ME. (EXTC) SEM: I (CBGS) (OLD) 10/5/16

S.S.A.

QP Code : 14195

Duration **03** Hours | Total Marks assigned to the paper **80**

NB 1) Attempt any **Four** questions from the **Six** questions
2) Assumptions made should be clearly stated.
3) Figures to the right indicate full marks.
4) Illustrate answer with sketches wherever required.
5) Use of **Normal** table is permitted.

Q.1>(a)	Define and prove Bayes theorem .Give its practical application.	(5)
(b)	What is Strict sense stationary process and wide sense stationary process?	(5)
(c)	Find the power spectral density of random process which has autocorrelation function $R_{xx}=e^{-\alpha\tau^2}$.	(5)
(d)	Explain M/M/1 queuing system in detail .	(5)
Q.2>(a)	If X and Y are exponential distributions with unity parameter , find the probability distribution function of U=X+Y V=X/(X+Y)	(10)
(b)	Consider a random process X(t)=A cos $(2\pi ft + \theta)$ where θ is uniform ally distributed random variable in $(0, 2\pi)$.Find the power spectral density of X(t).Find whether the random process is WSS and ergodic ?	(10)
Q.3>(a)	What is function of one random variable? If $f_X(x)=\frac{2x}{\pi^2}$ $0\le x\le\pi$. Find PDF of Y ($f_Y(y)$) where Y=sin(x).Prove the relation equation used.	(10)
(b)	Consider random process X(t) that assumes value ±1 .Suppose that X(0)= ±1 with probability 0.5 and suppose that X(t) changes polarity with each occurrence of an event in a poison process at rate α. Is this a continuous type Markov Process? Justify your answer.	(10)
Q.4(a)	State and prove central Limit Theorem.	(5)
(b)	Let the observation Zn is given By $Z_n=X_n+Y_n$, where X_n is the signal we wish to observe, Y_n is a white noise process with power σ^2_Y, and X_n and Y_n are dependent. Suppose that $X_n=A$ for all n, where A is a random variable with zero mean and variance σ_A. Find the power spectral density of Z_n.	(10)
(c)	A concentrator receives messages from a group of terminals and transmits them over a single transmission line. Suppose the messages arrive in Poisons process with one message every 4 milliseconds and suppose that message transmission time is exponentially distributed with mean 3 ms, Find the mean number of massages in system and mean total delay in the system. What percentage increases in arrival rate will double the mean total delay?	(5)
Q.5>(a)	What is Poisons Random Process? Is it continuous or Discrete Random process? Also find the autocovarince of the process.	(10)
(b)	Find the transfer function for the optimum filter for estimating Z(t) from $X(\alpha)=Z(\alpha)+N(\alpha)$, $\alpha(-\infty,+\infty)$ where $Z(\alpha)$ and $N(\alpha)$ are independent ,zero mean random processes.	(10)
Q.6>(a)	Find the PDF of sum of n independent random variables , all exponentially distributed with parameter α .	(5)
(b)	Explain Kalman Filter and its applications in communication systems.	(10)
(c)	What are 'Elements of queuing systems'?	(5)

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23/5/16 ME (CBGS) Sem I Elective - II
(EXTC) Embedded Systems

Q.P. Code : 14223

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

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assume **suitable** data wherever required with justification.
(4) **Figures** to the **right** indicate full marks.

1. For wireless a Toll Gate payment system draw the system diagram (minimum system) and data flow diagram. Explain the need of following system requirements to make it Real-time: a. Hardware Requirements b. Software requirements c. Task partition d. Need and type of scheduler e. Release time, deadline & execution time of tasks. **20**

2. (a) Explain the low power features and functional blocks of MSP controller. **10**
(b) Explain various exceptions of ARM processor. **10**

3. (a) Classify Real-time Kernels. **10**
(b) Write a program to implement preemptive scheduling algorithm using ARM GCC Tool chain or any other equivalent. **10**

4. (a) Explain evolution of ARM architectures **10**
(b) Explain STARTUP sequence and hardware initialization of any ARM processor **10**

5. (a) Write a program and explain ARM and THUMB interworking. **10**
(b) Explain the embedded systems design process. **10**

6. Explain any **four** of the following: **20**

(a) I/O PORTS of MSP
(b) JTAG Debugging features
(c) Write equivalent ARM assembly code : if (PORT1.0 ^ PORT1.1 ==0) func(1);
(d) Data type of ARM processor
(e) Schedulability of RMA

M.E. ExTC sem I CBSGS DSP & its App. 16-5-16

Q.P. CODE : **14202**

(3 hours) [Total Marks: 80

Note the following instructions.
(1) Attempt any four questions
(2) Assume suitable data wherever necessary, justify the same
(3) Figures to the right indicate full marks.

1.a **Explain in brief real time DSP system** [5]

1.b **List limitation of non-parametric method for power spectrum estimation** [5]

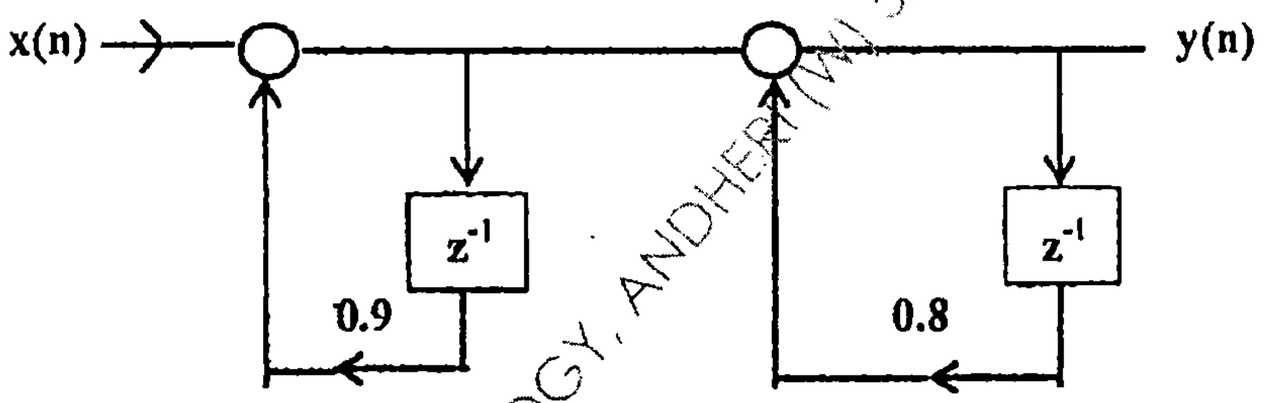
1.c **Explain very long instruction word (VLIW) architecture used for P-DSPs** [5]

1.d **What is the need for multirate signal processing? Give one example of multirate digital system.** [5]

2.a **Compute 8-point DFT of sequence x(n) = {1, 0, 2, 0, 3, 0, 4, 0 } using DIT-FFT algorithm** [10]

2.b **A cascade realisation of the two first order digital filter is shown below. The system functions of the individual sections are** [10]

$$H_1(z) = \frac{1}{1 - 0.9\,z^{-1}} \text{ and } H_2(z) = \frac{1}{1 - 0.8\,z^{-1}}$$



Draw product quantisation noise model of the system and determine the overall output noise power

3.a **The desired frequency response of a low pass filter is given by** [10]

$$H_d(\omega) = \begin{cases} e^{-j2\omega} & |\omega| \le \frac{\pi}{4} \\ 0 & \frac{\pi}{4} < |\omega| \le \pi \end{cases}$$

Determine the filter coefficients h(n), if h(n) = $h_d(n)$. w(n) using Hamming window also determine the filter response H(ω).

TURN OVER

$$W_{Hamm} = 0.54 - 0.46\cos\frac{2\pi n}{N-1} \quad for\ 0 \leq n \leq N-1$$

5.b Design a Butterworth filter using the Bilinear Transformation technique for the following specifications [10]

$0.8 \leq |H(e^{j\omega})| \leq 1 \qquad 0 \leq \omega \leq 0.2\pi$

$|H(e^{j\omega})| \leq 0.2 \qquad 0.6\pi \leq \omega \leq \pi$

4.a Implement a two stage decimator for the following specifications [12]

Sampling Frequency = 20 KHz

Decimation factor 'D'=100

Passband = 0 Hz to 40 Hz

Transitionband = 40 Hz to 50 Hz

Passband ripple = 0.02

Stopband ripple = 0.002

4.b The spectrum of discrete time signal is as shown in figure B. Sketch the spectrum of [8]

i. Downsampled or Decimated signal for D = 3

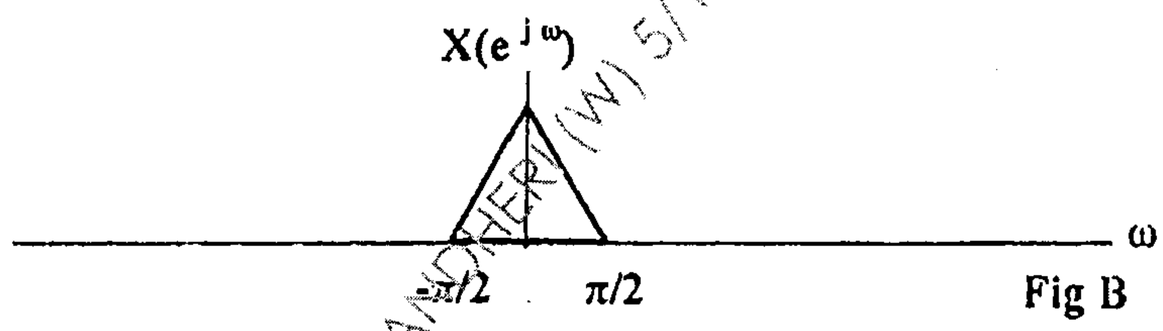


Fig B

5.a Define periodogram and explain how DFT and FFT are useful in power spectral estimation [10]

5.b Discuss power spectrum estimation using Welch method [10]

6. Write short notes on any Two [20]

i. Telecommunication applications of DSP

ii. Biomedical applications of DSP

iii. General purpose digital signal processors

iv. Polyphase implementation of Decimator and Interpolator

v. Effect of finite word length in digital filters

12/5/24

ME Sem I CBGS
(EXTC)
Optical Fiber communication

QP Code : 14199

(Time: 3 Hrs) **[Max.Marks:80**

Note: Question No.1 is compulsory
Answer any three questions form remaining five questions
All questions carry equal marks
Assume suitable data wherever necessary and justify the same.

Q.1 a) Explain the use of Non Zero Dispersion Shifted Fibers in optical communications. [05]
b) Explain the working of multimode interferer coupler in detail. [05]
c) What is meant by cross phase modulation and explain its importance in brief. [05]
d) Explain the working of SONET and also mention their merits and demerits. [05]

Q.2 a) What are different network topologies? Explain the performance of mesh architecture. [10]
b) Explain the principle of a LASER generation and discuss Vertical Cavity Surface Emitting Laser (VSCEL). [10]

Q.3 a) Explain the different phenomena responsible for signal degradation as the light wave propagates through an optical fiber. [10]
b) A lithium Niobate modulator designed for operation at wavelength of 1.3 μm is 3cm long with a distance between the electrode of 22 μm. Determine the voltage required provide a phase change of $\pi/2$ radians given that the electro optic coefficient for lithium Niobate is 30.8×10^{-12} mv^{-2} and its Refractive index is 2.1 at 1.13 μm. [10]

Q.4 a) What are different types of non linearity? Explain any two. [10]
b) State the principal of EDFA and state its application. Draw neat labeled diagram. [10]

Q.5 a) Derive the wave guide equation for an optical fiber. [10]
b) Explain the principle of resonant cavity enhancement detector? Compare RCE schottky photodiode and RCE avalanche photodiode. [10]

Q.6 Write short notes on any **two:-** [20]
a) Optical switch
b) Photonic crystal fibers
c) Optical MEMS

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