S.E. sem3 (CBGS) (ETRX) 5/6/15.

EIM

Q.P. Code : 4823

(3 Hours) [**Total Marks : 80**

N.B. : (1) Question **No.1** is **Compulsory.**
(2) Attempt any **Three** questions from remaining **five** questions.

1. Solve All : **20**
   (a) Compare Maxwell bridge and Hey bridge for measurement of indutance.
   (b) Write the applications of instrument systems.
   (c) Write the specifications of CRO.
   (d) Explain level measurement by float type method.

2. (a) Discuss in detail static and dynamic characteristic of instruments. **10**
   (b) Write short note on "Data logger". **10**

3. (a) Explain the Kelvin double bridge for measurment of unknown resistance. **10**
   (b) Draw and explain the block diagram of DSO. **10**

4. (a) Explain in detail classification and selection criteria of transducer. **10**
   (b) Write short note on " Dead Weight Tester". **10**

5. (a) Draw and explain the block diagram of digital multimeter. **10**
   (b) Draw and explain the construction and working of magnetic flow meter. **10**

6. Write short notes on :- **20**
   (a) Monitoring instruments
   (b) Resistance temperature detector
   (c) Electronics volmeter using transistors
   (d) Capacitance sensor.

JP-Con. 12214-15.

SE | Sem III (CBSGS) | ETRX

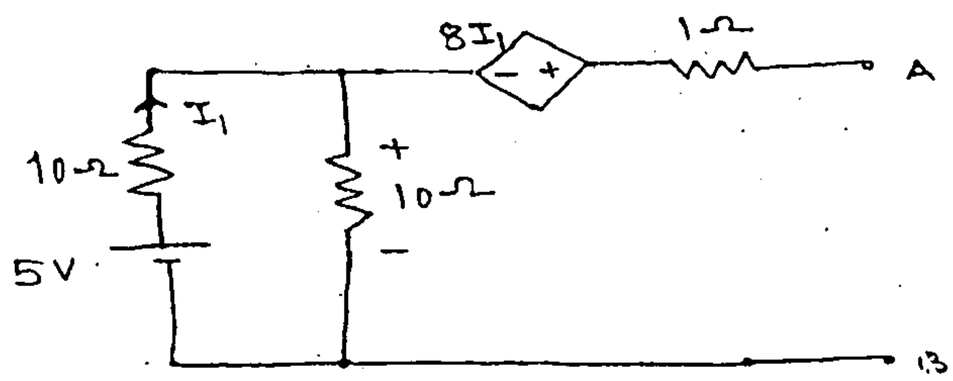
Circuit Theory 01|06|15

QP Code : **4821**

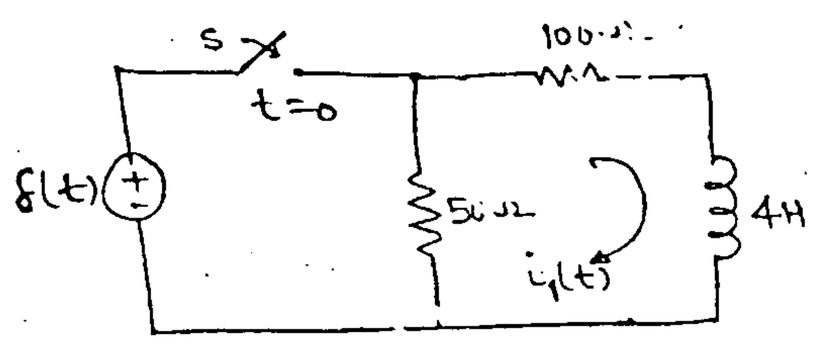
(3 Hours) [Total Marks : 80

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if required.
(5) Use smith chart for transmission line problem.

1. (a) Find the thevnin's equivalent network for terminals A and B. **4**



(b) For the network shown, the switch is closed at t = 0. Find the current $i_1(t)$ for t > 0 **4**

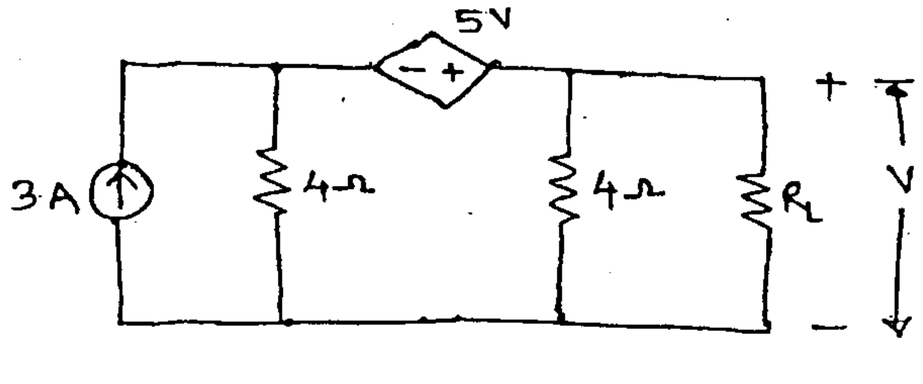


(c) State the condition for reciprocity of h-parameter and prove it. **4**

(d) Obtain S-domain equivalent circuit of an inductor and capacitor having non-zero initial conditions. **4**

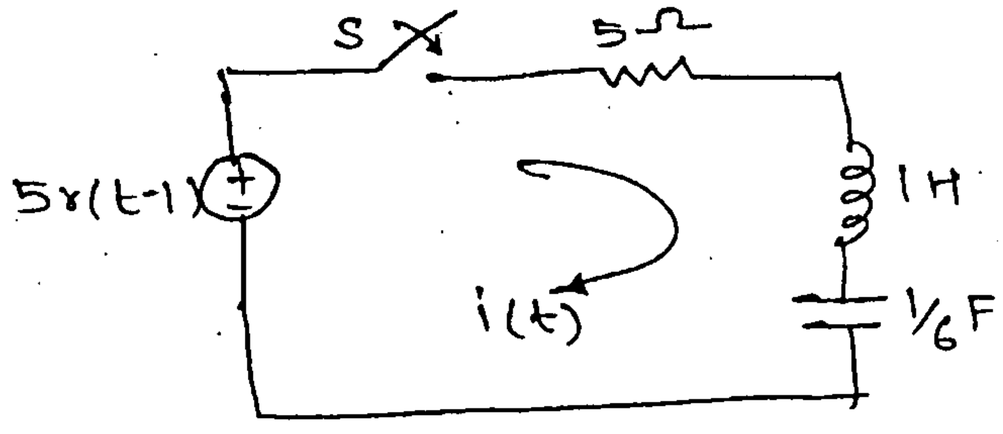
(e) What are scattering parameters. State their properties. **4**

2. (a) In the given network, what will be the R_L to get maximum power delivered to it. Calculate power. **8**



[TURN OVER

(b) For the network shown, determine the current i(t) when the switch is closed at t = 0 with zero initial conditions. 8



(c) List the types of damping in series R-L-C circuit and mention the condition for each damping. 4

3. (a) Design a single stub match for a load of (150 + j232.5) Ω for 75Ω transmission line at 500 MHz using smith chart. 8

(b) Define T-parameters and relate them to other parameter as indicated. 6

(i) A and C in terms of z-parameters

(ii) B interms of y-parameter

(c) Compare Foster form-I and Foster from-II of an L.C. network. 6

$$Z(s) = \frac{6s(s^2+4)}{(s^2+1)(s^2+64)}$$

4. (a) Check the positive real functions – 8

(i) $F(s) = \frac{s^2+6s+5}{s^2+9s+14}$ and

(ii) $F(s) = \frac{s^3+6s^2+7s+3}{s^2+2s+1}$

(b) Derive an expression for characteristic equation of a transmission line. Also obtain α, β and γ of the line. 8

(c) What are standing waves. Define reflection coefficent and V.S.W.R. of a transmission line. 4

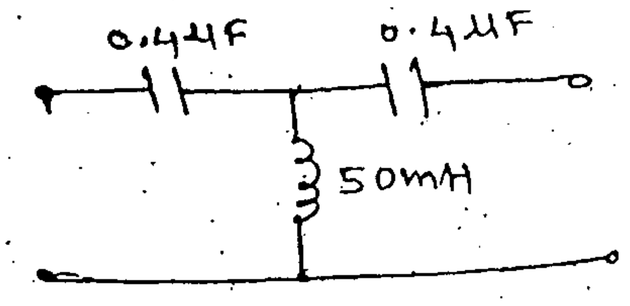
5. (a) Test wheather the following polynomials are Hurwitz, use continuous fraction expansion 10

(i) $s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

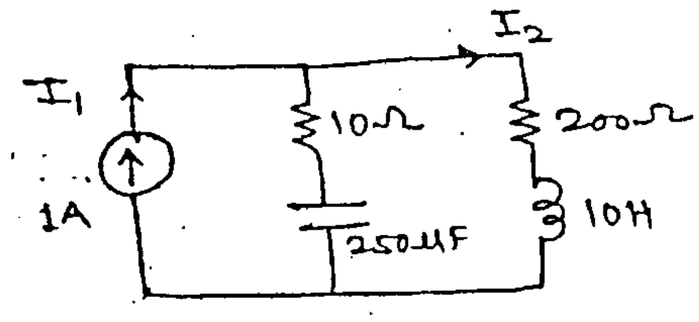
(ii) $s^4 + 2s^2 + 2$

[TURN OVER

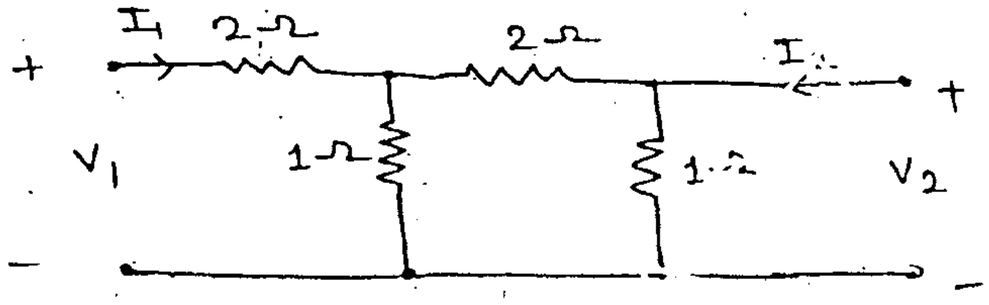
(b) Find the characteristic impedances, cut off frequency and passband frequency for given network. 5



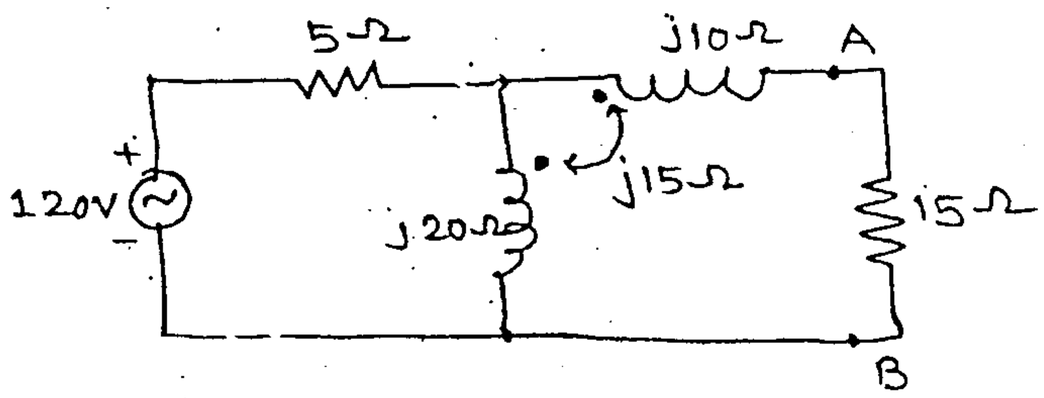
(c) Obtain pole-zero plot for I_2/I_1 5



6. (a) Two identical sections of the network shown are connected in cascade manner. Obtain the transmission line parameters of over all connection. 8



(b) Find the current through 15-Ω resistor 6



(c) Compare Cauer form - I and Cauer form - II of RC Network 6

$$Z(s) = \frac{3(s+2)(s+6)}{s(s+4)}$$

SE- SEM III [CBGS] - EIRT

26 May 2015

D. C. D.

QP Code :4818

(3 Hours) [Total Marks : 80

N.B.: (1) Question **No.1** is **compulsory**.
(2) Solve any **three** from remaining **five** questions.
(3) Draw **neat** diagram wherever **necessary**.

1. (a) Explain the current sinking and sourcing when two standard TTL gates are connected. **5**

   (b) Explain glitch problem of ripple counter along with waveform. **5**

   (c) Draw truth table and circuit of JK flip flop using NAND gates. **5**

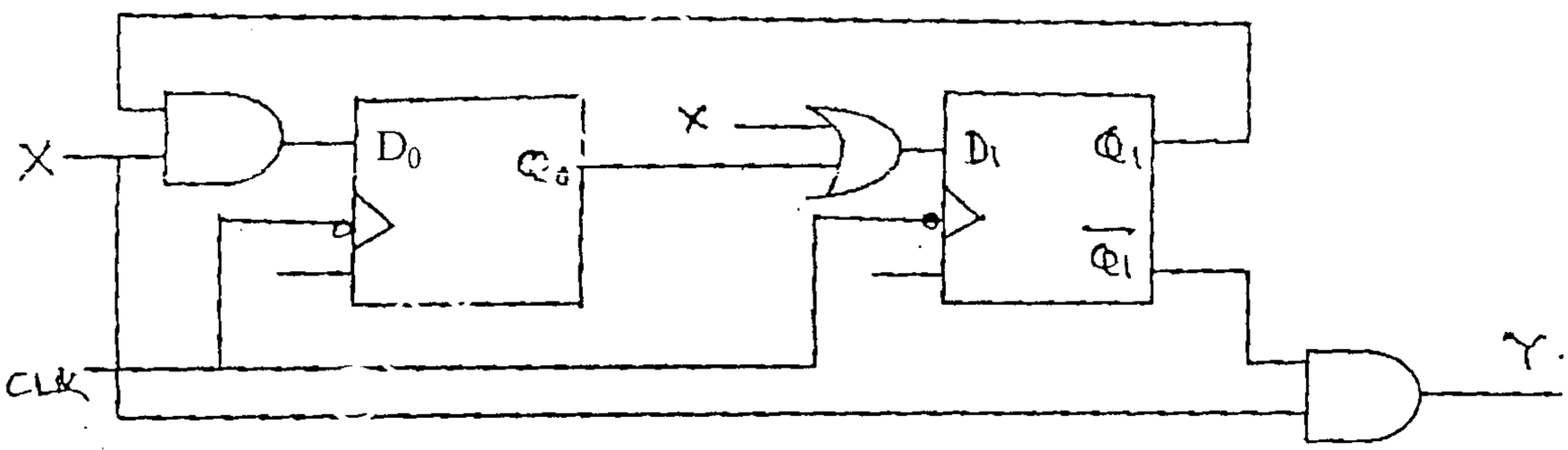
   (d) Draw internal block diagram of IC 7490. **5**

2. (a) Design 4 bit ring counter using IC 74194 and draw Its output waveform. **10**

   (b) Discuss CPLD XC 9500 architecture with neat block diagram. Describe main Features. **10**

3. (a) Design MOD 11synchronous counter using T flip flop. **10**

   (b) Identify the circuit shown in figure. Write the state table and draw state diagram for the same. **10**



4. (a) Implement 10 bit comparator using IC 7485. **10**

   (b) Simplify following logic function and realize using NOR gates. **10**

   $f(w,x,y,z) = \pi M(1, 2, 3, 7, 10, 11) + d(0,15)$

   $f(w,x,y,z) = \pi M(3, 4, 5, 6, 7, 10, 11, 15)$

5. (a) Identify indistinguishable state in following state table and obtain minimized state diagram **10**

PS	X = 0		X = 1	
	NS	Output	NS	Output
A	A	0	A	0
B	A	1	F	1
C	D	0	E	0
D	A	1	G	0
E	B	0	C	0
F	D	0	D	0
G	B	0	C	0

(b) Draw a circuit diagram of a CMOS inverter. Draw its transfer Characteristics and explain its operation. **10**

6. Write a short note on (any three) **??**
   (i) K-map.
   (ii) Automatic Test Pattern Generation (ATPG) .
   (iii) Mealy and Moore sequential machine.
   (iv) SR flip flop.

S.E. Sem III (CBGS) ETRX

Electronic Devices.

14/5/15

Q.P. Code : 4812

(3 Hours) **[Total Marks : 80**

N.B. : (1) Questions No.1 is **compulsory** and Solve any **three** questions from the remaining questions.
(2) Assume suitable data if necessary.
(3) Draw neat and clean Figures.

1. (a) What are nonideal effects in BJT? Explain any one nonideal effect in BJT. **5**
   (b) Determine the ideal reverse saturation current density in silicon P-N diode at 300^0k Given Na=Nd=10^{16} cm^{-3}, ni=$1.5x10^{10}cm^{-3}$ Dn=$25cm^2/s$ εr=11.7, Dp=$10cm^2/s$ τpo= τno=$5x10^{-7}$s **5**
   (c) With neat diagram explain the operation of UJT relaxation oscillator. **5**
   (d) Compare photodiode with phototransistor. **5**

2. (a) Draw energy band diagram of P-N junction for zero, forward, reverse bias clearly showing junction diagram, depletion width, fermi energy level and barrier potential. **10**
   (b) Calculate the theoretical barrier height, built in potential barrier and maximum electric field in a metal semiconductor diode for zero applied bias- Consider a contact between tungsten and n type silicon doped to Nd=$10^{16}cm^{-3}$ at T=300k. The metal work function for tungsten is ϕm=4.55V and electron a affinity for silicon is x=4.01V. Nc=$2.8x10^{19}cm^{-3}$, K=$1.38x10^{-23}$J/K, εs=$11.7x8.85x10^{-14}$, e=$1.6x10^{-19}$c **10**

3. (a) Calculate the threshold voltage V_{TO} at V_{SB}=0, for a polysilicon gate n channel MOS transistor with the following parameters - substrate doping density NA=$10^{16}cm^{-3}$ polysilicon gate doping density ND=$2x10^{20}cm^{-3}$ gate oxide thickness tox=$500A^0$ oxide Interface fixed charge density NOX=$4x10^{10}cm^{-2}$ **10**
   (b) Derive the drain current equation ID for MOSFET in ohmic and saturation regions. **10**

4. (a) Draw and explain construction, working, characteristics of JFET. Explain frequency limitation factors. **10**
   (b) Explain, schottky effect. Derive the position of maximum barrier Xm. **10**

[TURN OVER

Q.P. Code : 4812

5. (a) Draw and explain, construction and working of : 10
   (i) HEMT (MODFET)
   (ii) MESFET
   (b) Explain basic structure and characteristics of : 10
   (i) SCR (ii) DIAC

6. Solve any **four** of the following : 20
   (a) Draw and explain Ebers-moll model of transistor.
   (b) With the help of circuit diagram and characteristics explain application of zener diode as a voltage regulator.
   (c) What are optocouplers? Explain any one application of optocoupler.
   (d) Sketch and explain V-I and C-Vcharacteristics of MOSFET
   (e) Explain channel length modulation with cross section of MOSFET. Write equation associated with this effect.

S.E. Sem III (CBGS) (ETRx & EXTC). 20/5/15

Applied Maths—III

QP Code : **4787**

(3 Hours) [Total Marks : 80

[Revised Course]

N.B.: 1) Question No.1 is compulsory.

2) Attempt any three from the remaining questions.

3) Assume suitable data if necessary.

1. (a) Determine the constants a,b,c,d if $f(z) = x^2 + 2axy + by^2 + i(dx^2 + 2cxy + y^2)$ is analytic. 5

(b) Find a cosine series of period 2π to represent $\sin x$ in $0 \le x \le \pi$ 5

(c) Evaluate by using Laplace Transformation $\int_0^\infty e^{-3x}\, t \cos t\, dt$. 5

(d) A vector field is given by $\bar{F} = (x^2+xy^2)\,i + (y^2 + x^2 y)\,j$. Show that $\bar{F}$ is irrotational and find its scalar potential. Such that $\bar{F} = \nabla\emptyset$. 5

2. (a) Solve by using Laplace Transform 6

$(D^2 + 2D + 5)\, y = e^{-t} \sin t$, when $y(0) = 0$, $y'(0) = 1$.

(b) Find the total work done in moving a particle in the force field 6

$\bar{F} = 3xy\,i - 5z\,j + 10x\,k$ along $x = t^2 + 1$, $y = 2t^2$, $z = t^3$ from $t=1$ and $t=2$.

(c) Find the Fourier series of the function $f(x) = e^{-x}$, $0 < x < 2\pi$ and $f(x + 2\pi) = f(x)$. Hence deduce that the value of $\sum_{n=2}^{\infty} \frac{(-1)^n}{n^2+1}$. 8

3 (a) Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \cdot \sin x$ 6

(b) Verify Green's theorem in the plane for $\oint (x^2 - y)\, dx + (2y^2 + x)\, dy$ 6

Around the boundary of region defined by $y = x^2$ and $y = 4$.

(c) Find the Laplace transforms of the following. 8

i) $e^{-t} \int_0^t \frac{\sin u}{u}\, du$ ii) $t\sqrt{1 + \sin t}$

[TURN OVER

4 (a) If $f(x) = C_1Q_1(x) + C_2Q_2(x) + C_3Q_3(x)$, where C_1, C_2, C_3 constants and Q_1, Q_2, Q_3 are orthonormal sets on (a,b), show that 6

$\int_a^b [f(x)]^2 dx = c_1^2 + c_2^2 + c_3^2$.

(b) If $v = e^x \sin y$, prove that v is a Harmonic function. Also find the corresponding harmonic conjugate function and analytic function. 6

(c) Find inverse Laplace transforms of the following. 8

i) $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$ ii) $\frac{s+2}{s^2-4s+13}$

5 (a) Find the Fourier series if $f(x) = |x|$, $-k < x < k$ 6

Hence deduce that $\sum \frac{1}{(2n-1)^4} = \frac{\pi^4}{96}$.

(b) Define solenoidal vector. Hence prove that $\bar{F} = \frac{\bar{a} \times \bar{r}}{r^n}$ is a solenoidal vector 6

(c) Find the bilinear transformation under which 1, i, -1 from the z-plane are mapped onto 0, 1, ∞ of w-plane .Further show that under this transformation the unit circle in w-plane is mapped onto a straight line in the z-plane .Write the name of this line. 8

6 (a) Using Gauss's Divergence Theorem evaluate $\iint_s \bar{F} \cdot d\bar{s}$ where $\bar{F} = 2x^2yi - y^2 j + 4xz^2 k$ and s is the region bounded by $y^2 + z^2 = 9$ and $x = 2$ in the first octant . 6

(b) Define bilinear transformation. And prove that in a general, a bilinear transformation maps a circle into a circle. 6

(c) Prove that $\int x J_{2/3}(x^{3/2})\, dx = -\frac{2}{3} x^{-1/2} J_{-1/3}(x^{3/2})$. 8
