S.E. sem IV (old) (ETRx) 23/11/15

AEM

Q.P. Code : **1313**

(OLD COURSE)

(3 Hours) [Total Marks :100

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

(2) Solve any **four** from the remaining.

1. (a) The probability distribution of a random variable X is given by 5

X:	-2	-1	0	1	2	3
P(X = x):	0.1	K	0.2	2K	0.3	K

Find K, mean and variance.

(b) Find the eigen values and eigen vectors of matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ 5

(c) Determine the pole of the function $f(z) = \frac{z}{(z-1)^2(z+2)}$ and also find residue at each pole. 5

(d) If $f(x) = 2x^2+3$; $g(x) = 4x+3$, where f: R → R and g: R → R 5

(i) Test whether the inverse function exists for both f and g.

(ii) Find fog.

2) (a) Evaluate $\int_C \frac{dz}{z^3(z+4)}$ where C is $|z| = 2$. 6

(b) Fit a Binomial distribution to the following data and test the good-ness of fit. 6

x	0	1	2	3	4	5	6
f	5	18	28	12	7	6	4

(c) Verify Cayley-Hamilton theorem and find A^{-1} for $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ Hence find 8

$A^5-4A^4-7A^3+11A^2-A-10I$ in terms of A

3 (a) Find the mean and variance of the Poisson distribution. 6

(b) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$, find A^{50} 6

(c) Evaluate $\int_0^{2\pi} \frac{d\theta}{5+3\sin\theta}$ 8

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4. (a) A die was thrown 132 times and the following frequencies was observed. 6

No.obtained	1	2	3	4	5	6	Total
f	15	20	25	15	29	28	132

(b) Is the following function injective, surjective? $f: R \to R$, $f(x) = 2x^2+5x-3$ 6

(c) Find all possible Laurent's expansions of the function 8

$$f(z)=\frac{7z-2}{z(z-2)(z+1)}$$ about Z = -1

5. (a) Is $(Z_6, +, X)$ an Integral domain ? Is it a field? 6

(b) The first four moments of a distribution about the value 4 are -1.5, 17, -30 and 108 calculate the moments about the mean. 6

(c) Let A = {1, 2, 3, 5, 6, 10, 15, 30} and R be the relation "a divisible by" obtain the relation matrix and the Hasse diagram 8

6. (a) Find the characteristic equation of the matrix $\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify 6

that it is satisfied by A and hence, obtain A^{-1}.

(b) The number of defects in printed circuit board is hypothesized to follow Poisson distribution. A random sample of 60 printed boards showed the following data. 6

Number of defects	0	1	2	3
frequency	32	15	9	4

Does the hypothesis of Poisson distribution seen appropriate?

(c) Show that the matrix A is diagonisable. Find the diagonal form D and the diagonalizing matrix M. Where A is 8

$$\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$$

7. (a) Prove that the set A = { 0, 1, 2, 3, 4, 5} is a finite Abelian group under addition modulo 6. **6**

(b) A box contains 2 red and 3 black balls. Three balls are drawn at random. Let 'X' denote total no of red balls drawn from this box. Find (i) The MGF of X (ii) Hence find E (x) and var (x). **6**

(c) If X_1 has mean 5 and variance 5, X_2 has mean -2, and variance3. If X_1 and X_2 are independent random variables find.

(i) $E(X_1+X_2)$, $V(X_1+X_2)$

(ii) $E(2x_1+3x_2-5)$, $V(2x_1+3x_2-5)$

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OSD-II

Q.P. Code : **1359**

(3 Hours) [**Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions Q. 2 to Q. 7.

1. Answer any **four** : 20
   (a) Explain the features of VHDL.
   (b) Differentiate amongst ROM, static RAM and dynamic RAM.
   (c) Draw a stage diagram of two bit bidirectional shift register which has two inputs, one data bit and one direction bit to select left shift or right shift.
   (d) Design Mod 7 counter using IC 7490. Explain the connections.
   (e) Explain the general structure of sequenctial state machine with the help of block diagram.

2. (a) Reduce the following state table and draw the state diagram of the reduce table. 10

Present State	Next State		Output
	x = 0	x = 1	z
A	B	F	0
B	C	E	1
C	E	F	0
D	E	D	1
E	A	E	1
F	E	C	0
G	A	B	1

   (b) Write a VHDL code for UP/DOWN 4 bit counter. 10

3. (a) Draw the block diagram and waveforms of 10
   (i) Ring counter (ii) Twisted Ring Counter
   Explain the operation.
   (b) Design a sychronous sequential state machine to detect the sequence 1011. 10
   Overtapping sequence is allowed. Design Moore type machine.

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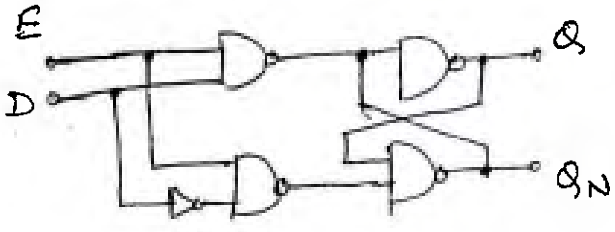
4. (a) Design MOD 100 counter IC 74191. 10

(b) Analyze the following feedback sequential circuit. Write the output equation, state and output table indicating the stable states. 10



5. (a) Explain the architecture of XC4000 FPGA.

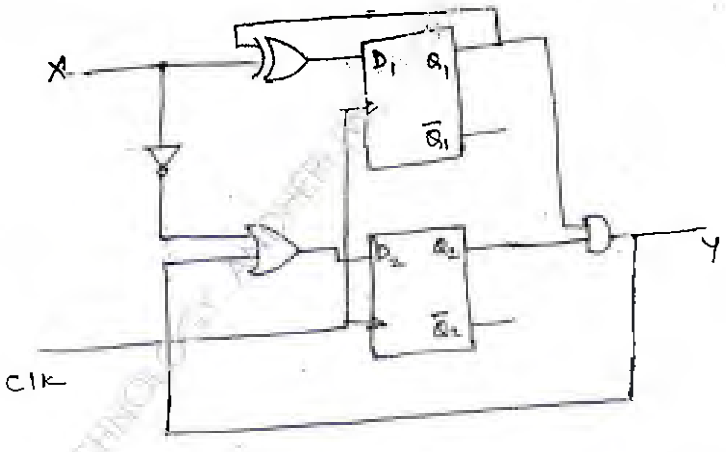
6. (a) Write a VHDL Code for a full adder. Using this as a component. Write a structural code for 4 bit binary adder. 10

(b) Analyze the following sequential state machine. Derive : 10

(i) Output and next state equations.

(ii) State transition table

(iii) Draw state diagram



(c) Explain different types of modelling used in VHDL with suitable examples. 10

20

7. Write short note on any **three**.

(a) SRAM basic cell

(b) Universal shift

(c) State assignment rules.

(d) CPLD XC-9500 : I/O block.

SE sem IV (old) electronics

ECAD 04/12/15

Q.P. Code : **1403**

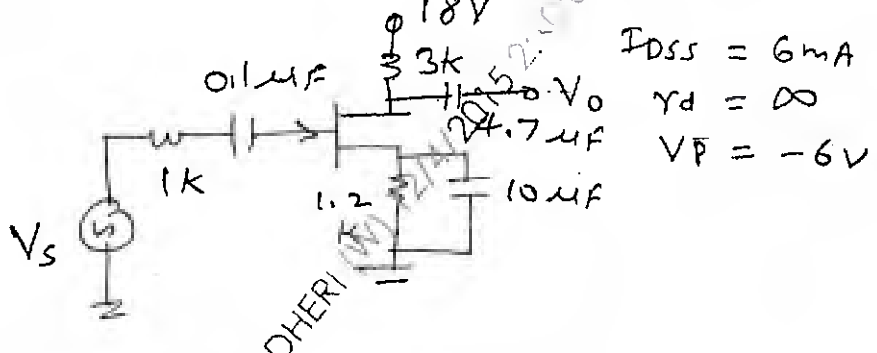
(3 Hours) **[Total Marks : 100**

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

1. (a) Explain open circuit and short circuit time constants related to frequency response of amplifier. **5**
   (b) Explain steps in designing of RC phase shift oscillator. **5**
   (c) Compare voltage and power amplifier. **5**
   (d) Draw the circuit diagram dual input balanced output differential amplifier and explain its operation. **5**

2. (a) Draw the circuit diagram of CE - BJT amplifier. Sketch its frequency response and explain the reasons of low frequency and high frequency gain fall. Mark f_L, f_H and Bandwidth on it. **10**
   (b) What is miller effect? Derive the expression of f_B and f_T. **10**

3. (a) Determine low cut-off frequency for the amplifier shown below : **10**



   (b) Design colpitts oscillator for f = 100 kHz. **10**

4. (a) Draw and explain operation of power MOSFET. **10**
   (b) What is necessity of Heat sink? Explain steps in design of Heat sink. **10**

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5. (a) Compare different types of feedback amplifiers. **10**

(b) Consider a three pole feedback amplifier with loop gain given by **10**

$$T(f) = \frac{\beta(100)}{\left[1 + j\left(\frac{f}{10^5}\right)\right]^3}$$

In this case all three poles occur at same frequency. Determine stability for β = 0.02, β = 0.2.

6. Design two stage CS amplifier for Av ≥ 100, Rin = 1M, Vo = 2.50, f_L = 10 Hz. **20**

7. Write short notes on (Any **Two**): **20**

(a) Applications of oscillators.

(b) Applications of Class A, Class B, Class C power amplifiers.

(c) Distortions in amplifiers.

(OLD COURSE)

QP Code : 1448

S.E. ETRX (IV) (old)

BADC

10/12/15

(3 Hours) [Total Marks :100

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

1. (a) What is need of modulation 20
(b) Explain TDM.
(c) Explain AGC
(d) Explain Noise-traingle.

2. (a) Explain elements of communication 10
(b) Explain Balance modulater. 10

3. (a) Explain superheterodyne radio receiver 10
(b) Explain A.M. modulation and De-modulation 10

4. (a) Explain FM. with fecquenl spectrum. 10
(b) Explain Indirect F.M. generation. 10

5. (a) Explain PWM modulation and De-modulation. 10
(b) Explain PAM system. 10

6. (a) Explain F.D.M. system. 10
(b) Explain Adaptive Deltamodulator. 10

7. Write short notes on 20
(a) VSB system
(b) SSB
(c) R.P Amplifice
(d) Sampling Thereom.

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E.E.M.I.M

Q.P. Code : **1494**

(3 Hours) [**Total Marks : 100**

N.B. : (1) Question Nos. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever necessary.

1. Answer the following : 20
   (a) How CRO is used for component testing.
   (b) What is Lissajous patter. How measurement of frequency can be done with it.
   (c) Explain the working of Megger.
   (d) Explain the working of Weston type frequency meter.

2. (a) Draw and explain Wein bridge Oscillator circuit. Derive an expression of output frequency. 10
   (b) What are the difficulties occurred in case of measurement of high resistance. Explain any one method for measurement of high resistance. 10

3. (a) What is dual trace, multi-trace, dual beam and sampling oscilloscope. 10
   (b) With the help of neat block diagram. Explain the working of phase meter using flip-flop. 10

4. (a) Explain microprocessor based ramp trigger digital voltmeter. 10
   (b) Discuss the following terms briefly related to CRO. 10
   (i) Time/Div (ii) Volt/div
   (iii) Focus (iv) Intensity
   (v) Sweep

5. (a) What is stepper Motor. Explain the working of any one type of stepper motor in detail. 10
   (b) Explain the working of measurement of capacitance by Schering bridge. 10

6. (a) Discuss briefly the different types of DVM. 10
   (b) Explain different methods for speed control of any DC machine. 10

7. Write short notes on (any four) : 20
   (a) Three point starter (b) Working of power factor meter
   (c) Significance of back emf. (d) DSO
   (e) FET voltmeter.

QP-Con. 11610-15.