## **Question Paper Code: 41327**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2015

Second Semester

Electrical and Electronics Engineering

14UEE207- ELECTRIC CIRCUITS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. In a double tuned circuit, consisting of two magnetically coupled, identical high-Q tuned circuits, at the resonance frequency of either circuit, the amplitude response has

(a) a peak, always	(b) a dip, always
(c) either a peak or a dip	(d) neither a peak nor a dip

2. The nodal method of circuit analysis is based on

(a) KVL and Ohm's law	(b) KCL and Ohm's law
(c) KCL and KVL	(d) KCL, KVL and Ohm's law

3. A network function can be completely specified by

(a) Real parts of zeros	(b) Poles and zeros
(c) Real parts of poles	(d) Poles, zeros and a scale factor

4. Reciprocity theorem is applicable to

(a) Linear networks only	(b) Bilateral networks only
(c) Linear/bilateral networks	(d) Neither of the two

5. The rms value of the a-c voltage  $v(t) = 200 \sin 314 t$  is

(a) 200 V	(b) 314 V	(c) 157.23 V	(d) 141.42 V
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6.	Impedance of an ideal parallel resonant circuit without resistance in either branch is				
	(a) Zero	(b) Capacitive	(c) Inductive	(d) Infinite	
7.	In a series parallel circuit, any two resistances in the same current path must be in				
	(a) series with (c) series with	th each other th the voltage source	<ul><li>(b) parallel with each other</li><li>(d) parallel with the voltage source</li></ul>		
8.	Time constant of series RC circuit				
	(a)1/RC	(b) R/C	(c) RC	(d) $e^{-RC}$	
9.	. Which of the following is a bilateral element?				
	<ul><li>(a) constant current source</li><li>(c) capacitance</li></ul>		<ul><li>(b) constant voltage source</li><li>(d) none of these</li></ul>		
10. Two wattmeter method of power measurement can be used to measure power in					
	(a) Balance circuits		(b) Unbalanced circuits		
	(c) Both the	(a) and (b)	(d) Neither of (a) and (b)		

PART - B (5 x 2 = 10 Marks)

- 11. State reciprocity theorem.
- 12. Modify the voltage source of 120 V in series resistance of 10  $\Omega$  into a current source in parallel resistance.
- 13. Write the expression for the power measured by two wattmeters used in 3-phase balanced load, in terms of voltage, current and power factor.
- 14. Categorize the different types damping conditions occurred in RLC transient circuits.
- 15. Two inductively coupled coils have self inductances  $L1 = 50 \ mH$  and  $L2 = 200 \ mH$ . If the coefficient of coupling is 0.5, compute the value of mutual inductance between the coils.

PART - C (5 x 
$$16 = 80$$
 Marks)

16. (a) Determine the current supplied by each battery in the circuit shown in figure using mesh analysis. (16)



Or

(b) Calculate *Vo* from the following circuit shown below using mesh analysis. (16)



17. (a) Predict the value of load resistance so that maximum power is transferred from battery. (16)



(b) Determine the load resistance to receive maximum power from the source; also find the maximum power delivered to the load in the circuit shown in below figure. (16)



18. (a) For a two-branch parallel circuit  $R_L = 15 \ \Omega$ ,  $R_C = 30 \ \Omega$ ,  $X_C = 30 \ \Omega$ ,  $E = 120 \ V$  and  $f = 60 \ Hz$ . For the condition of resonance, calculate (1) the two values of *L* and (2) the two values of total current. (16)

## Or

- (b) (i) A coil having an inductance of 100 *mH* is magnetically coupled with another coil having an inductance of 900 *mH*. The coefficient of coupling between coils is 0.45. Calculate the equivalent inductance if two coils are connected in parallel aiding and parallel opposing.
  (8)
- (ii) Identify the output current and voltage at resonance condition in single tuned coupled circuits.
- 19. (a) Explain the characterization of two port networks in terms of Z, Y and h parameters. (16)

## Or

- (b) Give transient current expressions for the RLC circuit excited by AC source with sinusoidal nature. (16)
- 20. (a) An unbalanced four wire star connected load has balanced supply voltage of 400 V. Load impedances are  $4+j8 \Omega$ ,  $3+j4 \Omega$  and  $15+j10 \Omega$  for *R* phase, *Y* phase and *B* phase respectively. Estimate the line currents, neutral currents and total power. (16)

## Or

(b) Calculate the total power input and readings of the two wattmeters connected to measure power in a three phase balanced load, if the reactive power input is15 *KVAR*, and the load power factor is 0.8. Also compute load *KVA*.