

ERM33 - Electrical circuits and Machines

113

REG. NO

OCTOBER 2021

Time: Three hours

Maximum Marks: 75

- Note:
1. Answer ALL the questions in PART-A (1 mark each)
 2. Answer any ONE question from each unit in PART-B (3 marks each)
 3. Answer any ONE question from each unit in PART-C (10 marks each)
 4. The question paper contains TWO Pages

PART-A (1x10=10)

1. Define electric current.
2. State : the Kirchhoff's current law.
3. Define peak value.
4. Write the expression for power in a RC series circuit.
5. State the condition for resonance in RLC series circuit.
6. What is the relationship between line voltage and phase voltage in a 3 phase balanced star connected system.
7. What is the use of commutator in a DC Generator?
8. List the two protective devices used in a 3-point DC starter.
9. What is the relationship between speed and frequency of 3 phase induction motor.
10. Write the emf equation for single phase transformer.

PART-B (3x5=15)

UNIT-I

11. Derive an expression for 3 resistors are connected in series.
12. State and explain superposition theorem.

UNIT-II

13. The alternating current passing through a circuit is given by $14-14 \sin(314t)$. Find the value of i) rms current (ii) Frequency.
14. Derive an expression for impedance in RL series circuit.

UNIT-III

15. Derive the expression to find the resonance frequency in series RLC circuit.
16. What are advantages of 3 phase over single phase system.

UNIT-IV

17. Derive the EMF equation for DC generator.
18. What is the necessity of using starter with DC motor.

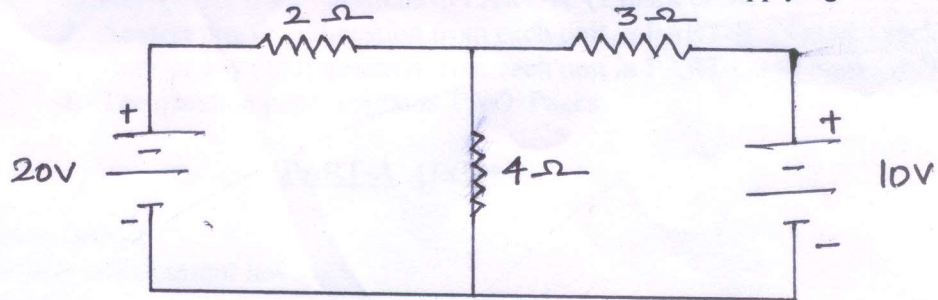
UNIT-V

19. Write a short notes on stepper motor.
20. Write a short notes on Auto transformer.

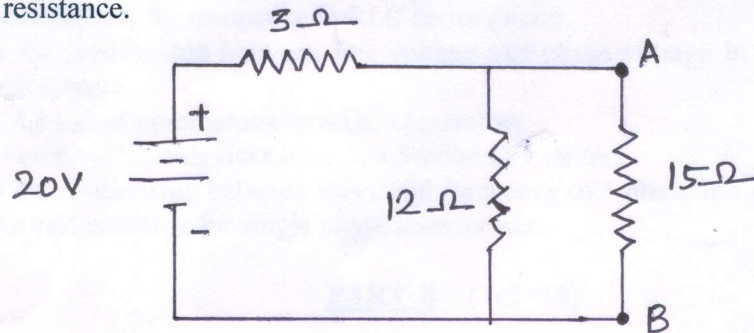
PART-C (10x5=50)

UNIT-I

21. Find out the current in 4Ω resistor connected between A and B applying mesh current method.



22. For the circuit given below apply Thevenin's theorem, find the current through 15Ω resistance.



UNIT-II

23. (a) Derive the expression for two capacitor connected in series.
 (b) Derive the expression for the energy stored in a capacitor.
24. A Coil of resistance 10Ω and inductance $0.2H$ is connected in series, with a capacitor of $150\mu F$ across a $220V$, $50Hz$ supply. Calculate (i) Impedance (ii) Current (iii) Power factor (iv) Power in the circuit.

UNIT-III

25. A series RLC circuit contain a resistance of 4Ω , an inductance of $0.5H$ and a variable capacitor across a $100V$, $50Hz$ supply. Find the value of capacitor for getting resonance at $50Hz$.
26. Prove that 2 wattmeters are sufficient to measure three phase power.

UNIT-IV

27. With neat sketches, explain the constructional details of a DC generator.
28. Explain about the working of 3 point starter in DC motor.

UNIT-V

29. Explain the different methods of starting of three phase induction motor.
30. Explain about the construction and operation of 1-phase transformer.
