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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.E.E.) II Year II-Semester Main & Backlog Examinations, May-2017

Electrical Circuits-II

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Draw the equivalent form of R, L and C elements interms of the initial condition of the element.
2. Define zero state response.
3. State the convolution property of Laplace transforms.
4. Derive the expression for Laplace transform of exponential function.
5. Write the properties of LC reactance functions.
6. Draw the pole-zero diagram for the given network function $V(s) = \dfrac{4s(s+2)}{(s+1)(s+3)}$.
7. What are the symmetry conditions in Fourier transform?
8. Derive the expression for exponential form of Fourier series.
9. State the properties of Hurwitz polynomial.
10. Define Time Constant.

Part-B (5 × 10 = 50 Marks)

11. a) An 8 μF capacitor is connected through a 1.5 MΩ resistance to a direct current source. After being on charge for 24 sec the capacitor is disconnected and discharged through a resistor. Determine what % of the energy input from the supply is dissipated in the resistor. [5]

    b) Find the response current of a seres R-L-C circuit, if R=2Ω, L=1H and C=1F when the Impulsive voltage δ(t) is applied. [5]

12. a) State and derive the expressions for Initial and Final value theorem. [5]

    b) Find F(s) for the periodic function shown in fig.1. [5]

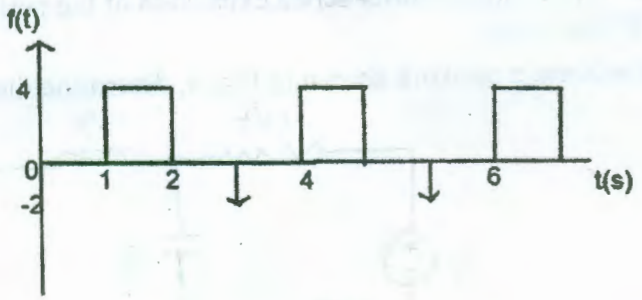

Fig.1

13. a) A series RLC circuit, with R = 200 Ω, L = 0.5 H, and C = 100 mF has a sinusoidal voltage source v = 300 Sin (500t +Ø) (V). Find the resulting current if the switch is closed at a time corresponding to Ø=30^0 using LT method. [5]

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b) Obtain the S-domain expression for the current I_L in the circuit shown in fig.2. [5]
Assume initial energy stored in the circuit is zero.

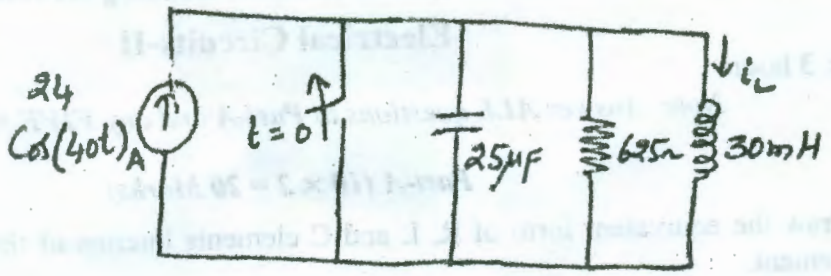

Fig. 2

14. a) Write the Fourier series for the voltage waveform shown in fig.3. [5]

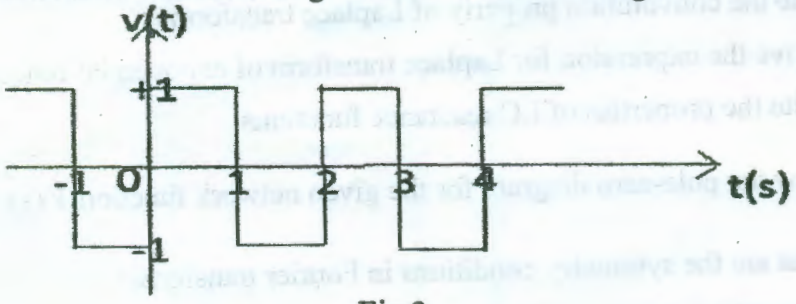

Fig.3

b) State and prove half wave symmetry property of Fourier series. [5]

15. Find the first and second Cauer's network for the function $Z(s) = \frac{S^2+9S+18}{S^2+6S+5}$ [10]

16. a) An RC circuit consists of a 20 kΩ resistor and a 0.05 μF capacitor. It is desired to decrease the current in the network by a factor of 5 without changing the capacitor voltage. Find the necessary values of 'R' and 'C'. [5]

b) Find $L^{-1}[F_1(s)F_2(s)]$ by using the convolution for the following functions. [5]

$$F_1(s) = \frac{1}{S};\ F_2(s) = \frac{1}{S+1}$$

17. Answer any **two** of the following:

a) Test whether the polynomial $S^5+3S^4+3S^3+4S^2+S+1$ is Hurwitz or Not. [5]

b) Find the exponential Fourier series expansion of the periodic function $f(t) = e^t\ 0 < t < 2\pi$, with $f(t+2\pi) = f(t)$. [5]

c) For the s-domain network shown in Fig. 4, determine the transfer function $H(S) = V_0/V_i$ [5]

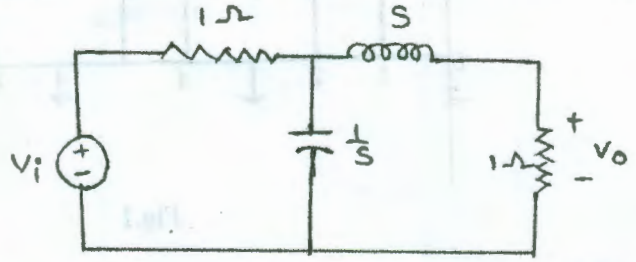

Fig 4

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