C09-EC-306

3238

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH / APRIL - 2019

DECE - III SEMESTER EXAMINATION

CIRCUIT THEORY

Time : **3** Hours] [Total Marks : **80**

PART - A **3×10=30**

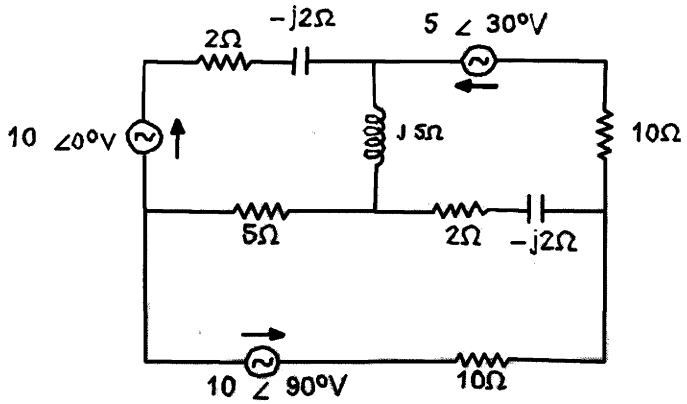
Instructions : *(1) Answer **ALL** questions.*
*(2) Each question carries **THREE** marks.*
(3) Answer should be brief and straight to the point.

1 Write the expression for the resonant frequency of the following parallel circuits.
(a) L, C (b) RL, C (c) L, CR

2 A sinusoidal signal of 5KHz frequency is applied across a 0.01 μF capacitor. Determine the capacitive reactance.

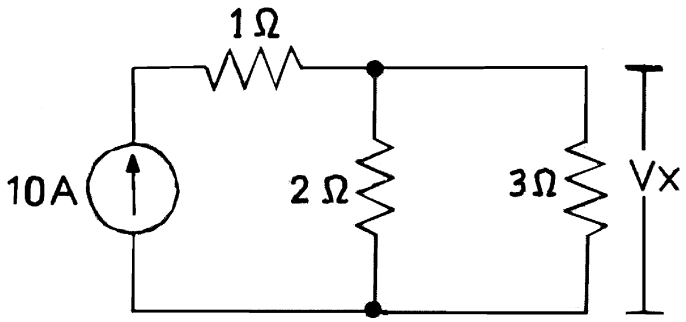
3 State the difference between active and passive circuit elements.

4 Determine the number of mesh equations required to solve the network shown below.



5 Define driving point impedance and transfer impedance of a network.

6 Verify the reciprocity theorem in the circuit shown in figure below :



7 List the limitations of Thevinen's theorem.

8 Write the expressions for the following parameters of low pass RC circuit.

(i) Upper 3dB frequency

(ii) Rise time in terms of upper 3dB frequency

9 Define :

(a) Co-efficient of coupling

(b) Critical coupling

10 Define reflected impedance of a coupled circuit.

PART - B **10×5=50**

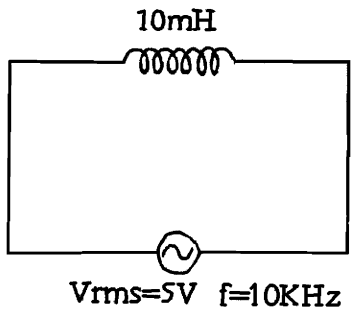
Instructions : *(1) Answer any **FIVE** questions.*

*(2) Each question carries **TEN** marks.*

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11 (a) Explain V-I characteristic of a pure inductor with a.c.source.

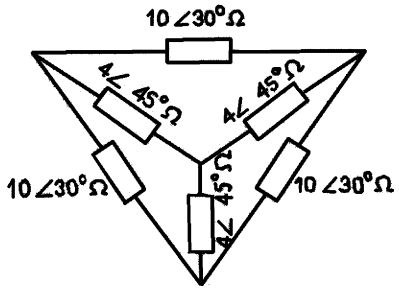
(b) Determine the r.m.s. current in the circuit shown below :



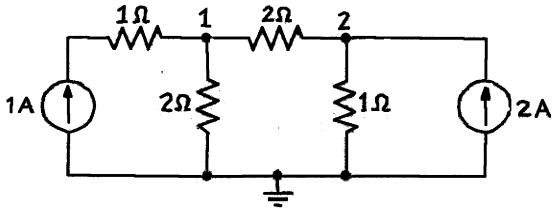
12 (a) Distinguish between series and parallel resonance.

(b) Find the value of inductance which should be connected in series with a capacitor of $5\ \mu F$ and resistor of $100\ \Omega$ and an a.c. source of 50 Hz so that power factor of the circuit is unity.

13 In the following figure a balanced delta connected circuit with $Z = 10\ \angle 30°\ \Omega$ is parallel with a balanced star connected circuit with $Z = 4\ \angle 45°\ \Omega$. Obtain the star connected equivalent,



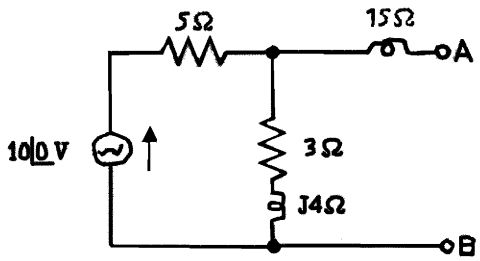
14 Determine the voltages at nodes 1 and 2 of the network shown below by using input and transfer admittances,



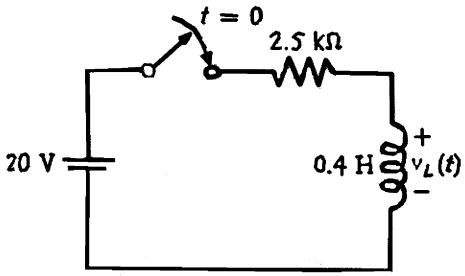
15 (a) Explain ideal voltage source and ideal current source. **4**

(b) A constant current source develops a terminal voltage of 9V when a $500\ \Omega$ resistor is connected across its terminals. What is its terminal voltage when the $500\ \Omega$ resistor is replaced by a $1.5\ K\Omega$ resistor ? **6**

16 Obtain Norton equivalent circuit at the terminals A, B for the circuit shown in figure,



17 At what time after the switch is closed in the following figure does $V_1(t)$ reach 15 V,



18 For the circuit shown below :

(a) Find the time constant

(b) After how many time constants will the current have decayed to one-half its maximum value ?