PURBANCHAL UNIVERSITY

III SEMESTER FINAL EXAMINATION-2006

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrial Engineerin-II

Full Marks: 80

TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-questions is specified along its side.

Attempt any FIVE questions

Q. [1] [a] Generate the matrix mode for the network in Fig. 1[a] using nodal analysis. And hence obtain the solution for the network using Cramer's Rule if R_1= 4Ω , R_2 = 2Ω , R_m= 4Ω , α = 0.4, β = 0.2, V = 24 volts, I = 10Amp.

Figure:

[b] In the given circuit, Fig 1[b], switch K is closed at t=0, the steady state condition having reached previously. Obtain the expression for the current in the circuit at any time t.

If R1 = R2 = 100Ω , V= 10volts and L = 1H, Calculate the following at time t = 5ms.

(i) Current.

(ii) Voltage drop across R2.

(iii) Voltage across L.

Q. [2] [a] In the series RL circuit shown in Fig. 2[a] the input V(t)=10Sin(10t+π/6) is applied at time t=0. Obtain the particular solution for the circuit current i(t). Assume zero initial current through the inductor L. [8]

inductor L. [8]

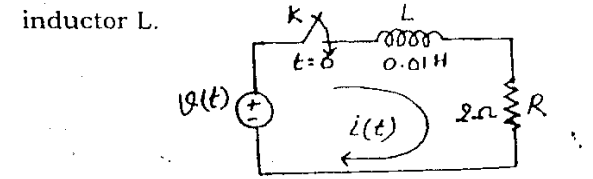


Fig. 2 [a]

[b] State and prove the initial and final value theorem for Laplace Transform. [8]

Q. [3] [a] An exponential voltage $v(t)=6e^{-2t}$ is applied at t=0 to a series RLC circuit with resistor R=5Ω, inductor L=1H and capacitor C=0.25μF. Obtain the complete solution for the current i(t) in the circuit using Laplace transformation. Assume zero initial condition before the application of the voltage. [6]

[b] Define the terms: Transfer function, voltage and current transfer ratio, transfer admittance and transfer impedance. [4]

[c] The transform current I(s) in a network is given the following response. [6]

$$I(s) = \frac{2S}{(S+1)(S+2)}$$

Plot the poles & zeros in S-plane and hence obtain the time-domain response. [6]

Q. [4] [a] The current in an inductance L=0.01H has a waveform as shown in Fig. 4 [a]. Obtain the trigonometric Fourier series for the voltage across the inductance V_L. Take w = 500rad/s. [8]

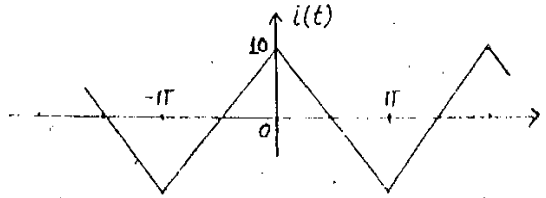


Fig. 4[a]

[b] The given network shown in Fig. 4[b] is driven by a current source and is terminated by resistor R2 at port 2. For this network calculate $G_{21}(s)$, $\alpha_{21}(s)$, $Z_{21}(s)$, $Y_{21}(s)$ and $z_{11}(s)$ 7yn{s), Y,,(s) and Zn(s). [8]

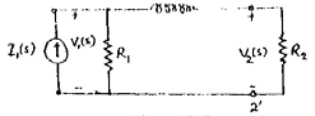


Fig. 4[b]

Q. [5] [a] Sketch the Bode plot (magnitude and phase) for the following network function.

$$H(s) = \frac{(1+0.2S)(1+0.025s)}{s^2(1+0.005s)(1+0.001s)}$$

[b] Define reciprocal network. For a reciprocal network show that AD-BC=1, A,B,C,D are transmission parameters. [4]

Q. [6] [a] The network of the Fig. 6(a) is the type used for the so-called "notch filter". For the element values that are given, determine the y parameters. [10]

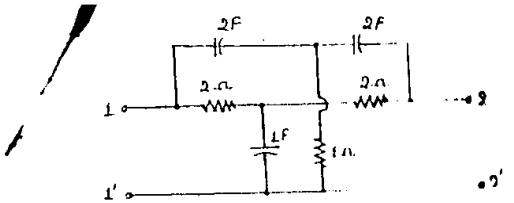


Fig. 6[a]

[b] Realize a network whose impedance is given as:[6]

$$z(s) = \frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$$

PURBANCHAL UNIVERSITY

III SEMESTER FINAL EXAMINATION-2005

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrical Engineering-II

Full Marks: 80

TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-questions is specified along its side.

Attempt any FIVE questions

Q. [1] [a] The network of Fig. 1[a] reaches a steady state with the switch K open. At t=0, switch k is closed. Find i(t) for the numerical values given for the element, sketch the current waveform, and indicate the value of the time constant.

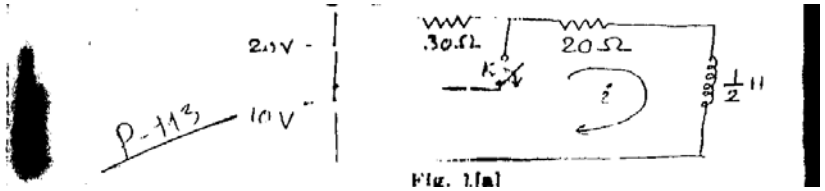


Fig. 1[a]

[b] In the network of Fig. 1[b], the switch k is closed at t =0 with zero capacitor voltage and zero inductor current. Solve for $\frac{dv_1}{dt}$, $\frac{dv_2}{dt}$, $\frac{d^2v^2}{dt^2}$ at t = 0. [2+2+2]

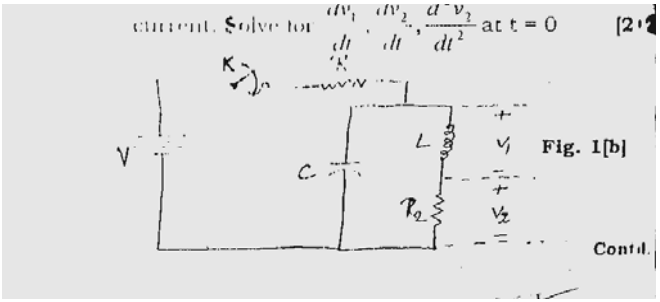


Fig. 1[b]

[c] Find the compete response of RC series circuit shown in Fig. 1[c] to sinusoidal input Vsinwt. [5]

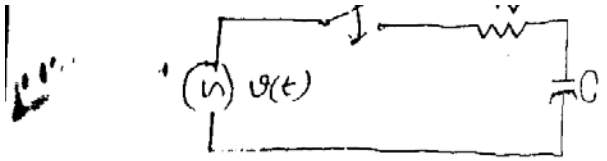


Fig. 1 [c]

Q. [2] [a] The voltage v(t) as shown in figure Fig. 2 [a(i)], is applied to R-L network of Fig. 2 [a(ii)]. Find the current i(t). [8]

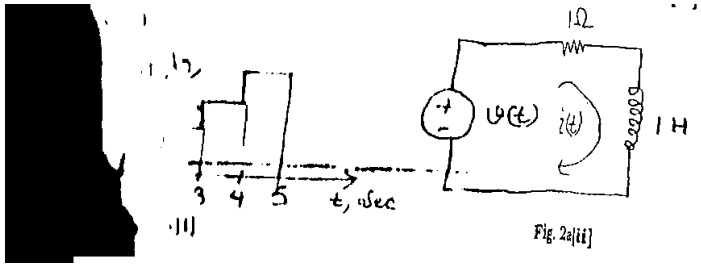


Fig. 2a[ii]

[b] In the network shown in Fig. 2[b], the switch K is closed at t=0 with the network previously unenergised. For the element values shown on the diagram, find $i_1(t)$ and $i_2(t)$ using Laplace transformation method. [8]

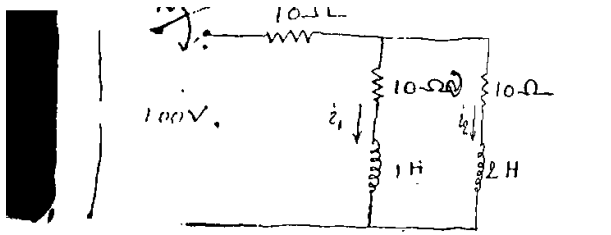


Fig. 2[b]

Contd. ...

Q. [3] [a] For the Laplace transformation $I(s) = \frac{2s+10}{s(s+2)}$, determine the value of i(0+) and i(α)making use of initial value theorem and finial value of theorem. [2+2]

[b] Find the range of K such that the network with the characteristics equation: [6]
$S^4+s^2+4s^2+Ks+3=0$ is stable

[c] Find the driving point impedance of the network shown in Fig. 3[c]. Also find poles and zeroes of the network and locate them in the s-plane. [6]

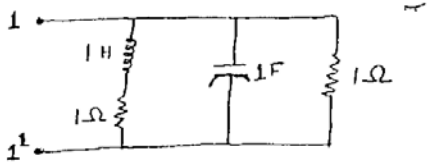


Fig. 3 [c]

Q. [4] [a] Find the Fourier Series expansion of the continuous waveform shown in fig. 4(a).

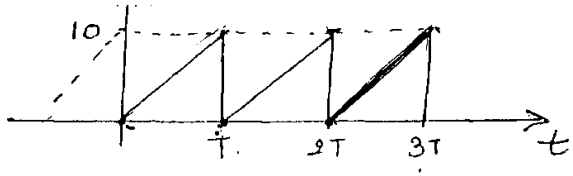


Fig. 4[a]

[b] Show that for the two port network, under the condition of reciprocity ΔT =AD –BC=1 in terms of transmission parameters. [5]

[c] Write down the properties of RL networks. [3]

Q. [5] [a] For the two port network of the fig 5[a]. [3+3+6]

[i] Determine the voltage ratio transfer function $\frac{V_2(s)}{V_1(s)}$.

[ii] Find the expression for half-power frequency.

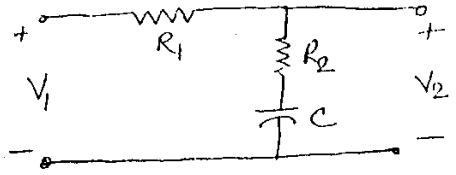


Fig. 5[a]

[b] Sketch the (asymptolic) Bode plot (Magnitude and Phase) for the network whose transfer function is given as: [10]

Q. [6] [a] Determine the Y and z parameters of the circuit shown in Fig. 6[a].

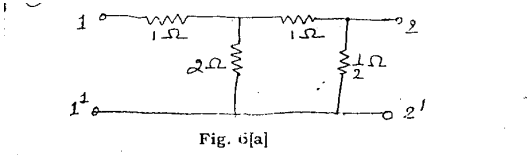


Fig. 6[a]

[b] Synthesize the given function:

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

PURBANCHAL UNIVERSITY

III SEMESTER BACK-PAPER EXAMINATION-2005

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrical Engineering-II

Full Marks: 80

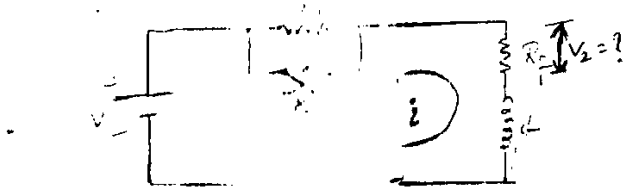
TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-questions is specified along its side.

Attempt any FIVE questions

Q. [1] [a] In the given circuit of fig. 1[a] switch k is closed at time t =0, the steady state is being reached previously. Calculate the current I following through the circuit and the voltage across R2 and L at time t=5ms. If the applied voltage is 10vots. R1=R2=100 ohm and L=1H.



[b] Calculate the following for the network of fig 1[b] when switch is closed at t=0. [2+3+3]

[i] i1(0+), i2(0+) [ii] di_1/dt (0+), di_2/dt (0+)

[iii] d^2i_1/dt^2 (0+), d^2i_2/dt^2 (0+)

(2)

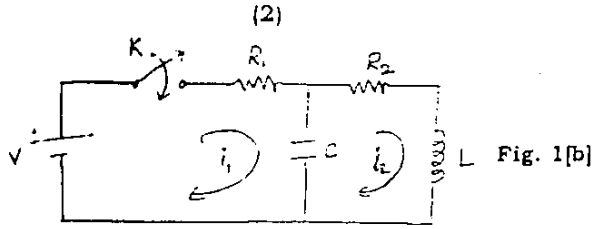


Fig. 1[b]

[c] Define active and passive network. [2]

Q. [2] [a] In the given circuit of fig [2a], capacitor C has an initial voltage $V_c(0+)$ = 10v and at the same instant current in the inductor is zero switch k is closed at time t=0. Obtain expression for the voltage v(t) across the inductor L.

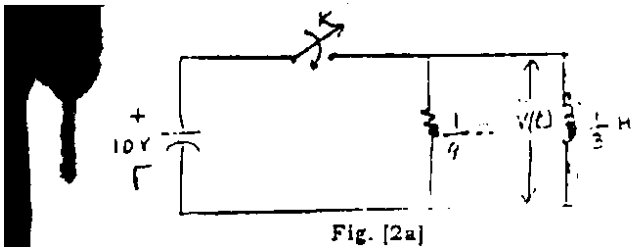
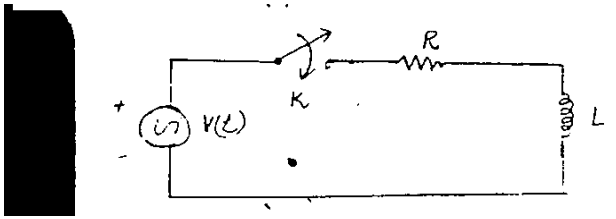


Fig. [2a]

[b] Find the complete response of RL series circuit shown in fig. 2[b] to sinusoidal input Vsinwt. [5]



[c] Derive the first shifting theorem using Laplace transform. [4]

Q. [3] [a] plot the pole and zero in the s-plane and hence obtain the time domain responses of the given transformed circuit in a network. [6]

$I(s)= 2S/(s+1)(s+2)$

[b] Find the range of B such that the network with the characteristics equation: [6]

$S^4+3s^3+3s^2+2s+k=0$ is stable.

[c] Define unit step function, dirac delta functions, ramp function and transfer function. [4]

Q. [4] [a] Find the Fourier series expansion of the square waveform shown in fig. 4[a]. [8]

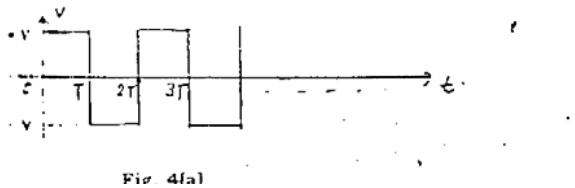


Fig. 4[a]

[b] Under what condition for the two port network is $z_{12}=z_{21}$? Show it analytically interms of z parameters. [5]

[c] Define positive real function and write its properties . [3]

Q. [5] [a] Find the voltage ratio transfer functions $V_2(s)/V_1(s)$ of a given two port network shown in fig 5[a]. [6]

[4]

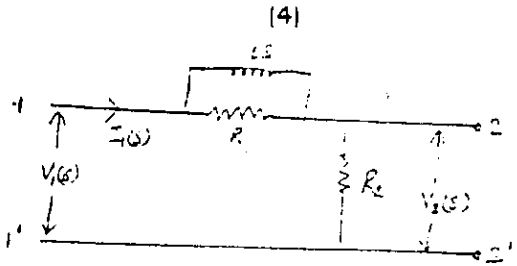


Fig. 5[a]

[b] Sketch the bode plot magnitude and phases for the network whose transfer function is given as:

$G(s)= \frac{10}{3(1-0.5S)(1-0.1S)}$

Q. [6] [a] Determine the hybrid parameters of the circuit shown in fig 6[a].

Figure:

[b] Synthesize the given parameter.

$Z(s) = \frac{S^2+2S+8}{S(S+3)}$

[c] Write short note on: [2×2=4]

[i] Ideal and non-ideal filters.

[ii] Transmission parameters.

PURBANCHAL UNIVERSITY

III SEMESTER FINAL EXAMINATION-2004

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrical Engineering-II

Full Marks: 80

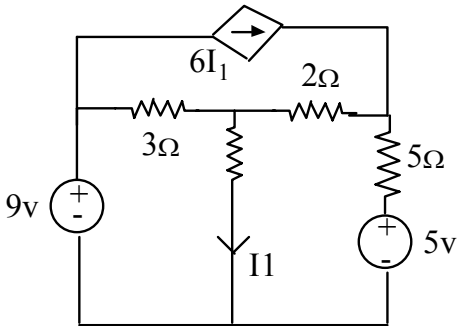
TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-questions is specified along its side.

Attempt any FIVE questions

Q. [1] [a] Find the current I in the circuit shown in fig 1[a]. [6]



[b] Obtain the expression for voltage across the capacitor when a series R-C circuit is excited by a d.c . Excitation of voltage V. [5]

[c] Obtain the complete expression for current when the switch K is closed at t=0 in fig. 1[c]. [5]

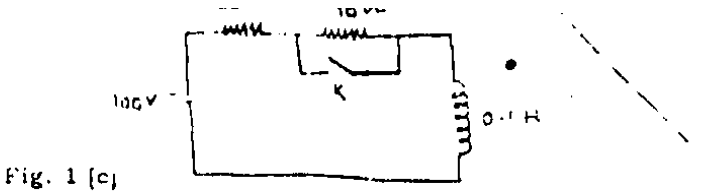


Fig. 1 [c]

Contd. ...

Q. [2] [a] In the Fig. 2[a], find the expression for currents and voltage through the inductor L and resistance R1 and R2 after the switch is opened. Assumed steady state initial condition with the switch closed at t=(0-) [L=1H, R1=R2=10ohm] [8]

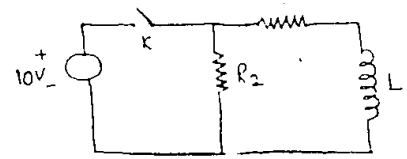
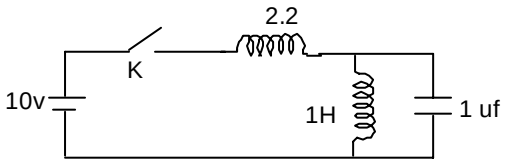


Fig. 2[a]

[b] In the circuit in Fig. 2[b] switch k is closed and steady state condition reached. Now at time t=0. switch K is opened . Obtain the expression for the current through the inductor using Laplace transform. [8]



Q. [3] [a] State and prove integration and derivation theorem of L.T. [4]

[b] State whether the system with transfer function given below is stable or not. [4]

$$H = \frac{K}{s(s+2)(s^2+3)+K}$$

[c] The transformed current in a network is given by the following expression:

$$I(s) = \frac{5S}{(s+1)(s+3)}$$

Find the time domain current from the plot of poles and zeroes of I(s) in S-plane. [8]

Q. [4] [a] Find the voltage transfer ratio for the network shown in Fig. 4[a]. [8]

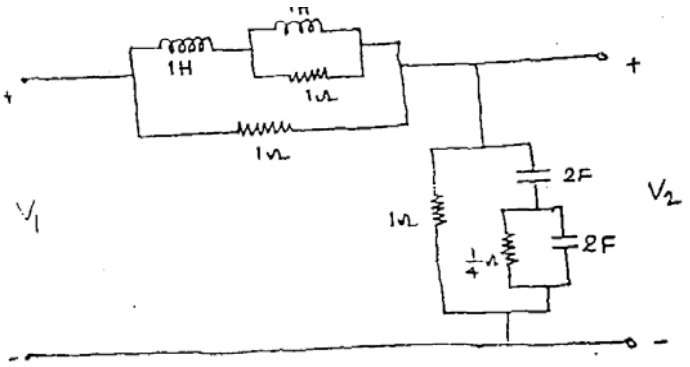
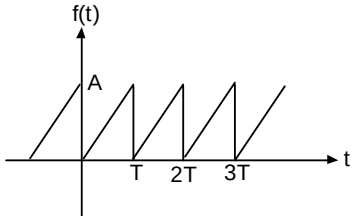


Fig. 4[a]

[b] Find the Fourier series expansion of the continuous wave form shown in fig. 4[b]. [8]



Q. [5] Draw the bode plot (magnitude and phase) for the function given below: [16]

$H(s) = \frac{5}{s(1+0.2S)(s^2+16s+100)}$. Use semi-log graph paper. Also discuss briefly about the plot.

Q. [6] [a] Realize the given driving point impedance function:

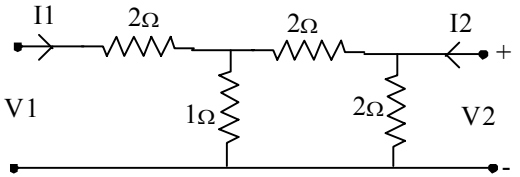
$Z(s) = \frac{4(s^2+1)(s^2+9)}{s(s^2+4)}$ [6]

[b] For a symmetrical network prove that

$h_{22} - h_{12}\, h_{21} = 1$.

Where h_{11}, h_{22} , h_{12}, h_{21} are hybrid parameters of a two-port network. [4]

[c] Determine the z-parameter of the circuit shown in fig 6[c].



PURBANCHAL UNIVERSITY

III SEMESTER FINAL EXAMINATION-2003

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrical Engineering-II

Full Marks: 80

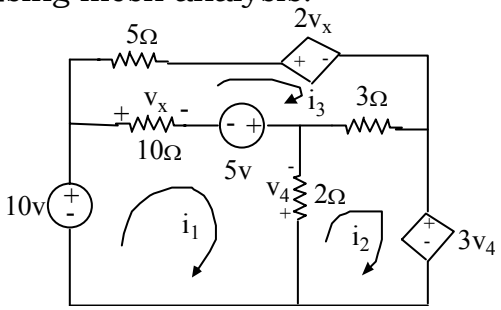
TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Attempt any FIVE questions

Q. [1] [a] Define passive network. Solve the given network using mesh analysis. [2+8]

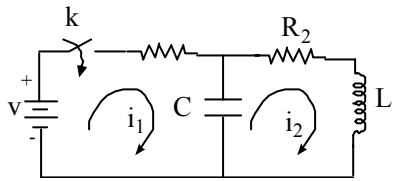


[b] Calculate: [6]

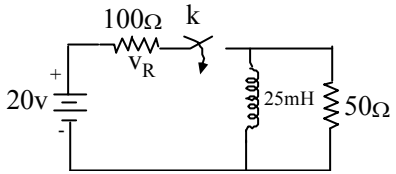
[i] $i_1(0_+)$ [ii] $i_2(0_+)$ [iii] $di_1/dt\ (0_+)$

[iv] $di_2/dt\ (0_+)$ [v] $d^2 i_1/dt^2\ (0_+)$ [v] $d^2 i_2/dt^2\ (0_+)$

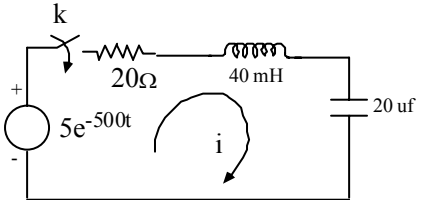
When the switch is closed at time t =0 in the circuit given below:



Q. [2] [a] What is damping ratio? Find V_R in the circuit given below at time t =[a]-1 ms; [b]0^+;[c]0.5ms [8]

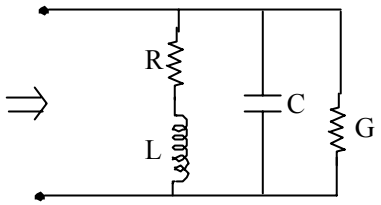


[b] Solve the given network in the fig 2[b] using Laplace method. Assuming current through inductor and charge at capacitor is zero before switching. Switch is closed at time t =0. [8]



Q. [3] [a] Find the Laplace Transformation of the first derivates. [3].

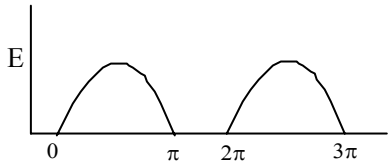
[b] Find the driving point impedance as a function of complex frequency s for the network shown in fig. 3[b]. [7]



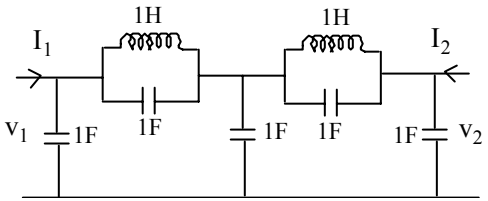
[c] Determine the value of K for the network to be stable.

$$G(s) = \frac{k}{s(s^2+s+1)(s+2)+k}$$

Q. [4] [a] Find the Fourier series expansion of half sinusoidal wave shown in fig 4[a]. [8



[b] Find the voltage ratio transfer function G_{21}, of the circuit given below. [8]



Q. [5] Define roll-off and skirt. Sketch the asymptotic Bode plot in semi-log paper (magnitude and phase) for the network whose transfer function is given as:

$$G(s) = \frac{75(1+0.5)S}{S(S^2+16S+100)}$$

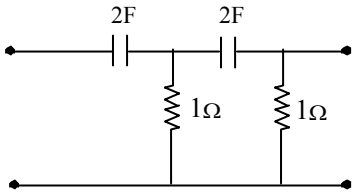
Also discuss briefly about the plot. [3+10+3]

Q. [6] [a] synthesize the following network function:

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

What is band stop filter? [7]

[b] Find *z* parameter for the RC ladder network shown below. [9]



PURBANCHAL UNIVERSITY

III SEMESTER BACK-PAPER EXAMINATION-2003

LEVEL: B. E. (Computer/Electronics & Communication)

SUBJECT: BEG223EL, Electrical Engineering-II

Full Marks: 80

TIME: 03:00 hrs. **Pass Marks:** 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Attempt any FIVE questions

Q. [1] [a] Use loop analysis to determine branch current in the network of fig. 1[a]. [8]

Figure:

[b] In the given network, the switch k is in position a for a long period of time. At t=0, the switch is moved form a to b. Find $v_2(t)$ assume the initial current in the 2H inductor zero. [8]

Figure:

Q. [2] [a] In the given circuit, capacitor C has a initial voltage of 10 volts and at the same instant current in the inductor L is zero. Switch K is closed at time t =0. Obtain expression for the voltage V(t) across the inductor. [8]

Figure:

[b] In the given parallel R-L-C circuit switch K is opened at time t=0. Obtain the particular solution for v(t) using Laplace transformation. [8]

Figure:

Q. [3] [a] Write down the unit step, unit ramp and unit impulse function in time domain. Also find the Laplace transformation of each spectrum. [10]

[b] In the given parallel R-L-C circuit switch k is opened at time t=0. Obtain the particular solution for V(t) using laplace transformation. [8]

Figure:

Q. [4] [a] Synthesize the network whose impedance is given as $z(s) = \frac{9S+20}{S^2+4S}$ [4]

[b] Plot the asymptotic Bode-diagram of magnitude as well as for phase for the given network function. [12]

$G(s) = \frac{20(S+1)}{S(S^2+2S+10)(S+5)}$

Use semi-log paper.

Q. [5] [a] The transformed current in a network is given by the following expression:

$I(s) = \frac{5S}{(S+1)(S+3)}$

Find the time domain current from the plot of poles and zeroes of I(s) in a S-plane. [8]

[b] For the given network find the voltage ratio transfer function. [8]

Figure:

Q. [6] [a] For a reciprocal network prove that AD-BC=1. where ABCD are transmission parameters of a two-port network. [6]

[b] Find the y and z parameters for the given resistive network. [10]

Figure:

