Sem III CBGS (ETRX) 24/5/16.

Digital ckts & Design

QP Code : 30651

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

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

(2) Solve any **three** from remaining **five** questions.

(3) Draw neat **logic diagram** and assume **suitable data** wherever necessary.

Q 1 (a) Interfacing between CMOS and TTL 05

(b) Explain Shift Register and its applications 05

(c) PLA and PAL 05

(d) Draw truth table and logic diagram of Full Subtractor 10

Q 2 (a) Write a VHDL code for Full Adder 10

(b) Design MOD 8 asynchronous counter. 10

Q 3 (a) Design a mealy sequence detector to detect ---0101--- using D flip-flops and logic gates 10

(b) Design a circuit with optimum utilization of PLA to implement the following functions 10

$F1 = \sum m (0, 2, 5, 8, 9, 11)$

$F2 = \sum m (1, 3, 8, 10, 13, 15)$

$F3 = \sum m (0, 1, 5, 7, 9, 12, 14)$

Q 4 (a) Implement following function using 8:1 MUX and logic gates 10

$P (A,B,C,D) = \sum m (1,2,6,7,8,10,13,14)$

(b) Construct ring counter using IC 74194 and the output waveform 10

Q 5 (a) Use K-map to reduce following function and then implement it by NOR gates. 10

$F = \pi M (1, 2, 5, 8, 10, 12, 15) + d (0, 6)$

(b) Design 6 bit up counter using IC 74163, draw a circuit diagram and explain its working. 10

6. Write short notes on any **three** 20

i) JTAG and BIST

ii) Stuck at '0' and '1' faults

iii) XC 4000 FPGA architecture block diagram

iv) Noise Margins

S-E-ETRX Sem III (CBGS) 3/6/16.

Electronic Instruments and Measurements.

Q.P. Code: 30742

(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) Define:- Accuracy, Precision, Linearity, Sensitivity, Resolution
   b) Write specifications of analog multimeter.
   c) Discuss the role of delay line in CRO.
   d) Explain selection criteria of transducers.

2. a. Explain in detail linear variable differential transformer. (10)
   b. Draw and explain multichannel data acquisition system. (10)

3. a. Discuss the working principle of RTD, Thermistor and Thermocouple. Also write their ranges and applications. (10)
   b. Draw and explain the Maxwell bridge. (10)

4. a. Draw and explain block diagram of CRO. (10)
   b. Write short note on "PC based instrumentation system". (10)

5. a. Explain the liquid level measurement using capacitive type method. (10)
   b. What is error? Write the classification of errors. Also discuss the methods to eliminate/reduce the errors during measurement. (10)

6. Write short notes on:- (20)
   a. Wheatstone bridge
   b. Applications of DSO
   c. Resistance strain gauge
   d. Turbine flow meter

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S.E. SEM-III ETRX (CBSGS) 30/5/16

Circuit Theory.

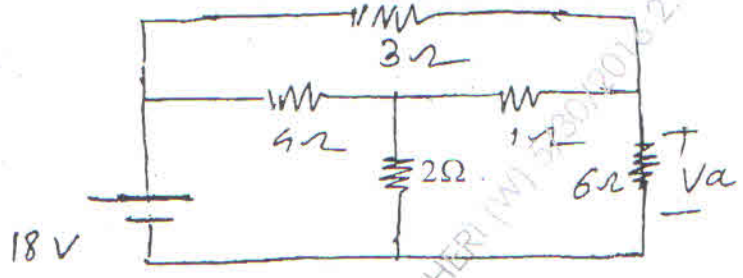
QP Code : 30699

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining questions.
(3) Use Smith chart wherever required.
(4) Assume suitable data if required.

1. (a) Test for following polynomial using continued fraction expansion only 20
$P(s) = s^5 + 12s^4 + 45s^3 + 60s^2 + 44s + 48$
(b) Obtain transmission parameters (ABCD) in terms of z-parameters.
(c) List the types of damping in a series R-L-C circuit and mention the condition for each damping.
(d) Obtain S-domain (Laplace Transform) equivalent circuit diagram of an inductor and capacitor with initial condition.

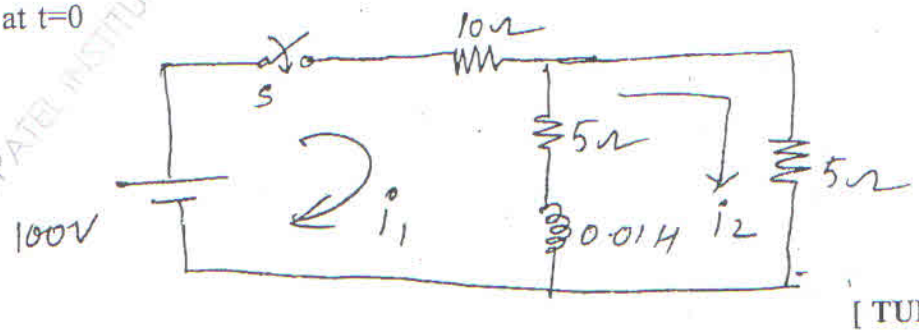
2. (a) Calculate voltage across the resister 6Ω using source shifting technique. 10



(b) Compare and obtain Foster-I and Foster-II form using example of RC circuit 10

$$Z(s) = \frac{(s+1)\ (s+6)}{s(s+4)\ (s+8)}$$

3. (a) Design a short circuit shunt stub match for Z_L=450 – 600j(Ω). For a line of Zo=300(Ω) and f = 20 MHz. Use Smith chart 10
(b) In the circuit shown determine current I_1 and I_2 when switch is closed at t=0 10



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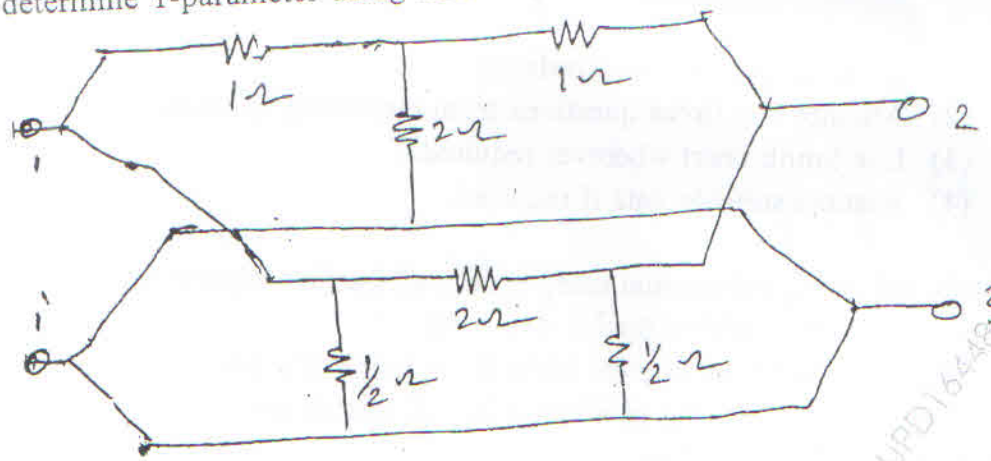
4. (a) determine Y-parameter using interconnection of two port networks 10



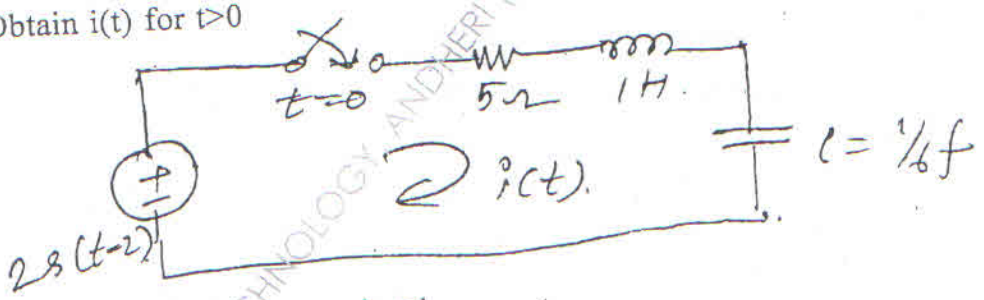
(b) Check for positive real function test 5

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

(c) Compare Cauer-I and Cauer-II form of LC network 5

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

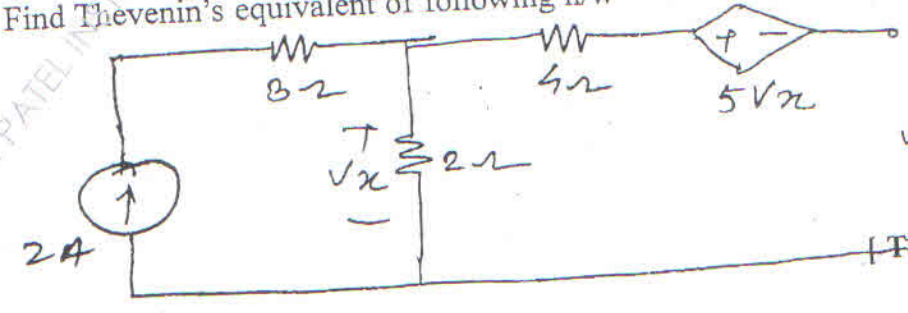
5. (a) Obtain i(t) for t>0 10



where r(t) is a ramp signal

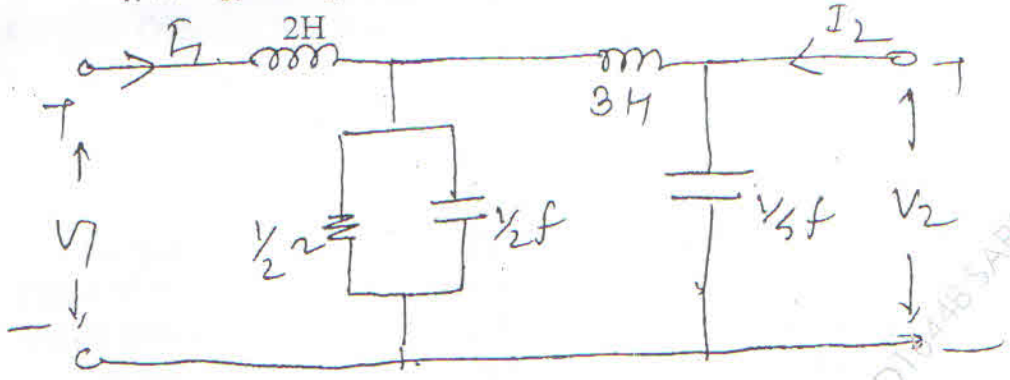
(b) Derive an expression for characteritic equation of a transmission line. Also obtain 'α', 'β' and 'γ' of the line. 10

6. (a) Find Thevenin's equivalent of following n/w 8



(b) Explain various types of filters. 4

(c) Obtain $Z_{11}(s)$, $Z_{21}(s)$, $G_{21}(s)$ for the ladders n/w. 8



Sem-III (CBGS)
Br: Electronics
Electronics Devices

12/5/16

QP Code : 30554

(3 Hours) [Total Marks : 80

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

1. Answer any **four.** **20**
   (a) Justify that the space charge width increase with reverse biased voltage in a p-n junction diode.
   (b) Explain zener diode application as voltage regulator.
   (c) Define internal pinchoff voltage, pinchoff voltage and drain to source saturation voltage.
   (d) Describe construction and V-I characteristics of IGBT.
   (e) Explain two terminal MOS structure.

2. (a) Explain concept, working and characteristics of Tunnel diode. **10**
   (b) Explain the types of junction breakdown in case of zener diode. **10**

3. (a) For a n-channel JFET with I_{DSS} = 8 mA, V_P = -4 V **10**
      (i) If ID = 3mA calculate the value of V_{GS}
      (ii) Calculate $V_{DS\ (SAT)}$ for ID = 3mA
      (iii) Calculate transconductance (g_m)
   (b) Explain minority carrier distribution in BJT considering transistor in active, cut off and saturation mode. **10**

4. (a) Compare Enhancement type and Depletion type MOSFET on the basis of their construction, working principle, characteristics and biasing. **10**
   (b) Discuss construction and working of SCR with its characteristics in detail. **10**

5. (a) Discuss Ebers-Moll model for BJT in detail. **10**
   (b) Discuss HBT in detail. **10**

6. Write short notes **20**
   (a) Optocoupler
   (b) Gunn diode
   (c) MESFET
   (d) DIAC-TRIAC

FW-Con. 9412-16.

Sem-III (ETRx & EXTC) 18/5/16

Applied Maths-III

QP Code : 30598

(Revised course)

Time :3 hours Total marks :80

N.B : (1) Question No.1 is compulsory.
(2) Answer any three questions from remaining.
(3) Assume suitable data if necessary.

1. (a) Evaluate $\int_0^\infty e^{-2t}\left(\frac{\sinh t \sin t}{t}\right)dt$ 05

(b) Obtain the Fourier Series expression for $f(x)=9-x^2$ in (-3,3) 05

(c) Find the value of 'p' such that the function f(z) expressed in polar co-ordinates as $f(z)=r^3\cos p\theta + ir^p \sin 3\theta$ is analytic. 05

(d) If $\overline{F}=(y^2-z^2+3yz-2x)\hat{i}+(3xz+2xy)\hat{j}+(3xy-2xz+2z)\hat{k}$.
Show that $\overline{F}$ is irrotational and solenoidal . 05

2. (a) Solve the differential equation using Laplace Transform 06

$\frac{d^2y}{dt^2}+4\frac{dy}{dt}+8y=1$, given y(0)=0 and y'(0)=1

(b) Prove that 06

$$J_4(x)=\left(\frac{48}{x^3}-\frac{8}{x}\right)J_1(x)-\left(\frac{24}{x^2}-1\right)J_0(x)$$

(c) i) Find the directional derivative of 08
$\phi=4xz^3-3x^2y^2z$ at (2,-1,2) in the direction of $2\hat{i}+3\hat{j}+6\hat{k}$.

ii) If $\bar{r}=x\hat{i}+y\hat{j}+z\hat{k}$
Prove that $\nabla \log r=\frac{\bar{r}}{r^2}$

Sem-III (ETRx & EXTC) 18/5/16

Applied Maths-III

QP Code : 30598

(Revised course)

Time :3 hours Total marks :80

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(2) Answer any three questions from remaining.
(3) Assume suitable data if necessary.

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ii) If $\bar{r}=x\hat{i}+y\hat{j}+z\hat{k}$
Prove that $\nabla \log r=\frac{\bar{r}}{r^2}$

3. (a) Show that $\{\cos x, \cos 2x, \cos 3x.....\}$ is a set of orthogonal functions over $(-\pi, \pi)$ .Hence construct an orthonormal set. 06

(b) Find an analytic function f(z) =u+iv where. 06

$$u = \frac{x}{2}\log(x^2+y^2) - y\tan^{-1}\left(\frac{y}{x}\right) + \sin x \cosh y$$ 08

(c) Find Laplace transform of

i) $\int_0^t ue^{-3u}\cos^2 2u\,du$

ii) $t\sqrt{1+\sin t}$ 06

4. (a) Find the Fourier Series for

$f(x) = \frac{3x^2 - 6\pi x + 2\pi^2}{12}$ in $(0, 2\pi)$

Hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2}..... = \frac{\pi^2}{6}$ 06

(b) Prove that

$$\int_0^b xJ_0(ax)dx = \frac{b}{a}J_1(ab)$$ 08

c) Find

i) $L^{-1}\left[\log\left(\frac{s^2+1}{s(s+1)}\right)\right]$

ii) $L^{-1}\left[\left(\frac{s+2}{s^2-2s+17}\right)\right]$

5. (a) Obtain the half range cosine series for 06

$$f(x) = x, 0 < x < \frac{\pi}{2}$$
$$= \pi - x, \frac{\pi}{2} < x < \pi$$

(b) Find the Bi- linear Transformation which maps the points 1,i,-1 of z plane onto i,0,-i of w-plane 06

(c) Verify Green's Theorem for $\int_C \overline{F}.\overline{dr}$ where 08

$\overline{F} = (x^2 - xy)\hat{i} + (x^2 - y^2)\hat{j}$ and C is the curve bounded by $x^2 = 2y$ and $x = y$

6.(a) Show that the transformation 06

$w = \frac{i - iz}{1 + z}$ maps the unit circle $|z| = 1$ into real axis of w plane.

(b) Using Convolution theorem find 06

$$L^{-1}\left[\frac{s}{(s^2+1)(s^2+4)}\right]$$

(c) 08

i) Use Gauss Divergence Theorem to evaluate $\iint_S \overline{F}.\hat{n}ds$ where $\overline{F} = x\hat{i} + y\hat{j} + z\hat{k}$ and S is the sphere $x^2 + y^2 + z^2 = 9$ and $\hat{n}$ is the outward normal to S

ii) Use Stoke's Theorem to evaluate $\int_C \overline{F}.\overline{dr}$ where $\overline{F} = x^2\hat{i} - xy\hat{j}$ and C is the square in the plane z=0 and bounded by x=0,y=0,x=a and y=a.