BTS – IV – 04.14 – 0115

B

B.Tech. Degree IV Semester Examination April 2014

EE 1404 CIRCUITS, SIGNALS AND SYSTEMS II

(*2012 Scheme*)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

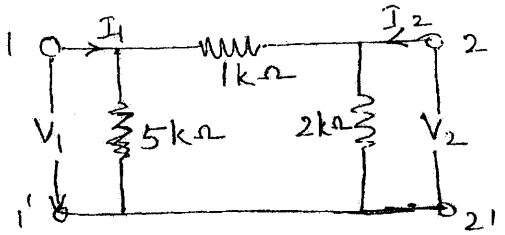
I. (a) Represent the following signals. (i) $10u(4-t)$ (ii) $u(t)-u(10-t)$

(b) Define static and dynamic systems with one example each and check whether the given system is static or dynamic.

$$\frac{dy(t)}{dt}+5y(t)=2x(t).$$

(c) Define *h* parameters and express it in terms of *Z* parameters.

(d) Calculate the *Y* parameters and draw the equivalent circuit.



(e) Explain the classification of filters.

(f) Design a constant *K* high pass filter (π) having cut off frequency 1kHz with terminal load resistance of 600Ω.

(g) Obtain the impulse response of the system

$$y(n)=x(n)+2x(n-1)-4x(n-2)+x(n-3)$$

(h) Obtain the initial and final value of $X(z)=\frac{1}{1-z^{-2}}$.

PART B

(4 × 15 = 60)

II. (a) Represent the following signals. (7)
(i) Unit impulse (ii) Unit step
(iii) Unit ramp (iv) real exponential
(v) Complex exponential
How is the impulse function related to step and ramp?

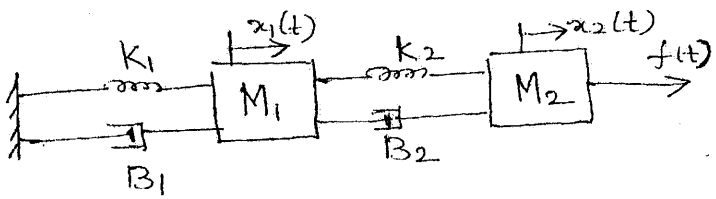
(b) Define LTI system and verify whether the system is linear and time invariant (8)

$$3\frac{dy(t)}{dt}+5y(t)=x(t).$$

OR

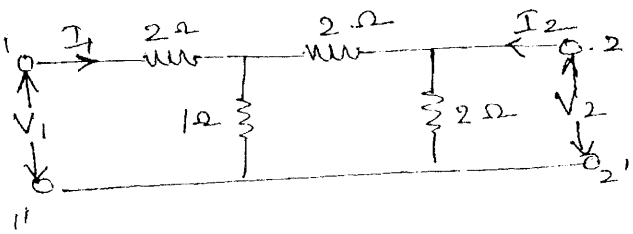
III. (a) What is meant by BIBO stable system. Determine the stability of (7)
(i) $y(t)=e^{4t}u(t-3)$
(ii) $y(t)=e^{-2t}Sin2t\,u(t)$

(b) Write the differential equations for the system. (8)



(P.T.O.)

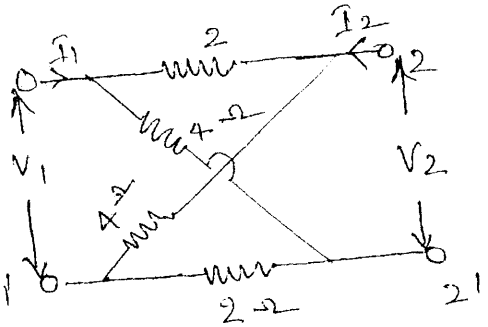
IV. (a) Calculate the open circuit impedance parameters of the given network and draw the equivalent circuit. (9)



(b) Define image impedance and obtain the formula for the characteristic impedance of a T Network. (6)

OR

V. (a) Obtain the transmission parameters of the given network. (9)



(b) Obtain the equivalent ABCD parameters when two networks are cascaded. (6)

VI. (a) Explain how the band, attenuation constant and phase constant are affected when $\frac{Z_1}{4Z_2}$ of a filter varies from $-\infty$ to $+\infty$ with (i) Z_1 and Z_2 are similar type and (ii) Z_1 and Z_2 are opposite type. (6)

(b) Design an *m* derived low pass filter (*T* and π section) having design resistance $R_0 = 500\Omega$, cut off frequency $f_c = 1500Hz$ and infinite attenuation frequency $f_\infty = 2000Hz$. (9)

OR

VII. (a) Discuss the properties of positive real functions. (6)

(b) Determine the 1st Foster form of the driving point impedance (9)

$$Z(s) = \frac{5(s+1)(s+4)}{(s+3)(s+5)}$$

VIII. (a) Explain sampling and aliasing. (6)

(b) Obtain the *z* transform of (9)

(i) $x(n) = [\sin w_o n]u(n)$

(ii) $x(n) = \{1, 2, -1, 2, 3\}$

(iii) $x(n) = na^{n-1} \uparrow$

OR

IX. (a) Explain the linearity, time reversal and convolution properties of *z* transform. (6)

(b) Determine the inverse *z* transform of (9)

(i) $X(z) = \frac{4}{z-5}$

(ii) $X(z) = \frac{z-4}{(z-1)(z-2)^2}$

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