L SE ETRX Sem - IV CBSD

AGJ 2nd half (f+) 17

B. A & D. G-A.

17/12/11

Con. 6641-11.

(REVISED COURSE)

MP–4312

(3 Hours)

[Total Marks : 100

N.B.:

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any four questions.
3. In all five questions to be attempted.
4. All questions carry equal marks.
5. Answer to each new question to be started on a fresh page.
6. Figures in brackets on the right hand side indicate full marks.

Q1.(A) Explain with block diagram a typical communication system. (5)

(B) The local oscillator frequency of superheterodyne AM broadcast receiver is kept above the signal frequency by an amount equal to intermediate frequency. Why? (5)

(C) A signal $m(t)= 2 \cos 6000\pi t + 4 \cos 8000\pi t + 6 \cos 10000\pi t$ is represented by samples. What is minimum sampling rate from a)Low pass sampling theorem b)band pass consideration? (5)

(D) "Double integration is used in the feedback path of delta modulation in case of voice communication" Justify. (5)

Q2.(A) Explain noise figure for cascade stages. Calculate the overall noise figure for a mixer stage has a noise figure of 20 dB and this is preceded by an amplifier that has a noise figure of 9 dB and an available power gain of 15 dB. (10)

(B) Explain with block diagram DSB-SC modulator and demodulator. (10)

Q3.(A) Show that DSB-SC amplitude modulation is linear while phase modulation is non linear. (5)

(B) Consider an angle modulated signal $x(t)=3\cos[2\pi 10^6 t+2\sin(2\pi 10^3 t)]$. (5)
Find(1) Instantaneous frequency at time 0.25ms and 0.5 ms.
(2) Maximum phase and frequency deviation.

(C) Explain VSB signal generation and detection in details. (10)

Q4.(A) In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the IF is 455KHz, calculate.
(1) The image frequency and its rejection ratio for tuning at 1100KHz.
(2) The image frequency and its rejection ratio for tuning at 25MHz. (10)

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(B) Explain TRF receiver with block diagram, also explain TRF sensitivity and TRF selectivity characteristics. (10)

Q5.(A) Explain the process of quantizing in PCM. Determine the signal to noise ratio at the output. (10)

(B) "In PCM, SNR can be controlled by transmission bandwidth" Justify. Compare PCM and Delta modulation. (10)

Q6.(A) Explain advantages and disadvantages of different PCM waveform formats. (10)

(B) Show that a limited signal of finite energy, which has no frequency components higher than W Hz may be completely recovered from a knowledge of its samples taken at the rate of 2W per seconds. (10)

Q7.(A) What parameter of the signals is sampled by a Delta Modulator? While sampling speech waveform what should be the sampling rate to avoid slope overload? What parameter should be reduced to decrease the quantization noise power for a given sampling rate of the Delta Modulation? (10)

(B) Explain in details NBFM and WBFM. (10)

29/12/11 SE ETRX - IV (R)
EE MIM

Con. 6913-11. **MP–4318**

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

N.B. : (1) Question No.1 is **compulsory.**
(2) Attempt any **four** questions from the remaining **six** questions.
(3) Assume **suitable** data if **necessary.**
(4) **Figures** to the **right** indicate marks.

1(A)Explain multi-range ohm-meter with diagram. 05

(B) What is back emf?Explain significance of back emf. 05

(C) Explain the function of delay line in oscilloscope. Which are the two types of delay lines? 05

(D) State the requirements of a good laboratory type of signal generator. 05

2.(A) Draw and explain FET as a voltmeter. What are its sensitivity considerations? 10

(B) Explain flash type ADC with suitable diagrams. 10

3.(A) Explain digital phase meter using flip flop. Write its advantages and disadvantages. 10

(B) Expain the construction and working principle of Weston type frequency meter. 10

4.(A) Explain beat frequency oscillator and its advantages. 10

(B) Explain analog storage oscilloscope. State the drawbacks of analog storage oscilloscope. 10

5.(A) How will you find the value of capacitance with the help of schering bridge? Explain with the help of derivation and vector diagram 10

(B) Explain the construction and working of electrodynamometer type power factor meter. 10

6.(A) Explain different methods of speed control of dc series motors. 10

(B) Derive the torque equation for 3 phase induction motors. Explain v/f method of speed control of induction motors. 10

7. Write short note on (any three):- 20

(A) megger

(B) variable reluctance stepper motor

(C) deivation of torque equation for moving iron meters.

(D) Gear wheel method in CRO.

2/12/11 SE. (ETRX) Sem-IV

Advanced Engineering Mathematics

ws Sept-2011-148

Con. 6052–11.

MP–4324

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) A sample of 100 students is taken from a large population. The mean hight of the students in this sample is 160 cm. Can it reasonably regarded that in the population, the mean height is 165 cm. and S.D. is 10 cm. **5**

(b) If $\lambda_1, \lambda_2, \lambda_3$ are the Eigen values of the matrix – **5**

$$\begin{bmatrix} -2 & -9 & 5 \\ -5 & -10 & 7 \\ -9 & -21 & 14 \end{bmatrix}$$

then find $\lambda_1 + \lambda_2 + \lambda_3$ and $\lambda_1 \lambda_2 \lambda_3$.

(c) Evaluate $\int_c \frac{\sin^6 z}{\left(z - \pi/6\right)^3} dz$, where c is $|z| = 1$. **5**

(d) A random variable X has the probability function $f(x) = \frac{4x}{81}\left(9 - x^2\right)$, $0 \le x \le 3$ **5**

find first four moments about mean.

2. (a) Find the expectation of (i) the sum (ii) the product of the number of points on the throw of n-dice. **6**

(b) P.T $G = \{1, -1, i, -i\}$ is a group under usual multiplication of complex numbers. **6**

(c) Two undepedent samples of sizes 8 and 7 gave the following results – **8**

Sample 1 :	19	17	15	21	16	18	16	14
Sample 2 :	15	14	15	19	15	18	16	

Is the difference between sample means significant ?

3. (a) Determine Eigen values and Eigen vectors for the following matrix :– **6**

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

(b) Let A be a set of non-zero integers and let R be a relation on A X A defined by (a, b) R(c, d) if ab = bc. **6**

(c) The marks obtained by students in a college are normally distributed with mean 65 and variance 25. If 3 students are selected at random from college, what is the probability that atleast one of them would have scored more than 75 marks ? **8**

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2/12/11 S.E. (ETRX) Sem-IV
Advanced Engineering Mathematics

4. (a) The probability mass function of a random variable X is zero excepts at the points X = 0, 1, 2. At these points it has the values $P(0) = 3C^3$, $P(1) = 4C - 10C^2$, $P(2) = 5C^{-1}$. Determine C, find $P(X < 1)$, $P(1 < X \leq 2)$, $P(0 < X \leq 2)$. **6**

(b) If $f : R \to R$, $g : R \to R$ are defined as $f(x) = 2x^2 + 5$ and $g(x) = 3x + 5$ then find gof, fof, g^{-1} of. Does f^{-1} exist ? Justify your answer. **6**

(c) If $f(\xi) = \int_c \frac{4z^2+z+5}{z-\xi} dz$ where c is the ellipse, find the values of f(i), f'(–1), f"(–i) and f(3). **8**

5. (a) If X denotes the out comes when a fair die is tossed, find M.G.F. of X and hence find mean and variance of X. **6**

(b) Determine the nature of poles of the following function and find the residue of each pole $f(z) = z^2 e^{YZ}$. **6**

(c) Show that the set of matrices $M = \begin{bmatrix} a & b \\ -5b & a \end{bmatrix}$, $ab \in z$ form an integral domain. Is it a field ? **8**

6. (a) Obtain two distinct Laurent's series for $f(z) = \frac{2z-3}{z^2-4z-3}$ in power of $(z - 4)$ indicating the regions of convergence. **6**

(b) Show that the matrix $A = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$ is similar to a diagonal matrix. Also find the transforming matrix and the diagonal matrix. **6**

(c) According to Genetic theory children having one parent of blood type M and the other of blood type N will always be one of three types M, MN and N and the average proportions of these types will be 1 : 2 : 1 out of 300 children, having one M parent and one N parent, 30 percent were found to be of tyep M, 45% of MN and remaining of type N. Test the Genetic theory by χ^2 test. **8**

7. (a) A transmission channel has a per-digit error probability p = 0·01. Calculate the probability of more than 1 error in 10 received digit using
(i) Binomial Distribution (ii) Poisson Distribution. **6**

(b) Check whether A = {2, 4, 12, 16} and B = {3, 4, 12, 24} are lattices under divisibility. Draw their Hasse diagrams. **6**

(c) Find the characteristic equation of the matrix A given below and hence find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ **8**

where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$

13/12/2011 SE ETRX Sem-IV (REV) ECAD

Con. 6519-11. **MP–4322**

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

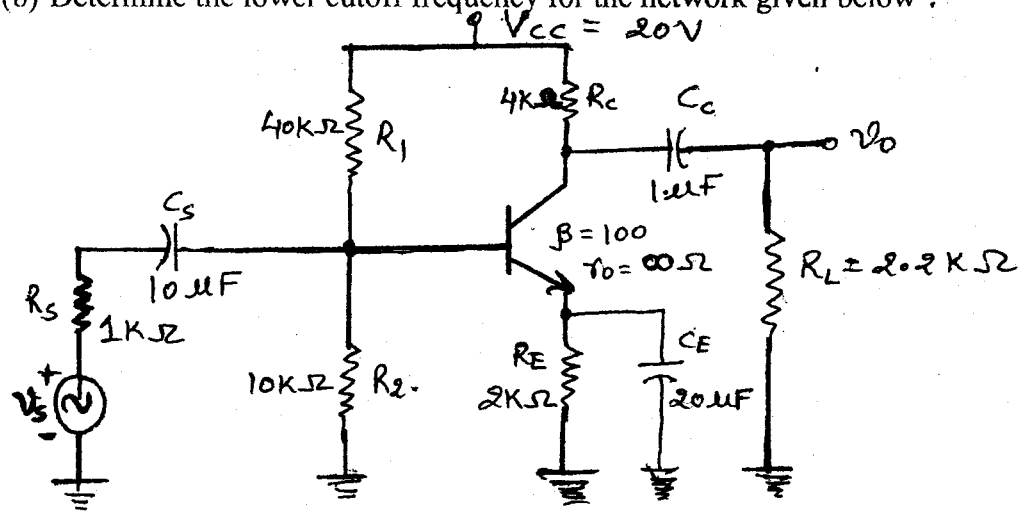
N.B. : (1) Question No.1 is **compulsory**.
(2) Attempt any **four** questions from question Nos. **2** to **7**.
(3) Assume **suitable** data wherever necessary with proper **justification**.
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt any **four** of the following :- 20
   (a) Derive an expression for the Miller input & output capacitance for inverting amplifier.
   (b) Explain Series-fed Class A power Amplifier,
   (c) For current series negative feedback derive the expression of the input resistance with feedback.
   (d) State the methods to improve CMRR of a Differential amplifier & explain any one.
   (e) Write a note on Darlington Pair.

2. Design a two stage RC coupled CS amplifier for zero temperature drift for following requirements: F_l better than 15Hz using JFET BFW11(Max) with $|Av| = 49$ & Vo = 3V. 20

3 (a) Explain Class B push Pull amplifier with waveforms & derive expression for its maximum efficiency. 10

(b) Determine the lower cutoff frequency for the network given below : 10



4. (a) For Dual input balanced output BJT differential amplifier derive the expression for input resistance, output resistance & voltage gain. 10
   (b) Explain the high frequency analysis of a BJT amplifier. Derive necessary expressions. 10

5. (a) Compare different types of Negative feedback amplifiers, 10
   (b) For a class B amplifier with Vcc=30V driving an 16Ω load, Determine 10
   (a) Maximum input power, (b) Maximum output power, (c) Maximum circuit efficiency, (d) Transistor dissipation.

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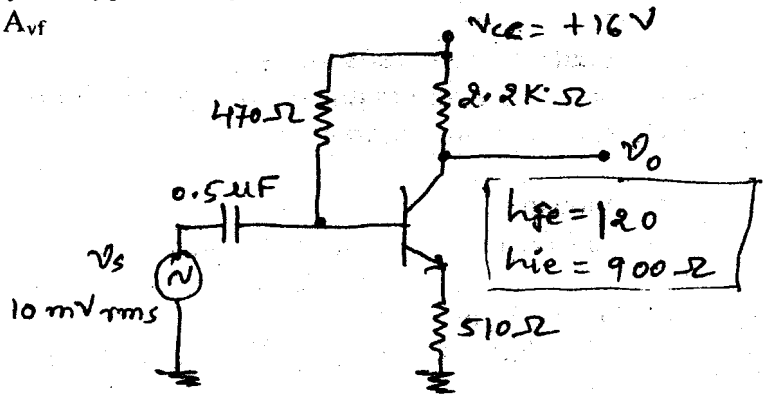
6. (a) Identify the type of Negative feedback for following circuit & determine A, β, A_f, Z_{if}, Z_{of} & A_{vf} 10



(b) Draw the circuit diagram of Hartley oscillator & explain its working. Derive the necessary equation for frequency of oscillations & for sustaining oscillations. 10

7. Write short note on any **three** :- 20

(a) MOSFET Differential amplifier

(b) Cross over distortion in class B Power amplifier

(c) Cascode amplifier

(d) RC phase shift Oscillator.

DBEC DATA SHEET

Transistor type	P_{dmax} @ 25°C Watts	I_{cmax} @ 25°C Amps.	$V_{CE(sat)}$ volts d.c.	V_{cbo} volts d.c.	V_{ceo} (Sus) volts d.c.	V_{cer} (Sus) volts d.c.	V_{cex} volts d.c.	V_{ebo} volts d.c.	T_j max. °C	D.C. current gain min	typ.	max.	Small Signal min.	typ.	h_{fe} max.	V_{BE} max.	θ_{ja} °C/W	Derate above 25°C W/°C
2N 3055	115.5	15.0	1.1	100	60	70	90	7	200	20	50	70	15	50	120	1.8	1.5	0.7
ECN 055	50.0	5.0	1.0	60	50	55	60	5	200	25	50	100	25	75	125	1.5	3.5	0.4
ECN 149	30.0	4.0	1.0	50	40	–	–	8	150	30	50	110	33	60	115	1.2	4.0	0.3
ECN 100	5.0	0.7	0.6	70	60	65	–	8	200	50	90	280	50	90	280	0.9	35	0.05
BC 147A	0.25	0.1	0.25	50	45	50	–	6	125	115	180	220	125	220	260	0.9	–	–
2N 525 (PNP)	0.225	0.5	0.25	85	30	–	–	–	100	35	–	65	–	45	–	–	–	–
BC 147 B	0.25	0.1	0.25	50	45	50	–	6	125	200	290	450	240	330	500	0.9	–	–

Transistor type	h_{ie}	h_{oe}	h_{re}	θ_{ja}
BC 147 A	2.7kΩ	18μmho	1.5×10^{-4}	0.4°C/mW
2N 525 (PNP)	1.4kΩ	25μmho	3.2×10^{-4}	—
BC 147B	4.5kΩ	30μmho	2×10^{-4}	0.4°C/mW
ECN 100	50Ω	–	—	—
ECN 149	15Ω	–	—	—
ECN 055	12Ω	–	—	—
2N 3055	6 Ω	–	—	—

BFW 11-JFET MUTUAL CHARACTERISTICS

$-V_{gs}$ volts	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0	2.4	2.5	3.0	3.5	4.0
I_{DS} max. mA	10	9.0	8.3	7.6	6.8	6.1	5.4	4.2	3.1	2.2	2.0	1.1	0.5	0.0
I_{DS} typ. mA	7.0	6.0	5.4	4.6	4.0	3.3	2.7	1.7	0.8	0.2	0.0	0.0	0.0	0.0
I_{DS} min.mA	4.0	3.0	2.2	1.6	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0 0	0.0	0.0

N-Channel JFET

Type	$V_{DS\ max.}$ Volts	$V_{DG\ max.}$ Volts	$V_{GS\ max.}$ Volts	$P_{d\ max.}$ @ 25°C	$T_{j\ max.}$	I_{DSS}	g_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{jc}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ mho	6	50 KΩ	2 mW/°C	0.59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5800 μ mho	2.5	50 KΩ	—	0.59°C/mW

8/12/2011 SE (ETRX) IV (R)
DSD - I

AGJ 2nd half (y) 48

Con. 6287-11. **MP–4315**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume any **suitable** data wherever required and justify the **same**.

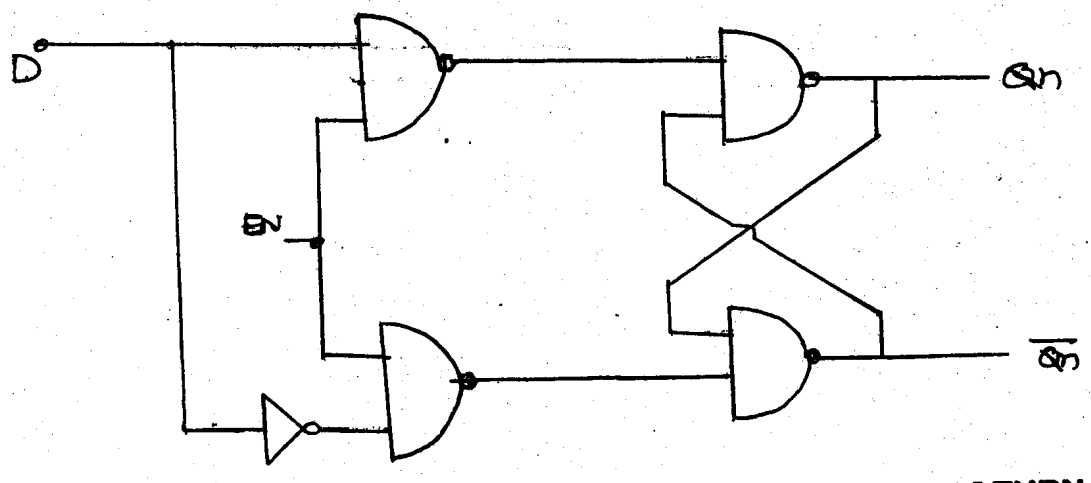
1. A. List the predefined types for signal declaration in VHDL 5
B. Write VHDL code for 4:1 multiplexer using selected signal assignment statement 5
C. Explain Moore and Melay sequential circuits 5
D. What is the need of state assignment rules? Explain the state assignment rules 5

2. A. Design Mod 120 counter using IC 7493 and few gates 10
B. Write VHDL code for twisted ring counter 10

3. A. Design a 3 bit synchronous counter controlled by input W. If W=1 the counter adds 2 to its contents. wrapping around if the counter overflows. Thus if the present state is 6 or 7 the next state becomes 0 or 1 respectively. If W=0 then the counter subtracts 1 from its contents acting as normal down counter. Make use of T flip flops and active low output decoders for the generation of excitation inputs. 10
B. Draw and explain 6T SRAM cell 10

4. A. Write VHDL code for mod 8 asynchronous counter using structural modeling. 10
B. Design 16x1 diode ROM. Use two dimensional decoding approach 10

5. A. Draw and explain architecture of XILINX 9500 family CPLD in detail. 10
B. Analyze the pulse mode asynchronous sequential machine given below and obtain transition table, flow table and state diagram of the circuit. 10



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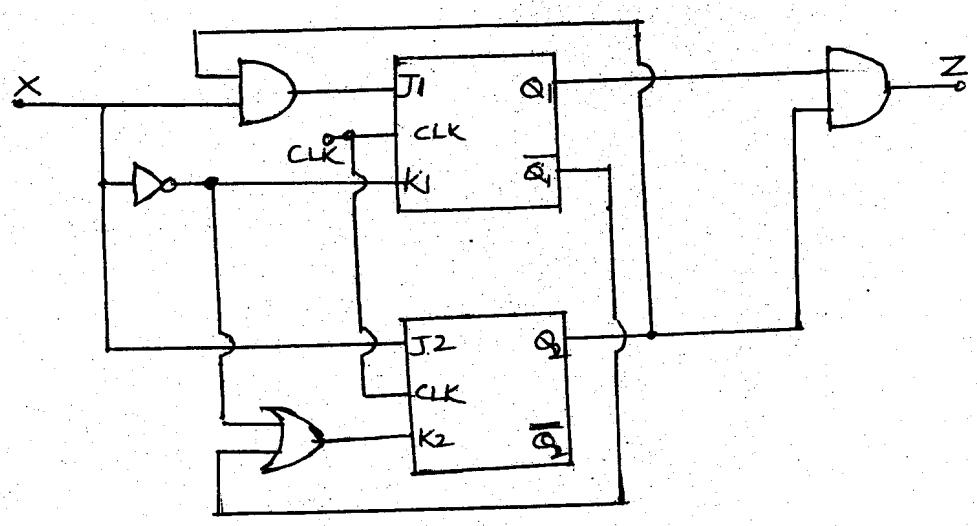
6. A. Analyze the clocked sequential synchronous circuit given below 10



B. Reduce the state of the following state table using implication chart method 10

PS	NS		O/P	
	X=0	X=1	X=0	X=1
S0	S2	S1	0.	0
S1	S4	S3	0	0
S2	S6	S5	0	0
S3	S0	S0	1	1
S4	S0	S0	0	0
S5	S0	S0	1	1
S6	S0	S0	0	0

7. A. Design a clocked synchronous state machine with two inputs x and y and one output z. The output should be 1 if the number of 1 inputs on x and y since reset is multiple of 4 and otherwise output z should be 0 10

B. Write notes on

i) Dynamic RAM

ii) Applications of Shift registers 10