Sem-III
ETRX(CBGS)
Maths -III

2/12/2016
44

Q. P. Code : 547400

DURATION: 3 HRS. **MAX. MARKS:80**

1) Question No. **1** is compulsory.
2) Attempt any **THREE** of the remaining.
3) **Figures** to the **right** indicate **full** marks.

Q 1.A) Determine the constants a, b, c, d, e if

$f(z) = (ax^4 + bx^2y^2 + cy^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ is analytic. (5)

B) Find half range Fourier sine series for $f(x) = x^2$, $0 < x < 3$. (5)

C) Find the directional derivative of $\varphi(x, y, z) = xy^2 + yz^3$ at the point (2,-1,1) in the direction of the vector $i + 2j + 2k$. (5)

D) Evaluate $\int_0^\infty e^{-2t} t^5 \cosh t \; dt$. (5)

Q.2) A) Prove that $J_{\frac{3}{2}}(x) = \sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x\right)$ (6)

B) If $f(z) = u + iv$ is analytic and $u - v = e^x(\cos y - \sin y)$, find $f(z)$ in terms of z. (6)

C) Obtain Fourier series for $f(x) = x + \frac{\pi}{2} \quad -\pi < x < 0$

$= \frac{\pi}{2} - x \quad 0 < x < \pi$

Hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots$ (8)

Q.3) A) Show that $\bar{F} = (2xy + z^3)i + x^2j + 3xz^2k$, is a conservative field. Find its scalar potential and also find the work done by the force $\bar{F}$ in moving a particle from (1,-2,1) to (3,1,4). (6)

B) Show that the set of functions $\{\sin(2n + 1)x\}, n = 0,1,2, \ldots$ is orthogonal over $[0, \pi/2]$. Hence construct orthonormal set of functions. (6)

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C) Find (i) $L^{-1}\{\cot^{-1}(s+1)\}$

(ii) $L^{-1}\left(\frac{e^{-2s}}{s^2+8s+25}\right)$ (8)

Q.4) A) Prove that $\int J_3(x)\,dx = -\frac{2J_1(x)}{x} - J_2(x)$ (6)

B) Find inverse Laplace of $\frac{s}{(s^2+a^2)(s^2+b^2)}$ $(a \neq b)$ using Convolution theorem. (6)

C) Expand $f(x) = x\sin x$ in the interval $0 \leq x \leq 2\pi$ as a Fourier series.

Hence, deduce that $\sum_{n=2}^{\infty} \frac{1}{n^2-1} = \frac{3}{4}$ (8)

Q.5) A) Using Gauss Divergence theorem evaluate $\iint_S \bar{N}.\bar{F}\,ds$ where $\bar{F} = x^2\mathbf{i} + z\mathbf{j} + yz\mathbf{k}$

and S is the cube bounded by x = 0, x = 1, y = 0, y = 1, z = 0, z = 1 (6)

B) Prove that $J_2'(x) = \left(1 - \frac{4}{x^2}\right)J_1(x) + \frac{2}{x}J_0(x)$ (6)

C) Solve $(D^2+3D+2)y = 2(t^2+t+1)$, with y(0)= 2 and y'(0)= 0 by using Laplace transform (8)

Q.6) A) Evaluate by Green's theorem for $\int_C (e^{-x}\sin y\,dx + e^{-x}\cos y\,dy)$ where C is the the rectangle whose vertices are (0,0), $(\pi, 0)$, $(\pi, \pi/2)$ and $(0, \pi/2)$ (6)

B) Show that under the transformation $w = \frac{z-i}{z+i}$, real axis in the z-plane is mapped onto the circle $|w| = 1$ (6)

C) Find Fourier Sine integral representation for $f(x) = \frac{e^{-ax}}{x}$ (8)

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Sem-III
ETRX (CBGS)
E·D

25-11-2016

3

Q.P. Code : 547301

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

N.B. : (1) Question no. **1** is **compulsory.** Solve any **three** questions out of remaining.
(2) Assume suitable data wherever applicable.
(3) Draw neat and clean diagrams.

1. Solve any **four**
   (a) For diodes, define forward voltage drop, maximum forward current, dynamic resistance, reverse saturation current and reverse breakdown voltage. **5**
   (b) For diodes, discuss different types of junction breakdown in detail. **5**
   (c) Write short note on HBT. **5**
   (d) Sketch the characteristics of PN junction solar cell and explain. **5**
   (e) Explain the two terminal MOS structure. **5**

2. (a) Explain the construction and working of Gunn diode with V-I characteristics. **10**
   (b) Compare Enhancement type and Depletion type MOSFET on the basis of their construction, working principle, characteristics and biasing. **10**

3. (a) Explain characteristics of Zener diode. Explain Zener diode as voltage regulator. **10**
   (b) With neat diagram explain minority carrier distribution in an npn transistor operating in forward active mode. **10**

4. (a) Explain the non ideal effects in case of BJT. Explain base width modulation in detail. **10**
   (b) Discuss Ebers-Moll model for BJT in detail. **10**

5. (a) Explain the operation of photodiode and avalanche photodiode. **5**
   (b) Draw and explain VI characteristics of DIAC. **5**
   (c) Discuss construction and working of SCR with its characteristics in detail. **10**

6. (a) For a n-channel JFET with $I_{DSS} = 8$ mA, $V_P = -4V$ **10**
      (i) If $I_D = 3$ mA calculate the value of VGS
      (ii) Calculate $V_{DS\ (SAT)}$ for $I_D = 3$mA
      (iii) Calculate transconductance (g_m)
   (b) Discuss the structure and working of MESFET. Draw V-I characteristics and explain. **10**

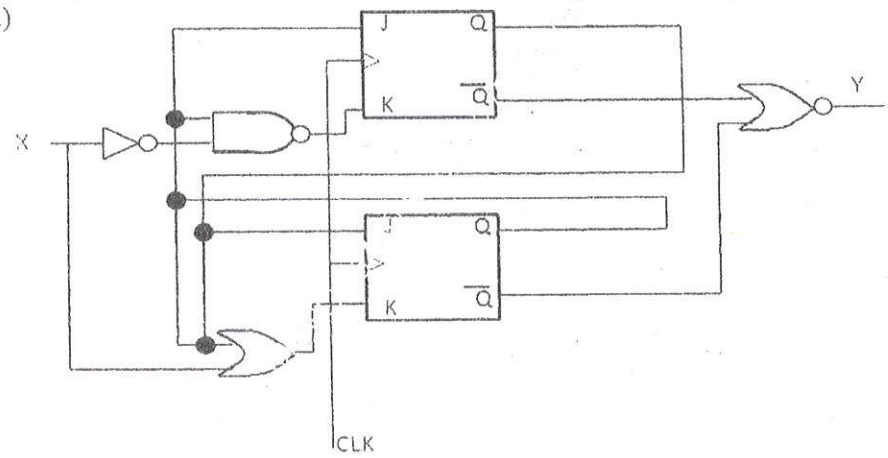
Sem III Electronics (CBGS) 9/12/15
DCD

QP Code :547501

(3 hours) **Total Marks :80**

N.B.:

1. Question No. 1 is **compulsory.**
2. Attempt any **3Questions** from the remaining 5 Questions
3. **Assume suitable data, wherever necessary**

Q. No	Solve any four	Marks
Q 1.(a)	Write a truth table of half adder and write a VHDL code for half adder	5
Q 1.(b)	Explain advantages of JTAG architecture	5
Q 1.(c)	Explain advantages and drawback of synchronous counter.	5
Q 1.(d)	Explain the following terms: 1.Noise margin 2. Noise immunity 3. Propagation delay with reference to digital ICs	5
Q 1.(e)	Differentiate between multiplexer and demultiplexer	5
Q2.(a)	Design a Meal type sequence detector to detect three or more consecutive 1's in a string of bits coming through an input line.	10
Q 2.(b)	What are universal gates? Why are they called so? Implement XOR and XNOR function using all NAND gates.	10
Q 3.(a)	 Analyze the sequential state machine shown in figure and obtain state diagram for the same	10
Q 3.(b)	Obtain excitation table for JK flip flop and convert JK flip flop to T flip flop.	10
Q 4.(a)	Draw a circuit diagram of 2 input TTL NAND gate and Explain the interfacing of TTL and CMOS.	10

[Turn Over

Q4.(b)	Design a MOD10 asynchronous counter using T flip flop	10
Q5(a)	Design a combinational circuit using a suitable PAL considering the following Boolean expressions. Use a PAL with four inputs and four outputs and three wide AND OR structure. $W(a,b,c,d)=\sum m(2,12,13)$ $X(a,b,c,d)=\sum m(7,8,9,10,11,12,13.14,15)$	10
Q5(b)	Design 4 bit Johnson counter using J-K flip flop. Explain its working using waveform	10
Q6(a)	Write short notes on 1. Stuck at zero and stuck at 1fault. 2. Entity declaration and architecture declaration. 3. FPGA architecture 4. State reduction and state assignment.	20

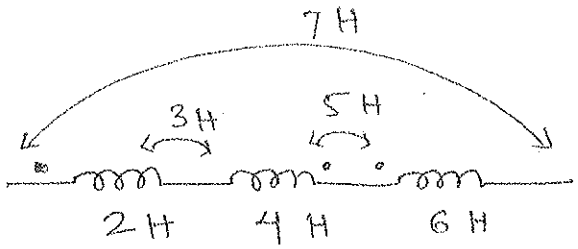
Sem. II
ETRX (CBSGS)
Circuit Theory
15/12/16

QP Code : 547600

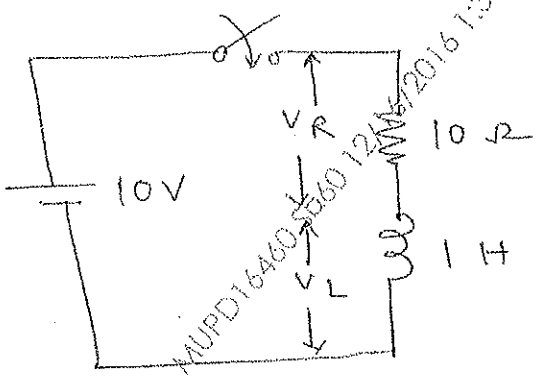
(3 Hours) [Total Marks : 80

N. B. : (1) Question No. 1 is **compulsory**.
(2) Solve any **three** questions out of remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Use Smith Chart for transmission line problem.

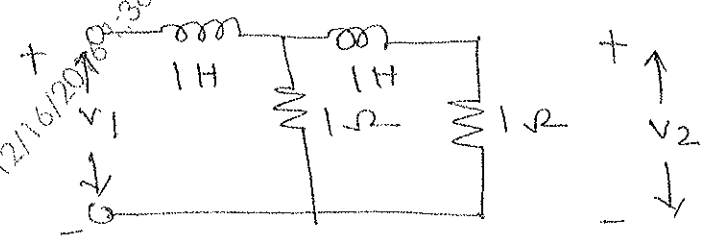
1. (a) Find the equivalent inductance of the network shown. **5**



(b) A series R-L circuit is shown in fig. has a constant voltage V applied at t = 0. At what time does $V_R = V_L$ **5**



(c) For the network shown plot poles and zeros of the transfer impedance function. **5**



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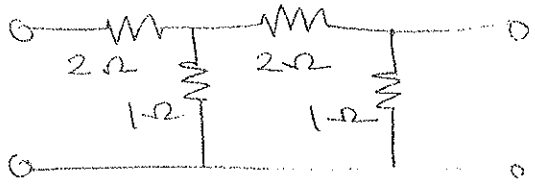
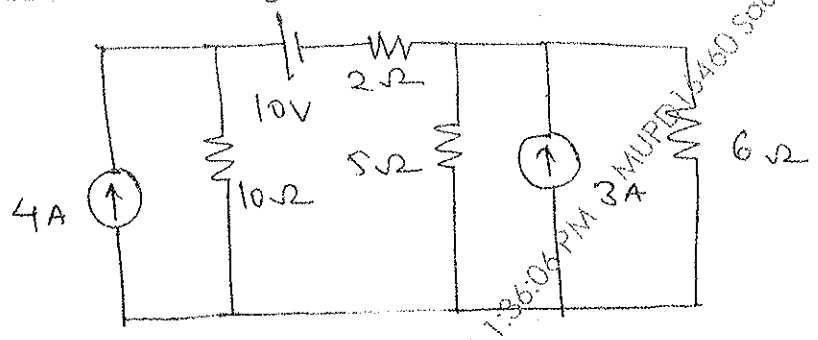
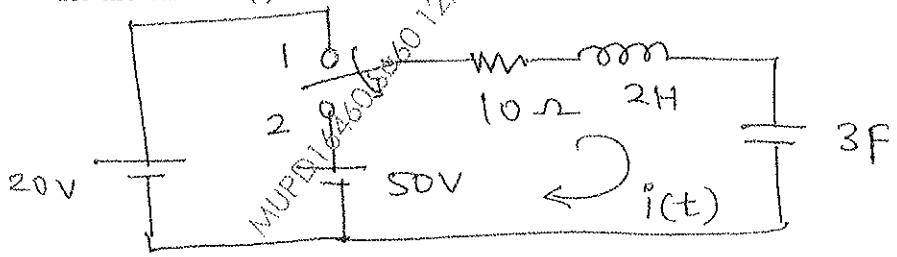
(d) Determine h parameters of the network given. 5



2. (a) Find the current through 6Ω resistor in given circuit. 10



(b) In the network shown switch is moved from position 1 to position 2. The switch is at position 1 for long time. Determine the expression for the current i(t). 10



3. (a) Test whether $F(s)=\frac{2s^3+2s^2+3s+2}{s^2+1}$ is a positive real function. 5

(b) Check the whether the following polynomials are Hurwitz or not. Use continued fraction method. 3

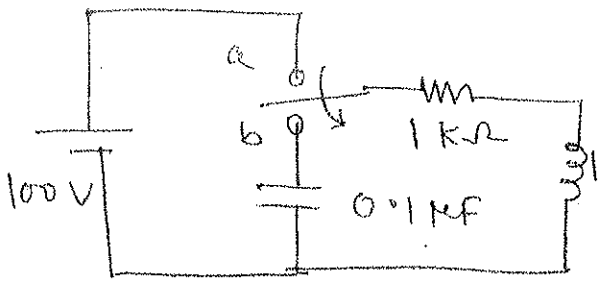
(i) $P(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$ 2

(ii) $P(s) = s^5 + s^3 + s$ 10

(c) Realise caur forms of the following LC impedance function.

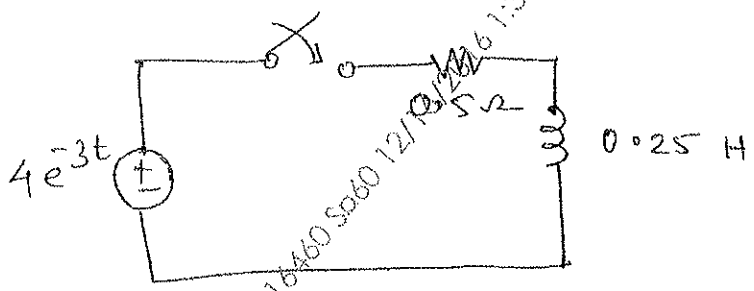
$$Z(s)=\frac{10s^4+12s^2+1}{2s^3+2s}$$

4. (a) In the network given the switch is changed from position a to b at t = 0. Find out i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ **10**



(b) The volves of primary constants of an open wire line per km are R = 10Ω , L = 3.5 mH C = 0.008 μF and G = 0.7 μmho. For a signal frequency of 1 KHz. Calculate z_0, Υ, α, β, λ and V_p. **10**

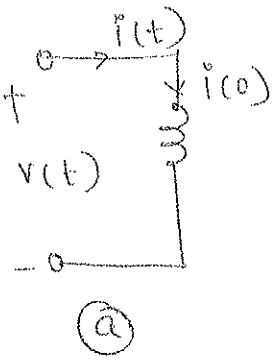
5. (a) Find the expression for i(t). **10**

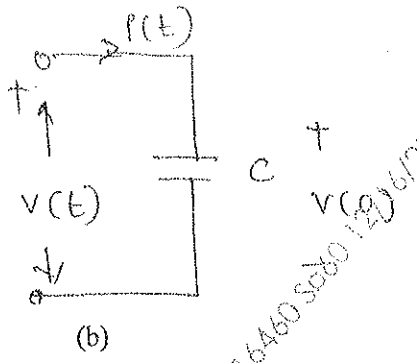


(b) Design an m-derived T section high pass filter with a cut off frequency of 2 KHz. Design impedance of 700Ω and m = 0.6. **5**

(c) The cha. impedance of a high frequency line is 100Ω. It is terminated in an impedance of 100 + j100Ω. Using Smith chart find the impedance at $\frac{1}{8}$th wavelength away from the load end. **5**

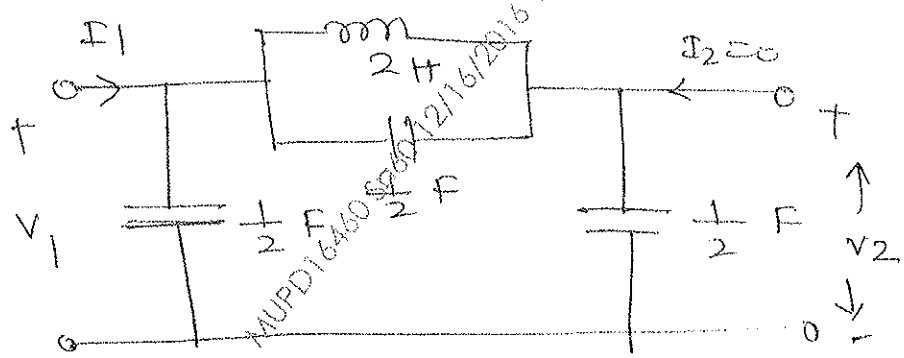
6. (a) Draw and explain transformed network in s domain for given circuits. Use current and voltage equation. 5





(b) A series RLC circuit has a quality factor of 5 at 50 rad/sec. The current flowing through the circuit at resonance is 10A and the supply voltage is 100V. Find the circuit constants. 5

(c) For the given network determine $\frac{V_2}{V_1}$ and $\frac{V_2}{I_1}$ 10



S.E.Sem-III
ETRX(CBGS)
E.I.M

22/12/2016
4D

Q. P. Code : 547702

(3 Hours) **Total : 80**

N.B. 1) Question **No.1** is **compulsory.**
2) Answer **any three** questions from remaining.

1) Attempt **any four**
a) Define transducer. List different types of transducers. **5**
b) Draw Schering Bridge and list applications. **5**
c) Draw a neat labeled McLeod Gauge system diagram **5**
d) Explain measuring principle of 'Q' meter and list applications **5**
e) Explain level measurement using differential pressure technique **5**

2) a) Explain in detail different types of errors in measurement system **10**
b) Explain FET type electronic voltmeter with neat circuit diagram. **10**

3) a) Discuss static and dynamic characteristics of instruments with importance of each parameter under consideration. **10**
b) Explain in detail Dead Weight Testing with neat labelled diagram **10**

4) a) Explain LVDT with neat labeled diagram. **10**
b) Draw and explain Kelvin's Double Bridge for unknown resistance measurement **10**

5) a) Explain single channel and multichannel data acquisition system with neat labeled separate block diagrams. **10**
b) Draw block diagram of CRO. and DSO. List important features and applications of DSO **10**

6) Short note on **(any four)** **20**
a) Selection criteria of transducers
b) Strain Gauges
c) Turbine flow meter
d) Thermocouples
e) Megohm bridge for high resistance measurement
