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BIEL-028

DIPLOMA – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (DECVI)/ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRONICS AND COMMUNICATION ENGINEERING (ACECVI)

Term-End Examination

June, 2014

BIEL-028 : CIRCUITS AND NETWORKS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt* ***five*** *questions. Question no.* ***1*** *is compulsory. Use of scientific calculator is permitted.*

1. Select the correct answer : *7×2=14*

(a) One sine wave has a period of 2 ms, another has a period of 5 ms, and another has a period of 10 ms. Which sine wave is changing at a faster rate ?

(i) sine wave with period 2 ms

(ii) sine wave with period 5 ms

(iii) sine wave with period 10 ms

(iv) All are at the same rate

(b) What is the phase angle between the inductor current and the applied voltage in a parallel RL circuit ?

(i) 0°

(ii) 45°

(iii) 90°

(iv) 30°

(c) The superposition theorem is valid

(i) only for a.c. circuits

(ii) only for d.c. circuits

(iii) for both a.c. and d.c. circuits

(iv) None of the above

(d) What is the total reactance of a series RLC circuit at resonance ?

(i) Equal to X_L

(ii) Equal to X_C

(iii) Equal to R

(iv) Zero

(e) The resultant voltage in a closed balanced delta circuit is given by

(i) three times the phase voltage

(ii) $\sqrt{3}$ times the phase voltage

(iii) zero

(iv) $\frac{1}{3}$ times the phase voltage

(f) Transient behaviour occurs in any circuit when

(i) there are sudden changes of voltage

(ii) the voltage source is shorted

(iii) the circuit is connected or disconnected from the supply

(iv) All of the above happen

(g) The Laplace transform of the first derivative of a function f(t) is

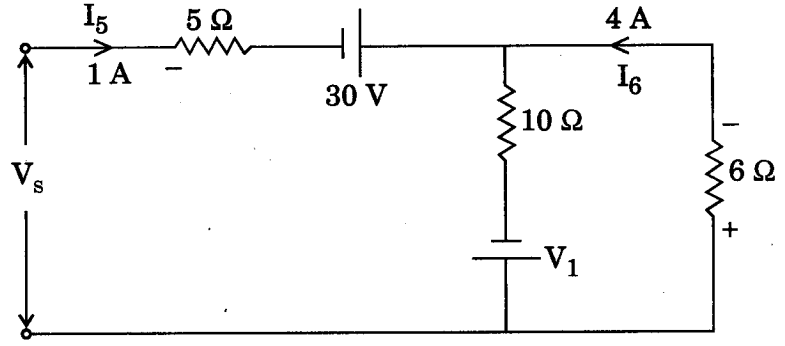
(i) $\frac{F(s)}{s}$

(ii) $sF(s) - f(0)$

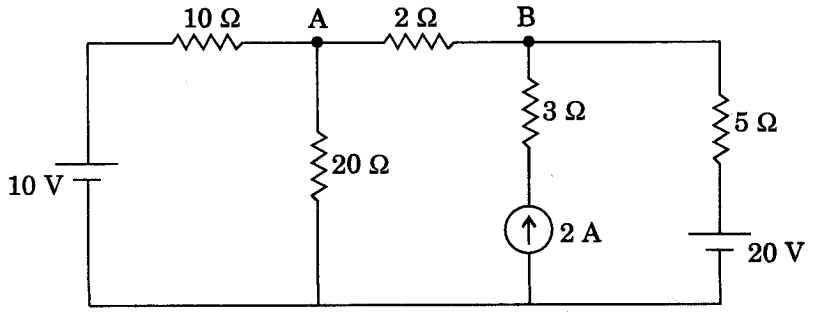
(iii) $F(s) - f(0)$

(iv) $f(0)$

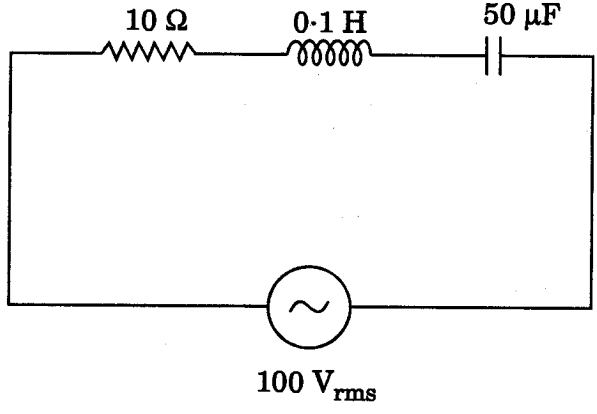
2. (a) Find the current in the 10 Ω resistance. Also calculate the value of V_1 and V_s in the circuit.



(b) Find the voltage across the 2 Ω resistor, by using the superposition theorem. *2×7=14*

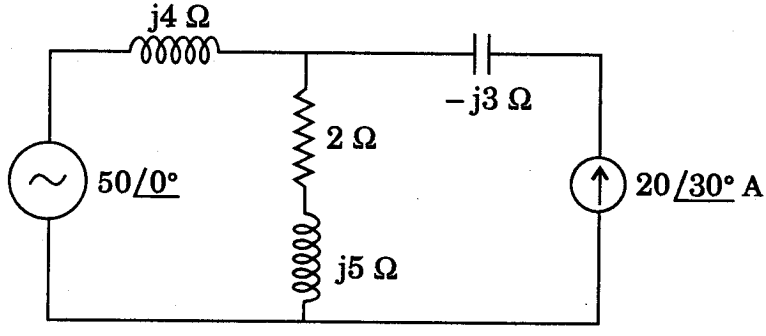


3. (a) For the circuit shown, determine the frequency at which the circuit resonates. Also find the voltage across the inductor at resonance and the Q factor of the circuit.

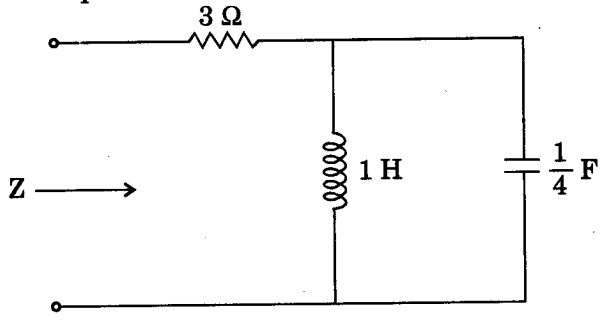


(b) Obtain the expression for the frequency at which the maximum voltage occurs across the capacitor in series resonance circuit in terms of Q factor and resonance frequency. *2×7=14*

4. (a) Determine the voltage across (2 + j5) Ω impedance as shown in fig. by using superposition theorem.



(b) Transform the circuit shown in fig. to the s-domain and determine the Laplace impedance Z(s). *2×7=14*

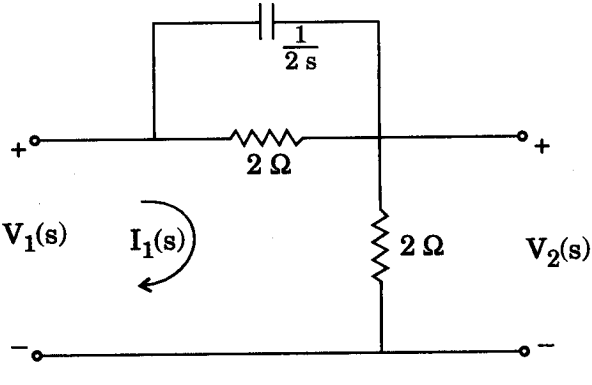


5. (a) Design a low pass filter (T-sections) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500 Ω.

(b) Design a π-type attenuator to give 20 dB attenuation and to have a characteristic impedance of 100 Ω. *2×7=14*

6. (a) Explain the necessary conditions for the transfer functions.

(b) For the network shown in fig. obtain the transfer functions $G_{21}(s)$, $Z_{21}(s)$ and driving point impedance $Z_{11}(s)$. *2×7=14*



7. (a) Express Z-parameters in terms of Y-parameters.

(b) Derive the condition for symmetry in terms of Y (admittance) parameters. $2 \times 7 = 14$

8. Write short notes on any ***two*** parts from each section (a) and (b) :

(a) (i) Image impedance

(ii) Transient state

(iii) Phasor notations $2 \times 3\frac{1}{2} = 7$

(b) (i) Cascade connection in Two-port network

(ii) Ladder network

(iii) Gate function $2 \times 3\frac{1}{2} = 7$