* 4 0 5 6 *

Networks and Lines
(1100)

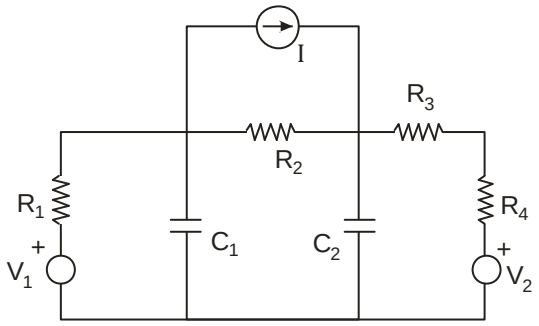
P. Pages : 3

Time : Three Hours **Max. Marks : 100**

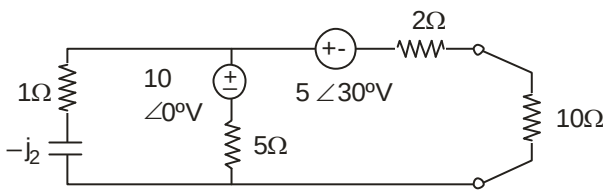
Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any two** question from each unit.
5. Assume suitable data if necessary.
6. Use of non - programmable electronics calculator is allowed.
7. Neat diagram must be drawn wherever necessary.

UNIT - I

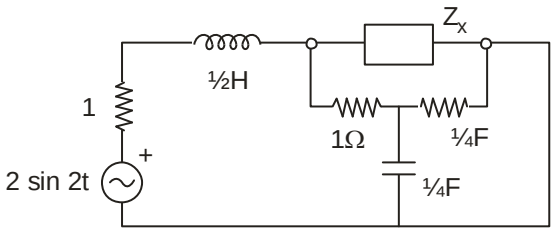
1. a) For the network given obtain. **10**
i) Incidence matrix
ii) Tie - set matrix
iii) t - cut set matrix.



b) Using Norton's theorem, calculate power loss in 10Ω for the fig given. **10**

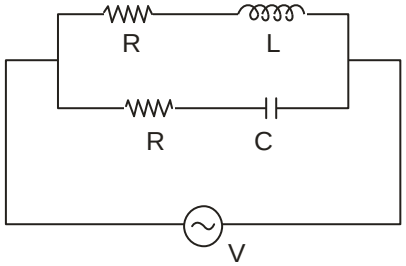


c) Determine Z_n, such that maximum power is transferred from source to load in the network given. **10**



2. a) Draw and explain the graphical representation of series RLC resonant circuit, by showing R, X_L, X_C, I, Z parameter w.r.t frequency. **10**

b) Show that total impedance of circuit given is equal to R. **5**



i) If $R^2 = \frac{L}{C}$

ii) For a series RLC circuit (resonant) calculate value of R and L ; if C = 250 pf, fo = 600 KHz, B.W = 20 KHz. **5**

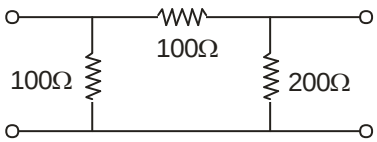
c) i) Explain the working of impedance matching circuit. **5**

ii) Derive the equation for coupling coefficient (K). **5**

3. a) A box containing impedance, has following measurement at 60ºC, Z_{10c} = 60 + j 30, Z_{20c} =40 + j20, Z_{isc} =50 + j20 construct equivalent T - network. **10**

b) i) Derive the equation for propagation constant (P) and characteristic impedance (Z_o) for a distortion less line. **5**

ii) Reduce the given π - network into its equivalent T. **5**



c) The characteristic impedance of certain line is $710\angle -16^{\circ}\Omega$, when frequency is 1KHz attenuation is 0.01 nepev/km and phase function is 0.035 rad/km calculate primary constant R, L, G, and C also find velocity of propagation (P). **10**

4. a) A high pass T - section filter has cutoff frequency of 600 Hz and nominal impedance of 500 Ω calculate the frequencies at which the characteristic impedance of the section is **10**

i) 50Ω
ii) 250Ω
iii) 450Ω.

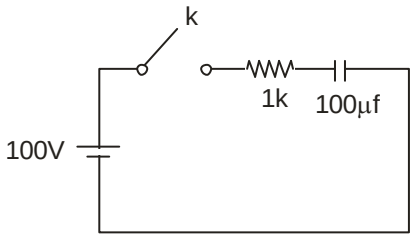
b) i) Design m - derived LPF T and π - section for the following specifications, $R_o = 600\Omega$, $t_c = 5KHz$, $f_\infty = 5.5KHz$. **10**

c) i) With block diagram, explain composite filter. **5**

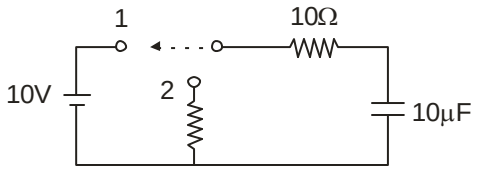
ii) Design symmetrical T - type attenuator to give 40 dB attenuation and characteristic impedance of 100Ω. **5**

5. a) i) What is initial condition, give the procedure to determine the initial condition. **5**

ii) For the circuit given, calculate value of current at t = 0.005 sec. If switch is closed at t = 0. **10**

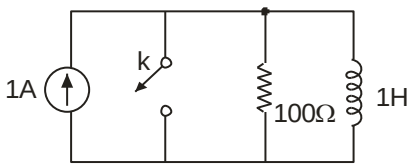


b) In the circuit shown, switch in initially at position 1, until the steady state reached At t=0, switch is changed to position 2. Calculate i (t). **10**



c) In the network given switch is open at t = 0, calculate **10**

i) v ii) $\frac{dv}{dt}$ iii) $\frac{d^2v}{dt^2}$ at t = ot.



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