B.E. DEGREE EXAMINATIONS: MAY/JUNE 2014

(Regulation 2013)

Second Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U13EET201: Circuit Theory

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. An electric current of 5 A is same as

   a) 5 V / C   b) 5 J / C

   c) 5 w / sec   d) 5 C / sec

2. Energy generated in joules when a current of IA flows through a conductor of RΩ for t seconds is given by _____

3. The period of the signal x(t) = 8 sin (0.8πt + π /4) is

   a) 0.4πs   b) 2.5s

   c) 1.25s   d) 0.8πs

4. In a certain RL circuit, the true power is 300W and the reactive power is 1000W. The apparent power is _____

5. The node method of circuit analysis is based on _____

   a) KVL and Ohm's law   b) KCL & KVL

   c) KCL , KVL & Ohm's laws   d) KCL and Ohm's law

6. The dual of capacitance is _____

7. The equivalent inductance of two coupled coils connected in parallel when two fields aiding each other is

   a)
   $$L_{eq} = \frac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}$$

   b)
   $$L_{eq} = \frac{L_1 L_2 - M^2}{L_1 + L_2 + 2M}$$

   c)
   $$L_{eq} = \frac{L_1 L_2 + M^2}{L_1 + L_2 - 2M}$$

   d)
   $$L_{eq} = \frac{L_1 L_2 + M^2}{L_1 + L_2 + 2M}$$

8. The unit of magnetic flux density is _____

9. In two wattmeter methods of power measurements, when the power factor is 0.5

   a) the readings of the two wattmeter's are equal and positive
   b) the readings of the two wattmeter's are equal and opposite
   c) the total power is measured by only one wattmeter
   d) none of the above

10. The resultant voltage in a closed balanced delta circuit is given by _____

PART B (10 x 2 = 20 Marks)

11. State current division rule.

12. Differentiate dependent and independent sources.

13. Calculate the power factor if v (t) = V_m sin (ωt-45°) and i (t) = I_m sin (ωt-135°).

14. Define quality factor of a coil.

15. State maximum power transfer theorem in a DC circuit.

16. A series resonant circuit has a bandwidth of 20kHz and a quality factor of 40. The resistor value is 10kΩ. Find the value of L of this circuit?

17. State DOT rule.

18. Define reluctance of a magnetic circuit.

19. Compare balanced and unbalanced circuits.

20. Three inductive coils each having a resistance 16Ω and a reactance of j12Ω are connected in star across a 400V, three phase, 50Hz supply. Calculate the phase voltage.

PART C (5 x 14 = 70 Marks)

Q.No. 21 is Compulsory

21.   (i)   Find the equivalent resistance between B and C.   (7)
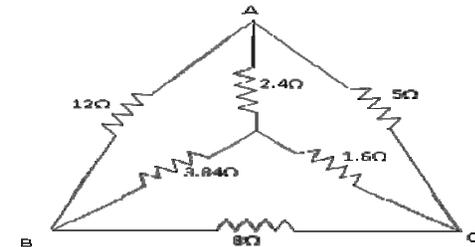

(ii) A resistance of 10Ω is connected in series with two resistances each of 15Ω   (7) arranged in parallel. What resistance must be inserted across this parallel combination so that total current taken will be 1.5A from 20V supply applied?

22. a) (i) The two parallel branch impedances Za = (10+j8) Ω and Zb = (9-j6) Ω are in (7) series with Zc = (3+j2) Ω. The voltage across the circuit is 100V. Find the branch currents and phase angle between them. Also draw the phasor diagram.

   (ii) Derive an expression for bandwidth and half power frequencies of series (7) resonant circuit.

(OR)

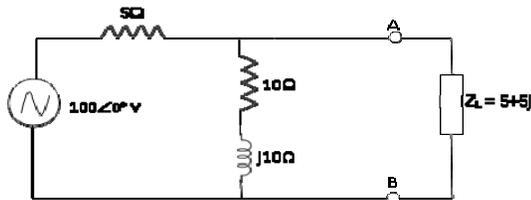   b) (i) Find the value of X_L at which the circuit resonates is shown in fig. (7)
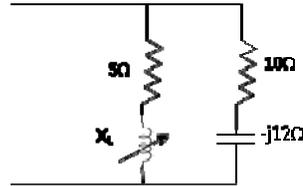
   (ii) A series RC circuit with R=20Ω and C=100μF is connected to a 230V, 50Hz (7) source. Calculate (i) impedance (ii) current (iii) power factor and (iv) power.

23. a) (i) Using superposition theorem, find current through 3Ω resistor in the circuit of (7) fig.
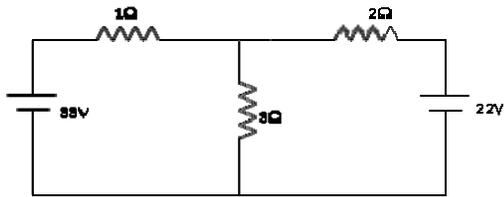
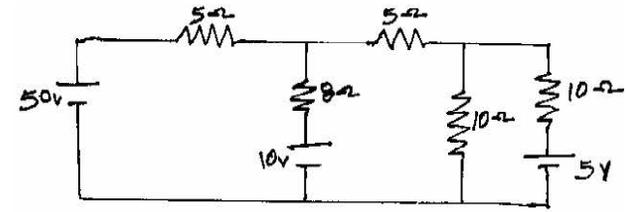   (ii) Using Thevenin's theorem, find current through load impedance Z_L for the (7) circuit shown in fig.
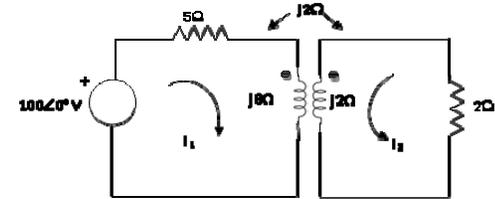

(OR)

   b) For the circuit shown in fig. find current in each branch by nodal method.

24. a) (i) In the coupled circuit shown in fig. find current through 2Ω resistor. (10)

   (ii) Compare electric and magnetic circuits. (4)

(OR)

   b) (i) A coil of 100 turns is wound uniformly over an iron ring with mean (7) circumference of 2m and a uniform cross sectional area of 0.025 cm^2. If the coil is carrying a current of 2A. Calculate (a) MMF of the circuit (b) Magnetic field intensity (c) Flux density (d) total flux

   (ii) Two coils connected in series have an equivalent inductance of 0.8H when (7) connected in aiding, and an equivalent inductance of 0.5H when connected in opposing. Calculate (i) mutual inductance (ii) coefficient of coupling

25. a) A delta connected three phase load with impedances (28+10j) Ω, (25+45j) Ω and (10-65j) Ω is connected across a three phase 230V, 50Hz symmetrical RYB supply. Find the line and phase currents. Draw the necessary circuit diagram.

(OR)

   b) (i) Derive the expression for total power in a three phase balanced circuit using (10) two watt meters.

   (ii) The power input to a 2000V, 50Hz, three phase motor is measured by two watt (4) meters which indicate 300kW and 100kW respectively. Calculate the input power, power factor and the line current.

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