T.E. (EXTC) (old) Sem V

RSA 18/11/14.

(OLD COURSE) QP Code : **11991**

(3 Hours) [Total Marks : 100]

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

1. (a) Explain what is a moment generating function of a random variable. **20**
(b) State and explain with example
(i) Conditional Probability. (ii) Baye's Theorem.
(c) State Important properties of power spectral density.
(d) State central limit theorem and give it's significance.
(e) Define markov chain and give an example of Markov chain.

2. (a) We have four Boxes. Box 1 contains 2000 components of which 5% are defective. Box 2 contains 500 components of Which 40% are defective. Box 3 and 4 contains 1000 each with 10% defective components . We select at random one of the boxes and we remove at random a single component. **10**
(a) What is the probability that the selected component is defective?
(b) Knowing that the selected component is defective, determine the probability that it come from box 2.
(b) Define discrete and continuous random variables by giving examples. Discuss the properties of distribution function. **10**

3. (a) What do you mean by function of one Random variable. **10**

Suppose $f_X(x) = \frac{2x}{\pi^2}$, $0 < x < \pi$,

and Y=sin X. Determine $f_Y(y)$

(b) When do you say that two random variables X and Y are Statistically Independent. **10**

$$f_{XY}(x,y) = \begin{cases} xy^2e^{-y}, & o < y < \infty, o < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

Determine whether X and Y are Independent.

4. (a) Show that if input $\{x(t)\}$ is a wss process for a linear system then the output $\{y(t)\}$ is a wss process. Also find $R_{xy}(\tau)$ **10**
(b) Examine whether the random process $\{x(t)\} = A\cos(\omega t + \theta)$ is a wide sense stationary if A and ω are constants and θ is uniformly distributed random variable in $(0,2\pi)$. **10**

TURN OVER

5. (a) What is Random process? State and Explain first and second order statics of Random process. 10

(b) Explain power spectral density. Find the power spectral density of a WSS process with auto correlation function $R(\tau) = e^{-\alpha\tau^2}$ 10

6. (a) State and prove the chapman-Kolmogorov equation. 10

(b) Write short notes on following special distributions. 10

(i) Poisson distribution (ii) Gaussian distribution

(iii) Uniform distribution.

7. (a) Find the characteristic function of poison distribution and hence find the values of first four Central Moments. 10

(b) Describe the sequence of Random variables. 5

(c) State and Explain Chebyshev Inequality. 5

T.E. EXTC Sem V (old). 24/11/12
µprocessor & µ controller-I

(OLD COURSE) QP Code : **12034**

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

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

1. (a) Explain the terms T state, Machine cycle and Instruction cycle related to 8085. 5
(b) Explain the reset state of 8085 microprocessor and 8051 microcontroller. 5
(c) Explain any four features of ARM processor. 4
(d) Explain interfacing of ADC 0808 to 8051. 6

2. (a) Explain Internal memory organization of 8051. 10
(b) Design a 8085 based microprocessor based system with following specifications: CPU of 3 MHz, EPROM of 8 KB using 4 KB chips and RAM of 8 KB using 4 KB chips. Discuss schematic and show the memory map. 10

3. (a) Explain addressing modes of ARM processor. 10
(b) Explain ICWs and OCWs of 8259. 10

4. (a) Explain control word register format of 8253 10
(b) Explain the following instructions of ARM processor. 10
(i) BL label
(ii) CMN RO,R2
(iii) TST RO,Rl,LSL #3
(iv) MLA R4,R3,R7,R8
(v) MVN R1,#6

5. (a) Explain various modes of operation of serial port in 8051 10
(b) Write assembly language for 8085 to arrange a series of ten, 8 bit numbers in ascending order. 10

6. (a) Write a assembly language program to generate a rectangular waveform of frequency 1KHz and 30% duty cycle at pin Pl.O using 8051. Assume 8051 is operating at frequency 12 MHz. 10
(b) Draw and explain timing diagram for instruction DCR M. 10

7. Write short note on **any four** of the following :– 20
(a) Serial communication in 8085.
(b) PORT 1 structure of 8051.
(c) Handshake mode of 8155.
(d) PSW register of 8051.
(e) DAC 0808 interfacing to 8051.

T.E. EXTC Sem V ... RFCD   28/11/14

(OLD COURSE) QP Code : **12073**

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

N.B. : (1) Question **No. 1** is **compulsary.**
(2) Answer any **4** out of remaining **six** questions.
(3) Assume suitable data wherever required but justify the same.
(4) Figure to the right indicates full marks.

1. (a) Explain the current flow in pn junction & give the expression for Idiff in terms of diffusion constant & Vdiff in terms of doping concentration. **5**

(b) Define VSWR, reflection coefficient & characteristic impedance. **5**

(c) A typical substrate has a dielectric constant of 4.3 & loss factor of 0.02 at 6 GHz. find the conductivity of the substrate. **5**

(d) Show that the maximum value of normalized resistance is numerically equal to the voltage standing wave ratio i.e. γ max = ρ. **5**

2. (a) A transmission line of characteristic impedance $Z_o = 50\ \Omega$ & length 0.2 λ is terminated in a load impedance $Z_L = 25 + j\ 30\ \Omega$. Find the reflection coefficient, VSWR & i/p impedance by using smith chart. **10**

(b) Starting from definition of time-averaed power, obtain expression for the power absorbed by the load for lossless and lossy transmission line. **10**

3. (a) Explain with equivalen circuits the RF behavious of resistor, capacitor & inductor. **10**

(b) Explain schottky contact with the help of energy band diagram for
(i) Metal & semiconductor do ont interact **10**
(ii) Metal semiconductor contact.

4. (a) Design a buterworth lowpass filter having a cut-off frequency of 250MHz & attenuation of 15 dB at 300 MHz. **10**

(b) Explain the design procedure of small signal BJT amplifier (PC circuit design & RF cirucuit design). **10**

5. (a) Explain construction and functionality of HEMT **10**
(b) A short circuited 50 Ω transmission line section is operated at 1GHz & possesses a phase velocity of 35% of the speed of light. Use both the analytical & smitch chart approach to determine the shortest lengths required to obtain on 4.7nH inductor. **10**

6. (a) Explain different filter parameters with generic a attenuation profile diagram. 10

(b) State Kuroda's four identities & prove. any two of them. 10

7. Write short notes on following :- 20
(a) Chip components
(b) Parallel & series connections
(c) Microstrip transmission lines.

Signals & Systems (Old & OTR). 4/12/14.
Sem IV & V. (EXTC).

(OLD COURSE) **QP Code : 12115**

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

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

2. Attempt any four question from remaining six question.

Q.1 a) Prove differentiation in Z domain property of Z transform.

b) Determine whether each of the signals are periodic. If so find its fundamental period

(i) $\cos\left(\frac{\pi}{20}\right)n + \cos\left(\frac{\pi}{10}\right)n$

(ii) $2\cos(100\,\pi t) + 5\sin 50t$

c) State and Prove linear convolution property of Fourier transform

d) x[n] = { 1, 1, 1,1,0.5, 0.5}

↑

Sketch even and odd parts of the signal. [20]

Q. 2 a) Convolve $x(t) = 1 \quad 0 \leq t \leq 1$

$= 0$ otherwise

With $h(t) = 1 \quad 0 \leq t < 1$

$= 0$ otherwise [10]

b) Check whether following systems are linear or nonlinear, time variant or invariant, causal or non-causal, static or dynamic.

(i) y(t) = x(t) cos(100πt)

(ii)y[n] = x[n÷10] + x^2[n] [10]

Q. 3 a) Sketch $x(t) = u(t) - r(t-1) + 2r(t-2) - r(t-3) + u(t-4) - 2u(t-5)$

Check whether signal is an energy signal or power signal and determine the same.

Draw Even and odd parts of the signal [10]

[TURN OVER

b) Determine the DT sequence associated with Z transform given below;

(i) $X[z] = \frac{1-(1/2)z^{-1}}{1+(1/2)z^{-1}}$; $|z| > 1/2$

(ii) $X[z] = \frac{z^2+z}{z^2+2z+1}$; $|Z| > 3$ [10]

Q. 4 a) i) Obtain Fourier Transform of rectangular pulse of duration n T and amplitude A.

ii) Obtain the fourier transform of impulse function. [10]

b) Find the Laplace transform of and draw its ROC.

(i) $x(t) = e^{-2t}[u(t) - u(t-5)]$

(ii) $x(t) = e^{-3t}[u(t)]] + e^{2t}[u(-t)]$ [10]

Q. 5 a) A causal discrete time LTI system is described by

$y[n] - \frac{3}{4}y[n-1] + \frac{1}{8}y[n-2] = x[n]$ where x[n] and y[n] are input and output of the system respectively .

(i) Determine the system function H[z]

(ii) Find the impulse response h[n] of the system

(iii) Find the step response s[n] of the system. [10]

b) Obtain the inverse Laplace transform of

(i) $X(s) = \frac{5s^2-15s-11}{(s+1)(s-2)^3}$

(ii) $X(S) = \frac{s-3}{s^2+4s+13}$ [10]

Q. 6 a) Find Z transform and specify its ROC

(i) $x[n] = (\frac{-1}{5})^n u[n] + 5\left(\frac{1}{2}\right)^n u[-n-1]$

(ii) $x[n] = 2^n u[-n-1]$

(iii) $x[n] = (n+1)u[n]$ [10]

Q. 7 a) Using suitable method obtain state transition matrix for the system matrix.

$$\begin{bmatrix} 3/4 & 0 \\ -1/2 & 1/2 \end{bmatrix}$$ [10]

b) Determine state variable model of

$$y[n] = -2y[n-1] + 3y[n-2] + 0.5y[n-3] + 2x[n]$$ [10]