BE /Sem VII / CBSGS/ EXTC - 2016-17
12/5/17.

Subject :- WN

Q.P.Code:16215

(3 Hours) [Total Marks: 80]

NB: (1) Question no 1 is compulsory.

(2) Solve any three from remaining five.

(3) Draw neat diagrams wherever required.

(4) Assume suitable data if required.

1. (a) What are the components of sensor nodes? 20

(b) Explain CSMA/CA technique

(c) Explain the concept of trusted device with reference to Bluetooth

(d) Discuss two evolution paths for the GSM to offer 3G services.

2. (a) Using the following data for a GSM network, estimate the voice and data traffic per subscriber. If there are 40 BTS sites, calculate voice and data traffic per cell. 10

Subscriber usage per month: 150 minutes

Days per month: 24

Busy hours per day: 6

Allocated spectrum: 4.8 MHz

Frequency reuse plan: 4/12

RF channel width: 200 kHz (full rate)

Present number of subscribers in a zone: 50,000

Subscriber growth per year: 5%

Network roll-over period: 4 years

Number of packet calls per session (NPCS): 5 (see Figure)

Number of packets within a packet call (NPP): 25

Reading time between packet calls (T_r): 120 s

Packet size (NBP): 480 bytes

Time interval between two packets inside a packet call (T_{int}): 0.01 s

Total packet service holding time during one hour (T_{hot}): 3000 s

Busy hour packet sessions per subscriber: 0.15

Penetration of data subscribers: 25%

Data rate of each subscriber: 48 kbps

Packet transmission time: 10 s

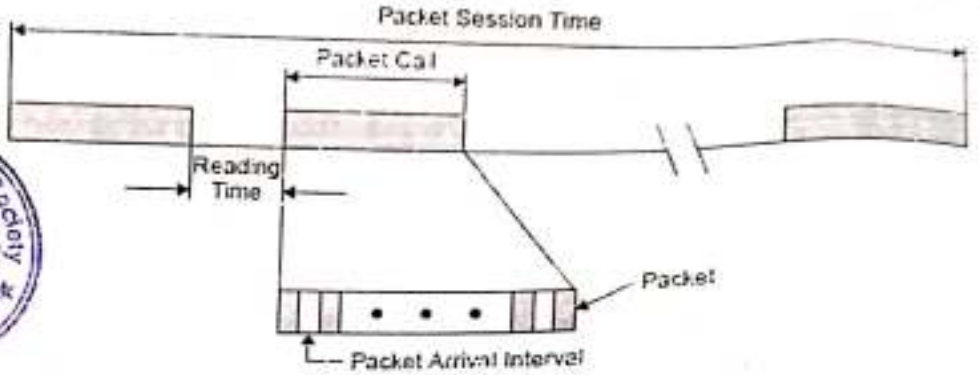

Fig: Packet session

(b) Explain the ZigBee technology. Discuss different network topologies that are supported in ZigBee. 10

3. (a) Discuss WiMAX in detail and compare its performance with Wi-fi 10

(b) Explain link budget analysis and requirements of wireless Network 10

4. (a) Explain transmit diversity present in forward link of Cdma 2000 10

(b) What are sensor network management design issues? Elaborate any one with example 10

5. (a) Explain Bluetooth security features and Give its protocol architecture 10

(b) Draw the neat block diagram of UMTS architecture Explain all interfaces. 10

6. Write short note on 20

(a) HSDPA

(b) RFID

EXTC / VII / REV / DTSP / 15 / 5137

Q.P. Code : 628302

(3 Hours) [Total Marks : 100

N.B. : - i) Question No. 1 is **compulsory.**
ii) Answer any **four** questions out of remaining six questions.
iii) Figure to the right indicates **full marks.**
iv) **Illustrate** the answers with **sketches** wherever required.

1 (a) What is the relation between DFT and DTFT? [20]
(b) What are the advantages and disadvantages of FIR filter and IIR filter?
(c) State and prove circular time shift and circular frequency shift property of DFT.
(d) What is the need of multirate signal processing?
(e) Compare various windows for design of FIR filters.

2 (a) Given
X[k]={36, -4+j9.656, -4+j4, -4+j1.656, -4, -4-j1.656, -4-j4, -4-j9.656}
using IFFT algorithm calculate x(n). [10]
(b) By means of DFT and IDFT technique compute the circular convolution of the following sequences
$x_1(n) = \{1,2,3,4\}$ and $x_2(n) = \{5,6,7,8\}$

3 (a) Show Direct Form-I, Direct Form-II realization. [10]

$$H(z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - z^{-1} + \frac{3}{16}z^{-2}}$$

(b) An all pole IIR filter has transfer function [10]

$$H(z) = \frac{1}{1 + \frac{3}{4}z^{-1} + \frac{1}{2}z^{-2} + \frac{1}{4}z^{-3}}$$

Obtain the lattice coefficients and show lattice realization.

4 (a) Design low pass filter for following specification [10]

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

Determine the filter coefficient $h_d(n)$ if the window function is defined as

$$w(n) = \begin{cases} 1 & 0 \le n \le 4 \\ 0, & otherwise \end{cases}$$

(b) i) Explain Polyphase decomposition process. [10]
ii) Write a short on Adaptive television echo cancellation.

TURN OVER

5 (a) What are the effects of finite word length in digital filter. [08]

(b) A low pass filter has following specifications [12]

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

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

Find the filter order and analog cutoff frequency using Impulse Invariance technique.

6 (a) Determine the response of the system with impulse response [10]

$$h[n] = \left(\frac{1}{2}\right)^n u[n]$$

when the input is

$$x[n] = 10 - 5\sin\frac{\pi}{2}n + 20\cos\pi n \qquad -\infty < n < \infty$$

(b) Convert the analog filter with system function [10]

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

into a digital IIR filter using Bilinear transformation. The digital filter should have a resonant frequency of $\omega_r = \frac{\pi}{4}$

7 (a) $x(n) = \{1 + 5j, 2 + 6j, 3 + 7j, 4 + 8j\}$, Find DFT X(k). [10]

Using the result obtained above find the DFT of the following sequence $x_1(n) = \{1, 2, 3, 4\}, x_2(n) = \{5, 6, 7, 8\}$

(b) Draw and explain the block diagram of a multistage decimator and integrator. [10]

BE - VII / Extc / CBGS / AVP / 15/5/19

Q. P. Code : 788501

(3 Hours) Total Marks : 80

Instructions:

(1)Question No 1 is Compulsory
(2)Answer any 3 questions from the remaining questions

Q1 Answer any four questions 20

a. Write a short note on connectivity of pixels.
b. Discuss the classification of video frames.
c. Explain dilation and erosion of binary image.
d. Explain image degradation model.
e. Quality of picture depends on the number of pixels and grey level that represent the picture. Justify or contradict

Q2 a. A Two dimensional DFT can be obtained using one dimensional DFT algorithms twice, explain with following example. 10

0	1	2	1
1	2	3	2
2	3	4	3
1	2	3	2

b. Explain image enhancement in frequency domain. 10

Q3 a. For the following image find the contrast stretching, $r_2=5$, $r_1=3$, $s_2=6$, $s_1=2$ 10

$f(x, y) =$

4	3	2	1
3	1	2	4
5	1	6	2
2	3	5	6

b. Explain KL transform. 10

Q4. a. Perform histogram equalization for following image. Plot original and the equalized histogram. 10

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

b. Discuss the concept of optical flow for motion estimation. 10

[TURN OVER]

Q5. a. Given 5 points use Hough transform to draw a line joining these points. 10
(1, 4) (2, 3) (3, 1) (4, 1) (5, 0)

b. Let V= {0, 1}.compute De, D_4, D_8, Dm using D_4 connectivity distance between two pixels p & q. Let the pixel coordinates p & q be (3, 0) and (2, 3) respectively for the image shown. Find distance measures. 10

	0	1	2	3
0	0	1	1	1
1	1	0	0	1
2	1	1	1	① q
3	① p	1	1	1

Q6. Write short note on 20
a. Weiner filter
b. RGB and HSI color models
c. Exhaustive block matching algorithms

19105

MC (CBSGS) EXTC Sem VII

Q.P. Code :788601

(3 Hours) [Total Marks : 80

N.B. : (1) Question **no.1** is **compulsory.**
(2) Attempt **any three** questions from remaining five questions.
(3) assume suitable data wherever necessary

1. (a) What is coherence bandwidth **20**
(b) Explain spread spectrum modulation.
(c) Explain Foliage loss in propagation.
(d) Explain how prioritizing in Hand off is done **10**

2. (a) Explain Handoff in 2G, 3G & 4G in detail. **10**

(b) A receiver in an urban cellular radio system detects a 1 mW signal at $d = d_o = 1$ meter from the transmitter. In order to mitigate co-channel interference effects, it is required that the signal received at any base station receiver from another base station transmitter which operates with the same channel must be below -100 dBm. A measurement team has determined that the average path loss exponent in the system is $n = 3$. Determine the major radius of each cell if a 7-cell reuse pattern is used. What is the major radius if a 4-cell reuse pattern is used? **10**

3. (a) Explain cellular networks (WMAN) evolution from 1G to 3G. **10**
(b) Explain how GPRS architecture handles data call **10**

4. (a) Why are so many logical channels used in the GSM? Explain GSM channel Structure. **10**
(b) Draw and explain 3GPP L TE architecture **10**

5. (a) Explain RPE-LTP speech coder as used in GSM. **10**
(b) Explain IMT 2000 family **20**

6. Write short note on.(any two)
(a) Problems in SDR communications
(b) Multiantenna technologies
(c) Rake receiver

EXTC/ Sem VII / CBSGS / OCAN/ 25/5/17

T4927 / T1337 OPTICAL COMMUNICATION AND NETWORKS

OCN 2 May 2017

Q.P. Code : 788700

(3 Hours) | Total Marks : 80

N.B. : (1) **Question no.1** is compulsory.
(2) **Attempt** any **three** questions from remaining questions.
(3) **Figures** to the right indicate **full** marks.

1. a) Compare Intramodal Dispersion and Intermodal Dispersion. 5
   b) Define Critical Angle, Acceptance Angle, Fresnel Reflection and External Reflection. 5
   c) Compare LED and LASER Sources. 5
   d) Differentiate DWDM and WDM Techniques. 5

2. a) Explain OTDR working principle in detail. 10
   b) Derive an expression for Time Delay in Intermodal Dispersion. 5
   c) Calculate the number of modes at 1.3 μm wavelength in GIF having index profile $\alpha = 2$, core radius 25 μm, core refractive index 1.48 and cladding refractive index 1.46. 5

3. a) Sketch the Refractive Index Profile of SIF and GIF. Derive an expression for Numerical Aperture and Number of Modes in SIF. 10
   b) Explain any one Fiber Fabrication Technique. 5
   c) Compare Isolators and Circulators. 5

4. a) Derive an expression for Link Power Budget Analysis of optical fiber. 7
   b) Derive an expression for Responsivity of PIN photodiode. Differentiate PIN and RAPD photodiodes. 8
   c) Explain Front End Amplifiers in optical communication. 5

5. a) Explain OTDM in detail. 10
   b) Describe SONET/ SDH in detail. 10

6. Write a short note on **any two** :- 20
   a) Crosstalk
   b) Dispersion
   c) Optical Safety
   d) Fault Management

E.&TC / VII / CBSGS / MICRO / 01-05-17

MRE May 2017

Q.P. Code : 788801

(3 Hours) Total Marks : 80

Note : 1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

1. a) Why are transferred electron devices able to operate at higher frequencies than bipolar transistors. 5
b) Explain the principle of working of a quarter wave transformer. 5
c) Explain the terms frequency pushing and frequency pulling with reference to magnetron. 5
d) How long does it take for the radar signal to travel out and back when the target is at maximum unambiguous range. 5

2. a) An air filled circular waveguide having an inner radius of 1 cm is excited in the dominant mode at 10 GHz. Find (i) the cut off frequency of the dominant mode (ii) guide wavelength (iii) wave impedance. Find the bandwidth for operation in dominant mode only. 10
b) Describe operation of following devices using faraday's rotation principle. (i) Isolator (ii) Gyrator 10

3. a) Calculate the position and length of short circuited stub design to match $(200+j300)\Omega$ load to a transmission line whose characteristic impedance is 300Ω (Use Smith chart) 10
b) What are '0' type tubes? Explain. 10
A TWT operates under following parameters,
Beam Voltage : 10KV
Beam Current : 500mA
Characteristic impedance of helix : 25Ω
Circuit length : 20cm
Frequency : 4GHz
Determine gain parameter and power gain.

4. a) Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for the bunched beam current. Also find out the condition for maximum power output. 10
b) Explain the operation of basic parametric device. Is it phase dependent. What are the relationships of the signal, pump and idler frequencies for a parametric amplifier with an idler circuit operated as a degenerate amplifier. 10

[TURN OVER]

Q.P. Code : 788801

5. a) Draw the functional block diagram of an MTI radar system and explain its operation. Define the terms range tracking and MTI improvement factor. 10

   b) Draw the block diagram of an amplitude comparison monopulse tracking radar and explain its principle of operation. 10

6. Write short notes on the following: 20
   a) Instrumentation landing system
   b) Modes in Gunn Diode
   c) 'M' type microwave tubes.
   d) Biomedical applications of microwave.

EXTC / Sem VII / FME (Rev) / 1-6-17

Q.P. Code : 628902

(3 Hours) [Total Marks : 100

N.B.: (1) Question No. **1** is **compulsory** and answer any **four** questions out of remaining **six** questions.
(2) Assume suitable **data** wherever **necessary**.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain Microwave propogation in ferrites. 5
   (b) With neat diagram explain working of two cavity Klystron. 5
   (c) Use the Smith Chart to find the reflection coefficient corresponding to a load impedance : $Z_L = (2 - 2j)\, Z_0$ 5
   (d) State and explain Lorentz Reciprocity theorem. 5

2. (a) Explain the working and derive S-matrix for a two hole directional coupler. 10
   (b) Match a load impedance $Z_L = 60 - j80\ \Omega$ to a $50\ \Omega$ line using a double stub tuner. The stubs are open circuited are spaced $\lambda/8$ apart. The match frequency is 2 GHz. 10

3. (a) Derive expression for phase velocity, cut off frequency, cut off wavelength and field equation for circular waveguide. 10
   (b) A Loss free transmission line of characteristic impedance $50\ \Omega$ is terminated with a real impedance of $30+j100\ \Omega$. If the line is lengthened by $0{\cdot}093\ \lambda$, what is the value of the new termination required to ensure that the impedance seen by the generator is unchanged ? 10

4. (a) Describe operation of following devices using Faraday's rotation principle: 10
      (i) Isolator
      (ii) Gyrator
   (b) Discuss the operation of backward wave devices. 10

5. (a) (i) Discuss the difference between transfered electron devices and avalanche transit time devices. Give example. 10

(ii) Discuss the factors that limit the high frequency response of a microwave BJT.

(b) Mention different types of electron flow. Explain Brillouin flow and derive an expression for Brillouin magnetic field Br. 10

6. (a) Describe operation of O-type and M-type devices in brief. Explain the working of Gyrotrons. 10

(b) Explain the working of (i) Coupled line filters, (ii) Filters using coupled resonators. 10

7. Write short notes on the following :—

(a) Triple stub matching 5

(b) Phase shifters 5

(c) Detectors and Mixers 5

(d) VSWR and Smith Chart. 5

EXTC/VII/CBSGS/DCQE/07.06.2017

T4927 / T1339 ELECTIVE I (DATA COMPRESSION & ENCRYPTION

DCE · 2017 May

QP Code : 788900

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

N. B. : (1) Question No. **1** is **compulsory.**
(2) Solve any **three** from remaining.
(3) Assume suitable data if necessary; with proper justification.

1. Answer the following in brief :– **20**
   (a) Classify data compresion techniques and give example for each.
   (b) What are one way trap door functions? What is their importance in cryptography?
   (c) State :–
      (i) Fermat's little theorem
      (ii) Euler's theorem
      (iii) Chinese Remainder theorem
      (iv) Difinition of primitive root
   (d) What do you mean by "auditory masking" and "temporal masking"?

2. (a) A source with alphabet A = {a,b,c,d,e} with probabilities P = {0.15, 0.05, 0.25, 0.35, 0.2} respectively, calculate **10**
   Standard Huffman code
   Minimum variance Huffman code
   Avg length & variance for both codes
   Draw binary tree for both.
   (b) What are private key cryptosystems? What are their advantages & disadvantages? Explain DES with neat block diagram. **10**

3. (a) What are dictionary based compression schemes? Explain the LZ-77 technique with an example. **10**
   (b) Alice and Bob choose p = 13 and q = 5 as prime numbers for RSA encryption. Alice chooses e = 7 as public key. Derive her private key. She wants to send plain text 17 to Bob using RSA. Compute the encrypted text and show how Bob will decrypt it. **10**

4. (a) Explain the principle of working of MP-III audio compression standard, with a neat block diagram. **10**
   (b) What are elliptic curves? Explain the "Elliptic curve Discrete Log" problem and hence explain ECC key exchange algorithm. **10**

[TURN OVER

5. (a) Explain any one lossless technique for image compression in detail. 10
   (b) What are digital signatures? Explain any one technique in detail. 10

6. Write short notes on **any** two :– 20
   (a) MPEG video compression standard
   (b) Hash and MAC functions
   (c) Digital Immune System
   (d) Diffie-Hellman key exchange
