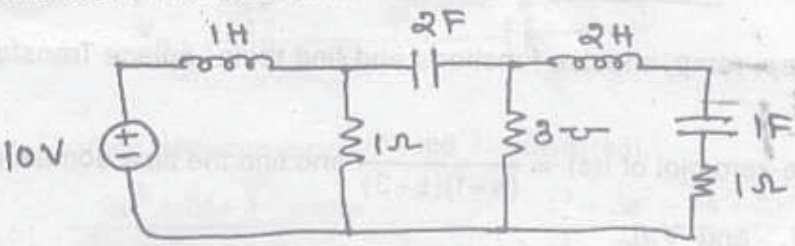
(REVISED COURSE)

(3 Hours) [Total Marks : 100

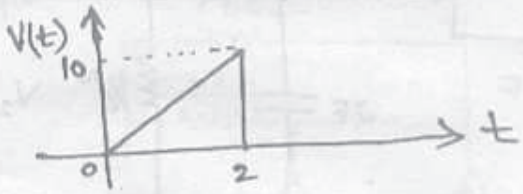
N.B.: (1) Question No. 1 is **compulsory**.
(2) Answer any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicates **full** marks.

1. (a) Draw the dual of the network shown : 20

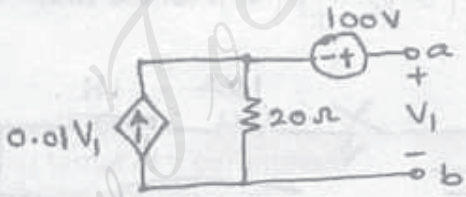


(b) Test whether $P(s) = s^6 + 8s^5 + 3s^4 + 15s^3 + 17s^2 + 12s + 4s$ is Hurwitz.

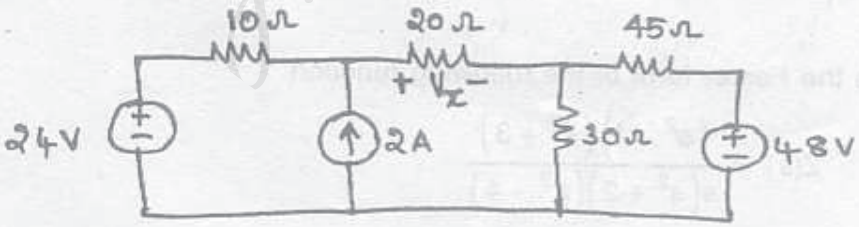
(c) Apply waveform synthesis and find Laplace transform for the following wave form.



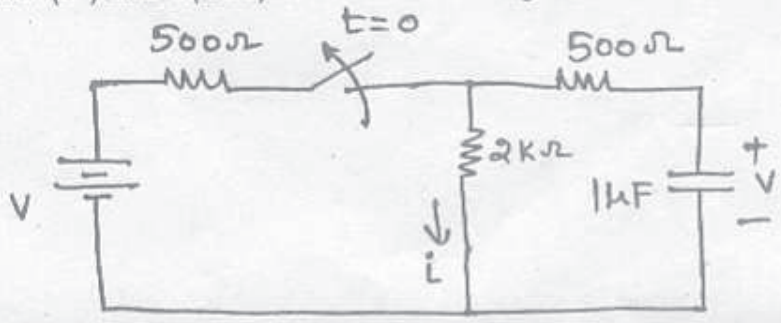
(d) Find Thevenin's equivalent voltage across a and b.



2. (a) Use Superposition to find the value of V_x in the circuit shown. 10



(b) Find $i(0^+)$ and V(2ms) for circuit in the figure below : 10



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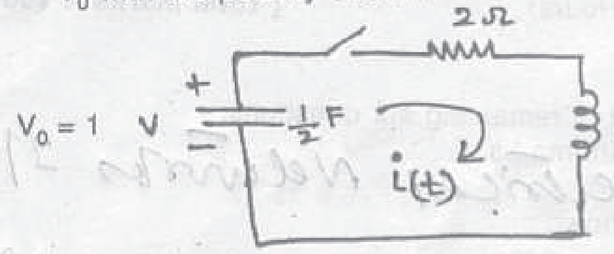
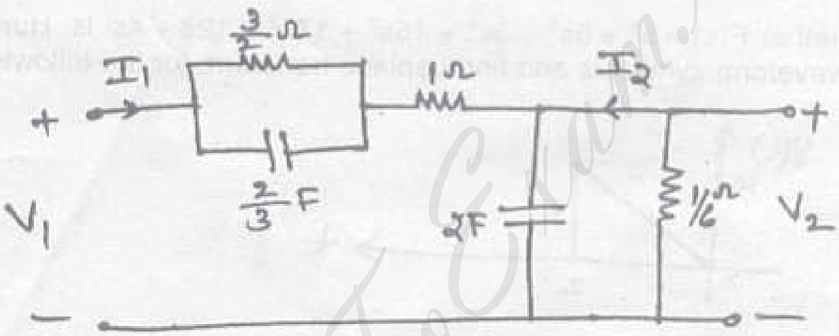
3. (a) Find i(t) using Laplace Transform. Given that capacitor is initially charged to V_0 with the polarity shown. 10



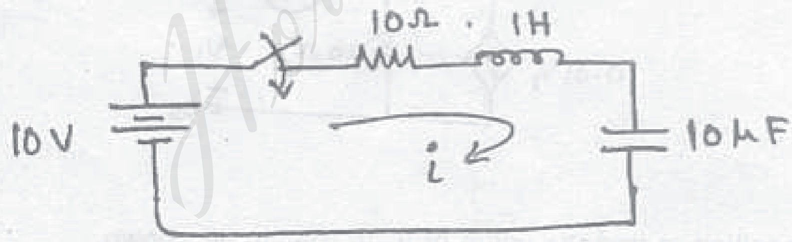
(b) Define step, ramp, impulse functions and find their Laplace Transforms. 10

4. (a) Draw pole-zero plot of $I(s) = \dfrac{5s}{(s+1)(s+3)}$ and find the time domain response. 8

(b) Find V_2/V_1 and V_1/I_2. 12



5. (a) Find $i(0^+)$, $\dfrac{di}{dt}(0^+)$, $\dfrac{d^2i}{dt^2}(0^+)$, for the circuit shown. $V_C(0) = 0$. 10

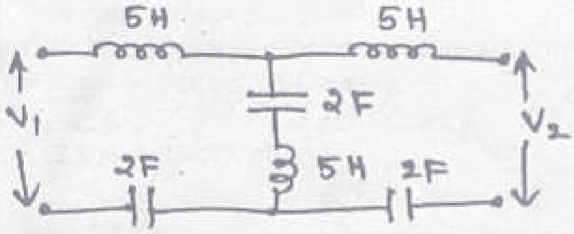


(b) Realize the Foster form of the following function 10

$$Z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$$

Page ③. S.E(E) Rev Electrical Networks 3/6/09

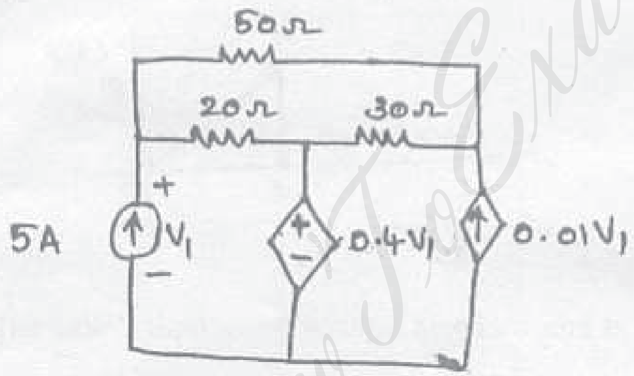
6. (a) Find Z-parameters 10



(b) Test whether following functions are Positive real. 10

(i) $\dfrac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$ (ii) $\dfrac{s^3 + 5s^2 + 9s + 3}{s^3 + 4s^2 + 7s + 9}$

7. (a) Use nodal analysis to determine V_1. 10



(b) Write short notes on any two :— 10

(a) Z- parameters in terms of y parameters

(b) Tellegen's and Millman's theorem.

(c) Properties of RC function

(d) Cut set matrix.
