Register No.:

818

October 2017

Time – Three hours
(Maximum Marks: 75)

[N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. Answer any FOUR questions from the remaining in each PART - A and PART - B.

(2) Answer division (a) or division (b) of each question in PART-C.

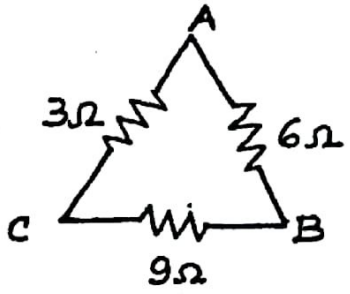
(3) Each question carries 2 marks in PART – A, 3 marks in Part - B and 10 marks in PART – C.]

PART – A

1. Define electric flux density. State its unit.
2. In a circuit, three resistors R_1 Ω, R_2 Ω and R_3 Ω are connected in series. What is the total resistance?
3. Write the equation for load current by using Norton's theorem.
4. Convert the vector 8+j6 into polar form.
5. Define power factor.
6. Define Q factor in RLC series circuit.
7. What is meant by phase sequence?
8. Write the relationship between line voltage and phase voltage, line current and phase current in a 3-phase delta connected system.

PART – B

9. Derive expression to find the total capacitance of three capacitors C_1 μF, C_2 μF and C_3 μF connected in parallel in a circuit.
10. State Kirchhoff's laws.
11. State superposition theorem.
12. Convert the following delta connected resistors into equivalent star.



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13. Define form factor and peak factor in AC circuit.

14. Draw the power triangle and define different powers in AC.

15. What is meant by balanced and unbalanced load?

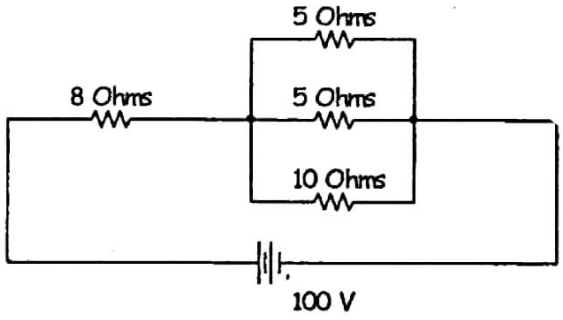
16. List the applications of resonant circuits.

PART – C

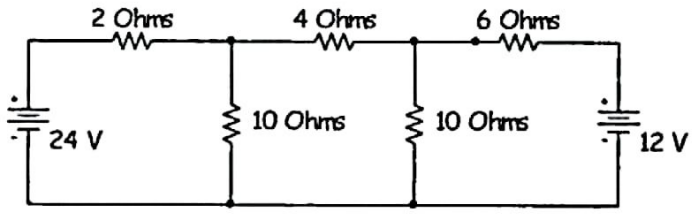
17. (a) (i) State and explain Coulomb's laws of electrostatics.
(ii) A coil of copper wire has a resistance of 20Ω at 20°C. Determine its resistance at 70°C. Temperature coefficient of copper is 0.00394/°C at 20°C.

(Or)

(b) For the circuit given below, find (i) Total resistance (ii) Total current (iii) Branch currents and (iv) Total power dissipated in the circuit.

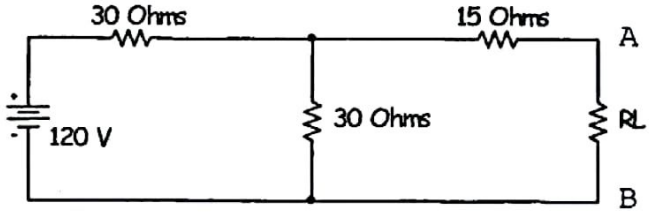


18. (a) By using mesh current analysis, find the current supplied by the batteries.



(Or)

(b) (i) State and explain Thevenin's theorem.
(ii) For the circuit given below, calculate the value of the load resistance for maximum power transferred from source to load. Also find the value of maximum power in RL.

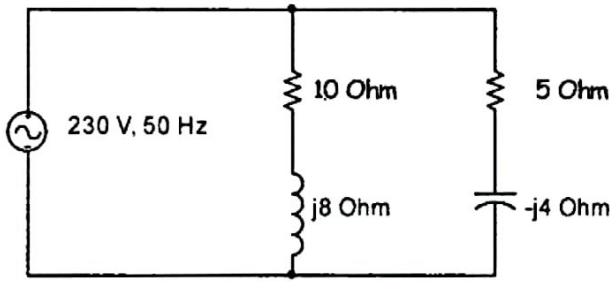


19. (a) (i) Derive the expression to find the average value of AC sinusoidal current.

(ii) A coil of resistance 10Ω and inductance 0.1H is connected in series with a capacitor of capacitance 150μFd. A 220V, 50Hz supply is connected to the circuit. Find (1) Impedance (2) Current (3) Power factor and (4) Power consumed by the circuit.

(Or)

(b) By using admittance method, find the current in each branch and total current drawn from the supply for the AC parallel circuit given below.



20. (a) (i) Compare series and parallel resonance circuits.

(ii) A coil having a resistance of 10Ω and an inductance of 20mH is connected in series with 100μF capacitor. Calculate resonance frequency and Q factor of the coil.

(Or)

(b) A coil of 10Ω resistance and 0.2H inductance is connected in parallel with a capacitor of 100μF. Calculate the frequency at which the circuit will act as non-inductive resistance of RΩ. Find also the value of dynamic resistance.

21. (a) Derive an expression to calculate the power and power factor of a balanced 3-PH load by using two wattmeter method.

(Or)

(b) Three identical coils each having a resistance of 20Ω and inductive reactance of 15Ω are connected in star across 3Φ, 400V, 50Hz supply.

(i) Draw the circuit diagram.

(ii) Calculate the line current and phase current.

(iii) Power factor of the coil.

(iv) Power consumed by the circuit.
