 PM]

Session: FN

[Total Marks: 60]

**PART-A**

**Instructions:**

1. Answer any **TWELVE** questions
2. Each question carries **ONE** mark

12 X 1 = 12

1. State Kirchoff's current law.
2. List any two limitations of Ohm's law.
3. Write the formula for load current in a Thevenin's equivalent circuit.
4. State superposition theorem.
5. Define amplitude of an alternating quantity
6. Define angular velocity of an alternating quantity.
7. Define active power.
8. Write the units for active power and reactive power.
9. Define branch with respect to electrical circuits.
10. Define maximum value of an alternating quantity. <sup>Peak</sup>
11. State the condition for resonance in parallel circuit., <sub>RMS</sub>
12. Define instantaneous value of an alternating quantity
13. Draw the impedance triangle of parallel RLC Circuit.
14. Define Q-factor of a single-phase parallel RLC Circuit.
15. Draw the phasor diagram of 3- phase emfs.
16. Draw the waveforms of 3- phase emfs .

## PART-B

### Instructions:

1. Answer any **SIX** questions

6 X 3 = 18

2. Each question carries **THREE** marks

17(a). Three resistances 4 ohms, 8 ohms and 6 ohms are connected in delta configuration. Find their equivalent star connected resistances.

--- OR ---

17(b). Write the formulae for equivalent resistances for "star to delta" and "delta to star" transformation.

18(a). Draw the equivalent circuit of Norton's Theorem

--- OR ---

18(b). Give the comparison between Thevenin's Theorem and Norton's Theorem in any 3 aspects.

19(a). The maximum sinusoidal current in an AC circuit is 10 A. What is the instantaneous current at  $45^\circ$  and  $195^\circ$

--- OR ---

19(b). Calculate the average value of a triangular current waveform.

20(a). Draw the current, voltage waveforms and phasor diagram of a purely inductive circuit.

--- OR ---

20(b). Draw the current, voltage waveforms and phasor diagram of purely resistive load. <https://www.sbtetonline.com>

21(a). Differentiate between active and passive electrical circuits in any 3 aspects.

--- OR ---

21(b). A coil of 10 ohm resistance and 0.1H inductance is connected in parallel with a capacitor of  $100\mu\text{F}$  capacitance. Calculate the frequency at which the circuit will act as a non-inductive resistance of R ohm.

22(a). Write the equations for apparent power, active power, and reactive power in a RLC series circuit and mention their units.

--- OR ---

22(b). Derive the relation between line and phase currents in a three-phase star circuit.

23(a). State why a parallel resonant circuit is called as a rejector circuit.

--- OR ---

23(b). A circuit comprises of a conductance G in parallel with a susceptance B. Calculate the admittance, conductance and susceptance if the impedance is  $(10+j5)\text{ohm}$ .

24(a). Derive the expression for power in 3-phase star connected circuit.

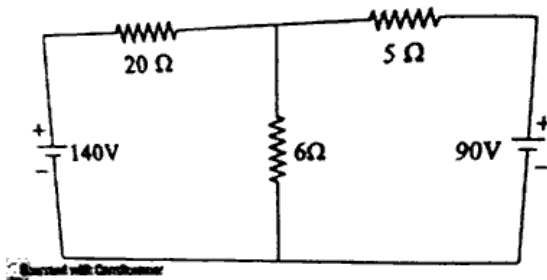
--- OR ---

- 24(b). A delta connected motor takes 90 A at 400 V. Determine (i) current flowing through and (ii) voltage across each winding.

**PART-C**

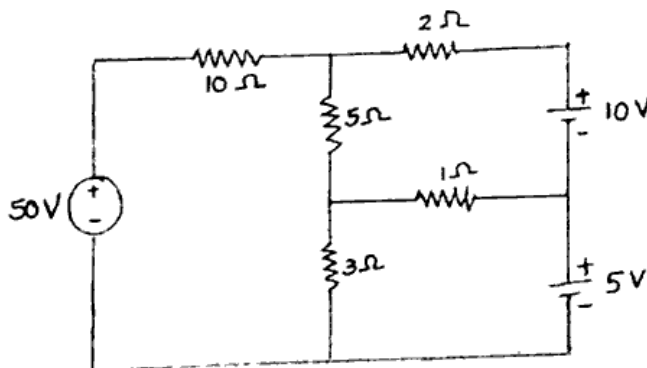
**Instructions:** 1. Answer any **SIX** questions 6 X 5 = 30  
2. Each question carries **FIVE** marks.

- 25(a). For the circuit shown below, calculate (i) the current through  $6\Omega$  resistor by using Kirchoff's laws and (ii) power dissipated in the  $6\Omega$  resistor.



--- OR ---

- 25(b). For the circuit shown in the figure below, determine the current in each mesh using mesh analysis.



- 26(a). Explain source transformation technique.

--- OR ---

- 26(b). ✓ State and Explain Thevenin's Theorem

- 27(a). A sinusoidal current is given by  $i = 50\sin(100\pi t)$ .

Determine the values of the (i) time period (ii) maximum value (iii) average value (iv) RMS value and (v) peak factor.

--- OR ---

27(b) Calculate the (i) average value and (ii) RMS value of a full-wave rectified sine wave.

28(a) Draw current, voltage phasor diagram, power triangle and impedance triangle for RLC series circuit

--- OR ---

28(b) Derive expression for voltage, current, impedance, phase angle and power in a RC series circuit.

29(a) Derive the formula for equivalent resistances from star to delta connection.

--- OR ---

29(b) A 10 ohm resistor, 15.9mH inductor and 159 $\mu$ F capacitor are connected in parallel to a 200V, 50Hz AC supply. Calculate the supply current and power factor.

30(a) Calculate average value and RMS value for a square wave.

--- OR ---

30(b) Three coils, each having a resistance of 20 ohms and an inductive reactance of 15 ohms, are connected in star to 400 V, 3-phase, 50 Hz supply. Calculate (i) line current (ii) power factor and (iii) power supplied.

31(a) A coil has an impedance of 20 ohm at 50Hz, and its power factor is 0.8. Determine the value of the capacitor to be shunted with the coil to produce resonance at 100Hz also calculate the Q-factor of the circuit.

--- OR ---

31(b) Two impedances  $Z_1 = (6 + j6)\Omega$  and  $Z_2 = (6 - j6)\Omega$  are connected in parallel. Calculate the total (i) conductance (ii) susceptance (iii) admittance (iv) current taken from the supply and (v) power factor if the supply voltage is 200V, 50Hz.

32(a) Explain the concept of generation of 2 - phase emfs by drawing their waveforms and phasor diagram.

--- OR ---

32(b) Derive the relation between line current and phase current in a three-phase balanced delta circuit.