This question paper contains 5 printed pages. *Your Roll No. .....*

Sl. No. of Ques. Paper : 1778 **GC-3**
Unique Paper Code : 32511101
Name of Paper : **Basic Circuit Theory and Network Analysis**
Name of Course : **B.Sc. (Hons.) Electronics / Instrumentation (CBCS)**
Semester : I
Duration : : 3 hours
Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

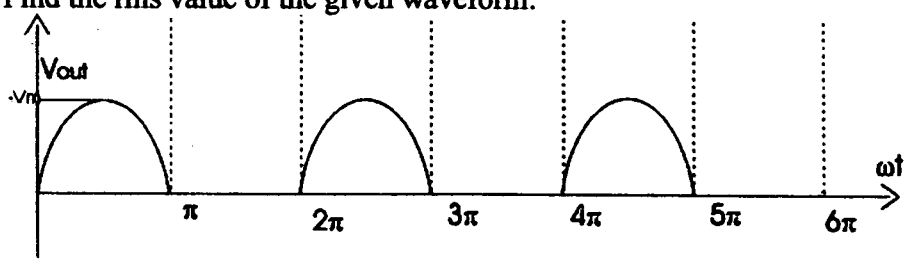
Attempt five questions in all. Q. No. 1 is compulsory.
Use of scientific calculator is allowed.

1. a) How can a capacitor be tested using a multimeter? 3

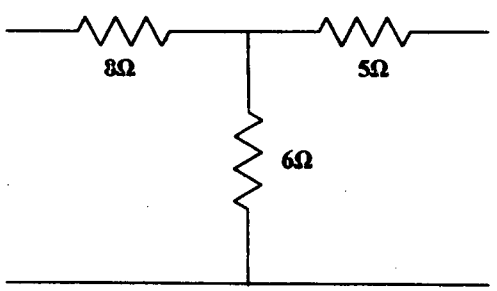
b) Draw the ideal and practical response for a bandpass filter with passband of 3kHz-6kHz. 3

c) Write the formulae for converting a delta network (consisting of Z_A, Z_B and Z_C) into a star network (consisting of Z_1, Z_2 and Z_3) 3

d) Find the rms value of the given waveform: 3

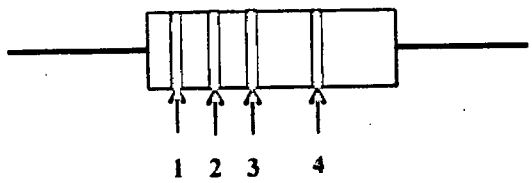


e) Find the Z-parameters of the given two-port network: 3



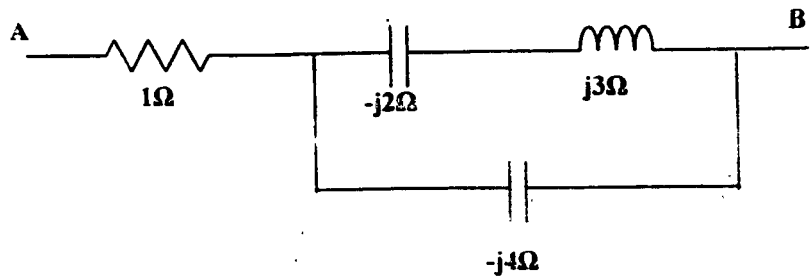
2. a) Calculate the value of resistance according to the given band color. 4

P. T. O.

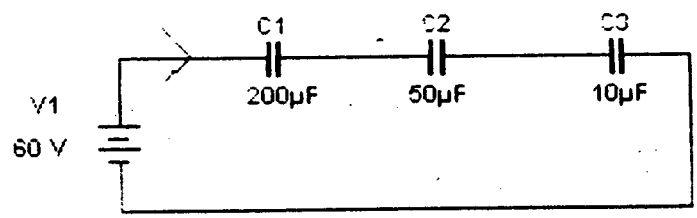


(i) 1-Brown, 2-Green, 3-Black, 4- Silver
(ii) 1-Green, 2-Blue, 3-Orange, 4- Brown

b) Find the equivalent impedance between terminals A and B 4

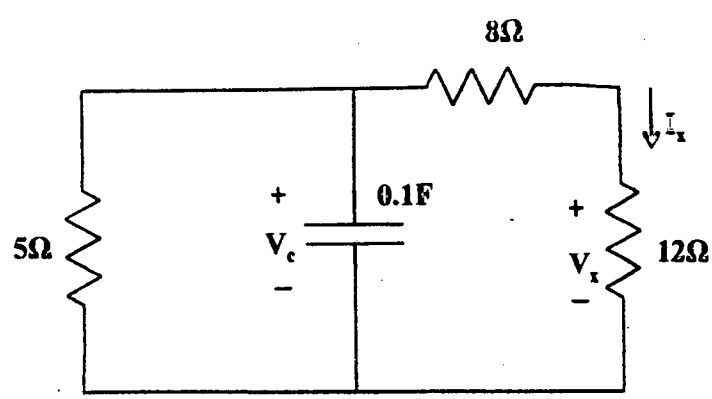


c) For the circuit shown below: 7



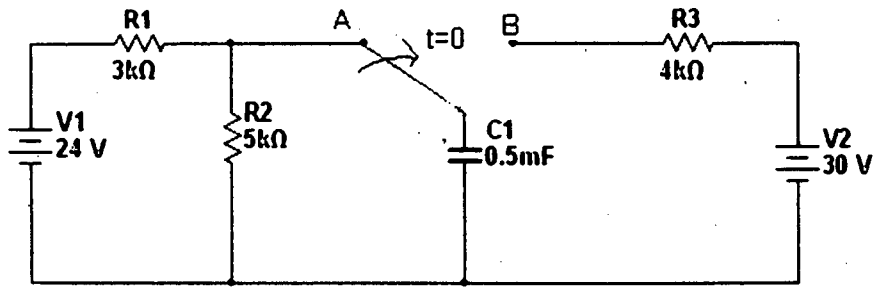
Find: (i) the total capacitance,
(ii) the charge on each plate,
(iii) voltage across each capacitor.

3. a) For the given network, let $V_c(0) = 15V$. Find V_c, V_x and I_x for $t>0$. 5

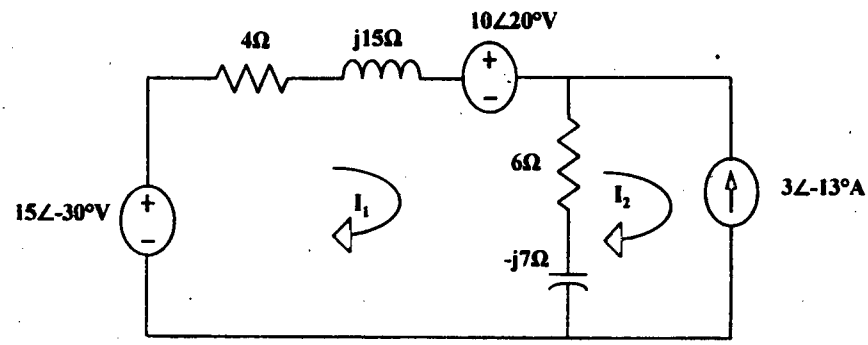


b) Define transient state and steady state response for dc circuit analysis. 2

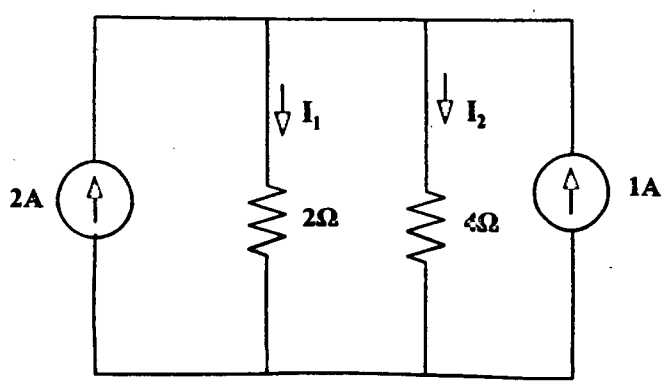
c) In the given circuit, the switch has been in position A for a long time. At t=0, switch moves to position B. Determine V (t) for t>0 and calculate its value at t=1s and 4s. 8



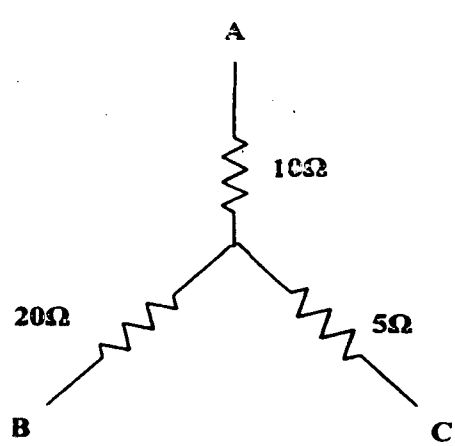
4. a) Using mesh analysis, find the mesh currents I_1 and I_2 7



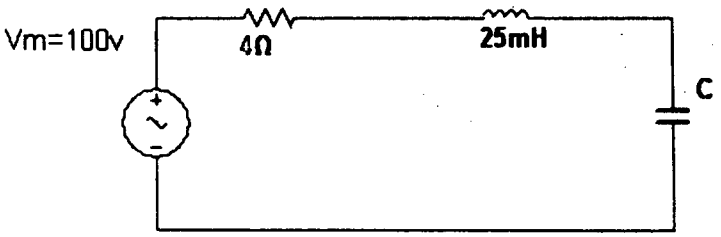
b) Find the currents I_1 and I_2 using node analysis 4



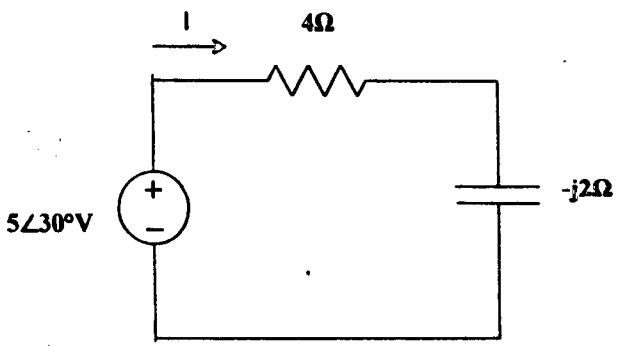
c) Find the delta-equivalent for the given network 4



5. a) For the given circuit, calculate the value of C that produces Q=50. Also, find: (i) ω_1, ω_2 and B, (ii) the average power dissipated at $\omega = \omega_0, \omega_1$ and ω_2. 8

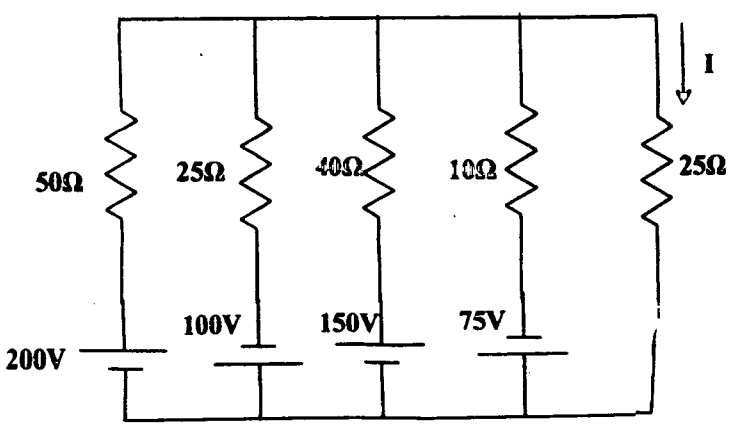


b) Find the average power supplied by the source and the average power absorbed by the resistor. 4

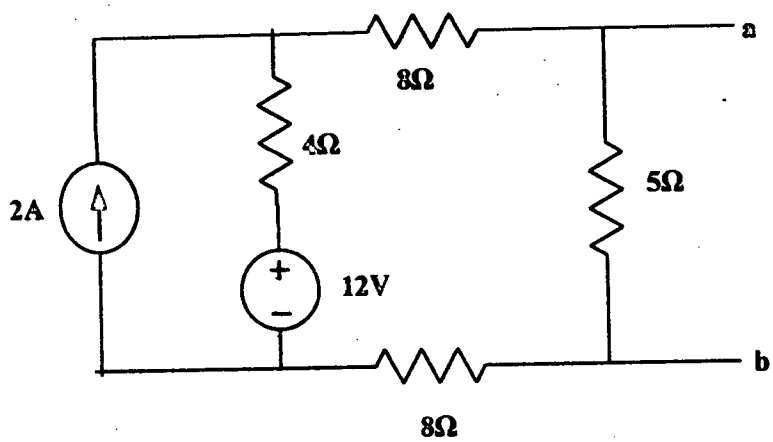


c) Define the term Power factor. What is its value for a purely reactive load? 3

6. a) Using Millman's theorem, find I 5



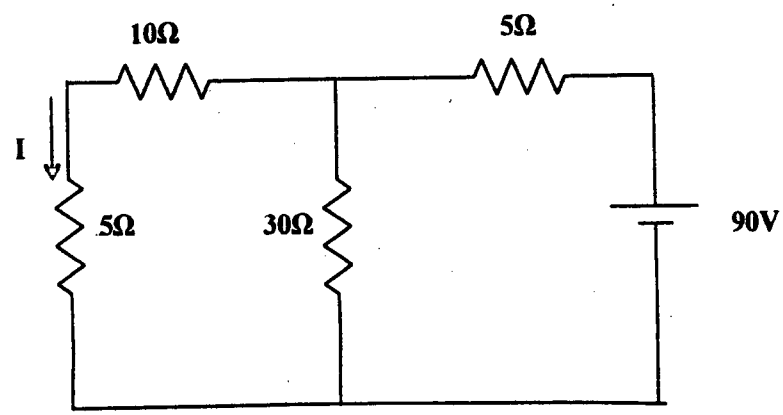
b) Determine the Thevenin and Norton equivalents ofthe given network. 8



c) Determine the maximum power that can be delivered to a load connected across terminals 'ab' in the network given in part (b). 2

7. a) State the Superposition theorem. 3

b) Verify the reciprocity theorem by determining the value of I for the given network. 8



c) Define the Y parameters for a two-port network. 4