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324453(25)

B. E. (Fourth Semester) Examination, ~~2020~~ APR-MAY 2022

(New Scheme)

E)ECT **(EE Engg. Branch)**

NETWORK ANALYSIS & SYNTHESIS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

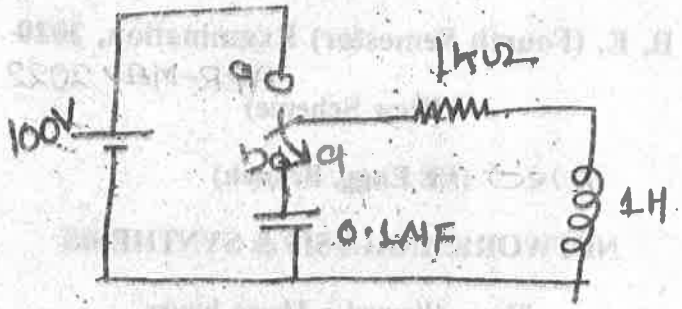
Note : *Attempt all questions. Part (a) of each question is compulsory and carries 2 marks each and attempt **two** parts from (b), (c) and (d) carrying 7 marks each.*

Unit-I

1. (a) Define Ramp and impulse functions. 2

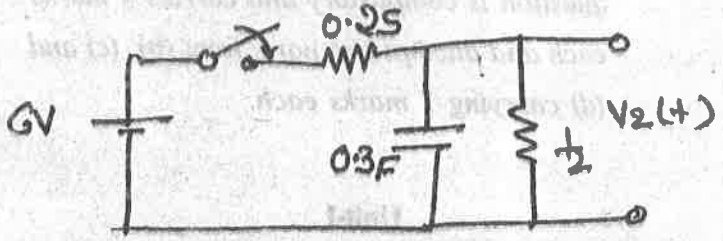
(b) In the network of fig shown below, the switch is changed from the postion a to b on $t = 0$. Solve for

$$i, \frac{di}{dt} \text{ and } \frac{d^2i}{dt^2} \text{ at } t = 0^+. \quad 7$$

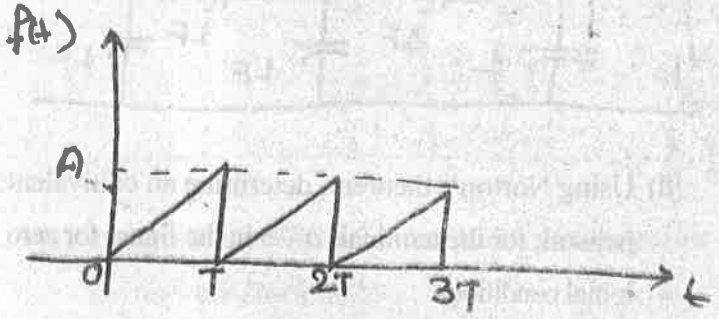


(c) In the network of figure shown below, the switch is open for a long time and at $t = 0$, it is closed.

Determine $v_2(t)$. 7



(d) Find the Laplace transform of the waveform shown in fig. 7



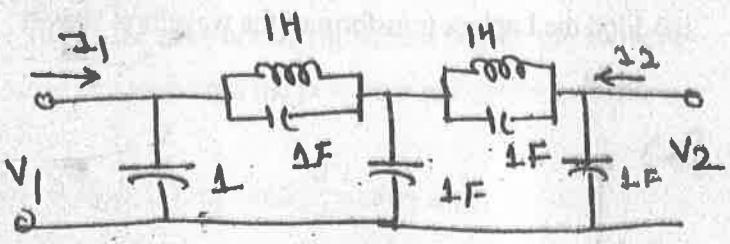
Unit-II

2. (a) Define driving point function. 2

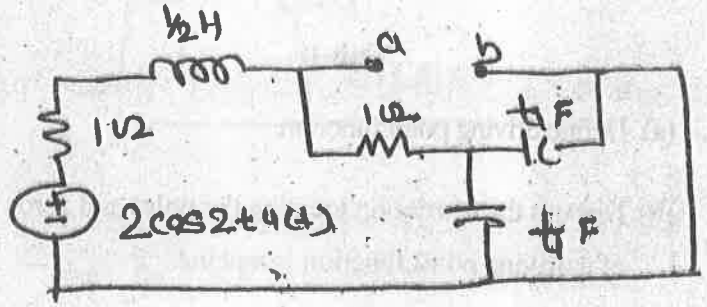
(b) Disouss the restriction locating the poles and zeros of a driving point function is s-plane. 7

(c) For the network shown in the figure, show that the voltage-ratio transfer function is

$$G_{12} = \frac{(S^2+1)^2}{5s^4+5s^2+1} \quad 7$$



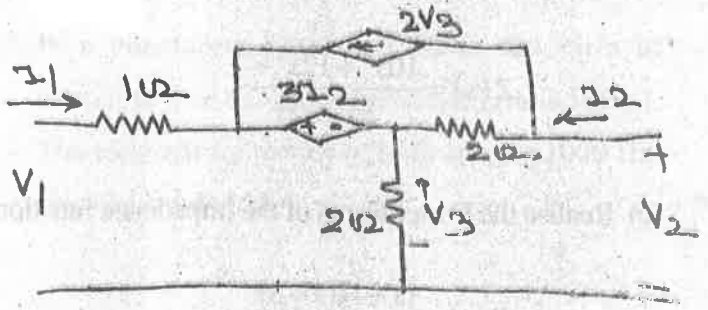
(d) Using Norton's theorem, determine an equivalent network for the terminals $a - b$ in the figure for zero initial conditions. 7



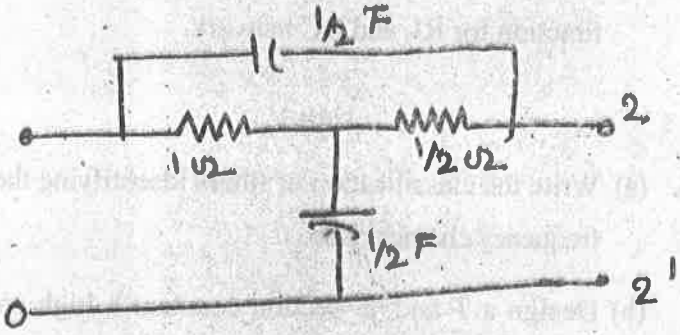
Unit-III

3. (a) Explain Bartlett's bisection theorem. 2

(b) The accompanying network contains a voltage controlled source and a current centrolled source. For the element values specified, determine the Y and Z parameters. 7



(c) Determine the *ABCD* (transmission) parameters for the network show below. 7



(d) Obtain the z-parameters in terms of h-parameters. 7

Unit-IV

4. (a) What are the properties of postive real functions? 2

(b) Realise the Cauer forms of the following LC impedence function : 7

$$Z(s)=\frac{10s^4+12s^2+1}{2s^3+2s}$$

(c) Realise the Foster forms of the impedence function : 7

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

(d) Explain the properties of driving point immittance function for RL and RC network. 7

Unit-V

5. (a) Write the classification of filters idsentifying their frequency characteristic. 2

(b) Design a T and π section constant-k high pass filter having cut-off frequency of 12 kHz and nominal impedance $R_0 = 500\,\Omega$. Also find its characteristic impedance and phase constant at 24 kHz. 7

(c) Derive the expression for characteristics impedence of π -type low pass filter. Also prove that

$$Z_{0t} = \sqrt{Z_{sc} \times Z_{oc}}$$ 7

(d) In a constant-k band-fass filter, the ratio of capacitance in the shunt and series arm is 100 : 1. The resonent frequency of both arms is 1000 Hz. Find the bandwidth. 7