# RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
## (AUTONOMOUS)

### FIRST SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2021
### Course Code: 101009/EE100D

**Course Name: Principles of Electrical Engineering**

Max.Mark:100                                                                 Duration: 3 hours

## PART A
### Answer all questions

*(Answer all questions, each question carries 3 marks)*

1. Differentiate between inductance and capacitance parameters.
2. State Kirchoff's laws with an example.
3. State and explain Norton's theorem.
4. Write equations to convert a star connected resistors to a delta connected resistors.
5. For an ac waveform explain average value, rms valus and form factor.
6. Explain active, reactive, apparent and complex power.
7. A parallel plate capacitor is constructed of metal plates, each with an area of $0.2\ m^2$. The capacitance is 7.9 nF. Determine the plate separation distance.
8. Derive the emf equation of a single phase transformer.
9. Explain the working of a piezoelectric transducer.
10. Draw the basic layout of the electrical distribution system.

## PART B
### *Each question carries 14 marks*

11. By using mesh analysis, find the current $I_x$ and voltage across the 4Ω resistor of the circuit shown in the figure and also calculate the power associated with the 4V voltage source.                     14 Marks
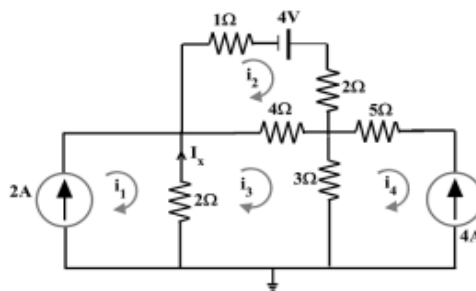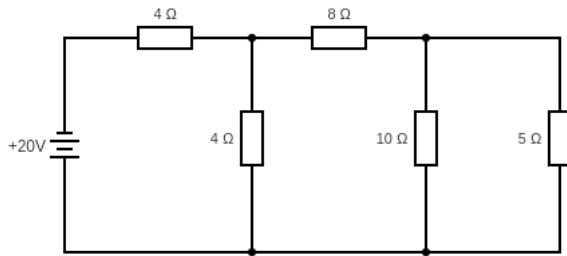


### OR

12. Refer figure above and write the nodal equations in terms of node to datum voltages $V_1$ and $V_2$. Solve for $V_1$ and $V_2$. Also determine the current through the 5 Ω resistor.                     14 Marks

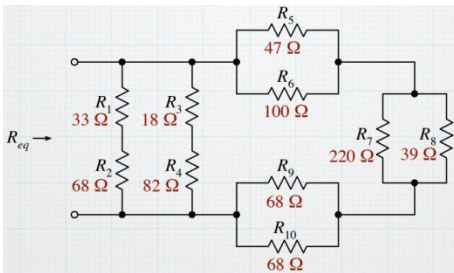13. (a)  State Thevenin's Theorem.                                                      4 Marks
    (b) Calculate the current through the load resistance ($R_L$) = 5 Ω.                 10 Marks
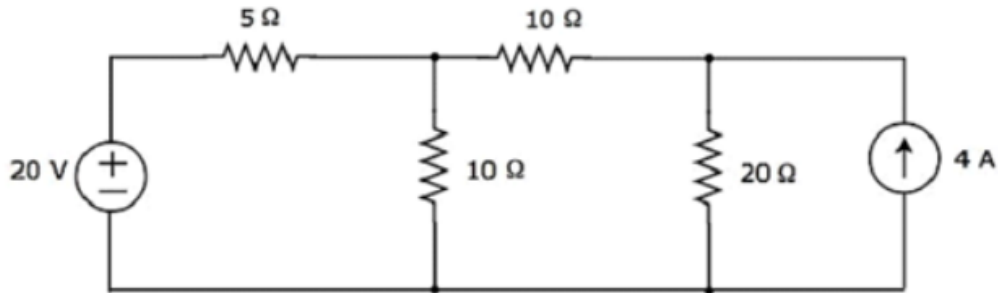


## OR

14. (a) Find the equivalent resistance looking into the indicated port of the circuit shown below. 7 Marks



   (b) Find the current flowing through 20 Ω resistor of the following circuit using superposition theorem.

                                                                                        7 Marks



15. (a) Give the equations, waveforms and phasor diagram of three phase voltages.        7 Marks
    (b) Enumerate the advantages of a three phase system over the single phase system.   7 Marks

## OR

16. (a) A resistance of 10 Ω, inductance of 0.4 H and capacitance of 120 µF are connected in series and are fed by a 230 V, 50 Hz supply.
    Find i) inductive reactance ii) capacitive reactance iii) impedance of the circuit iv) admittance of the circuit     v) power factor  vi) active and reactive power.                                        7 Marks
    (b) A 240 V, 50 Hz AC supply is applied a coil of 0.08 H inductance and 4 Ω resistance connected in series with a capacitor of 8 µF. Calculate the following –
    (i) Impedance (ii) Circuit current (iii) Phase angle between voltage and current (iv) Power factor
    (v) Power consumed (vi) Resonant frequency  (vii) Q-factor of the circuit at resonant frequency.
                                                                                        7 Marks

17.    A transformer has 500 turns of the primary winding and 10 turns of the secondary winding.

a) Determine the secondary voltage if the secondary circuit is open and the primary voltage is 120 V.

7 Marks

b) Determine the current in the primary and secondary windings, given that the secondary winding is connected to a resistance load 15 Ω?                                                7 Marks

**OR**

18.    (a) Draw and explain the construction and working of a DC motor.                7 Marks

(b) What are the various types of DC motors. Explain.                                7 Marks


19.    (a) With circuit diagram explain the working of different types of moving iron instruments also derive its deflecting torques.                                                              7 Marks

(b) Explain the working of a thermocouple. What are the Common Causes for Thermocouple Temperature Measurement Errors?                                                              7 Marks

**OR**

20.    (a) What is electrical earthing? Draw and explain pipe earthing.                7 Marks

(b) Draw and explain the working of a moving coil instrument.                7 Marks