04/06/14 Fundamentals of Microwave Engg..
B.E. Sem-VII (CR) - May-June 2014.
EXTC

QP Code : MV-20178

(2 Hours) **[Total Marks : 60**

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) A waveguide termination having VSWR of 1.1 is used to dissipate 100 watts of power. Find reflected power. **5**
(b) Explain different modes of Gunn diode. **5**
(c) Design a circular using Magic Tees. **5**
(d) Justify why rectangular wareguide does not support TEM propogation. **5**

2. (a) With the help of suitable diagram explain mechanism of operation of magnetron? How are various modes separated? Explain the terms frequency pushing and frequency pulling with reference to magnetron. **10**

(b) Antenna with impedance 50 + j 30 Ω is to be matched to 100 Ω losslessline with a shorted stub.
Determine : (i) Required stub admittance
(ii) Distance between stub and Antenna
(iii) Stub length
(iv) Standing wave ration between stub and load, stub and source, along the stub (Use smith chart) **10**

3. (a) Describe operation of the following devices using faraday's rotation principle.
(i) Isolatar
(ii) Cyrator **10**

(b) Discuss design procedure for filters using image parameter method. **10**

4. (a) A helix travelling wave tube operates at 4GHz under a beam voltage 10 KV and beam current 500 mA. If the helix impedance is 25 Ω and the interaction length is 20 cm. Find the output power gain in decibels. **10**

(b) Explain the working of a negative resistance parametric amplifier and explain its application. **10**

5. (a) A slotted line with a short circuit termination measures two successive minima at 25.3cm apart, when an unknown load is connected, the VSWR is 3.1 and the minimum occurs at 16.5 cm position. Find
(i) Voltage reflection coefficient at load
(ii) The load impedance when the characteristic impedance of the lien is 50 Ω. **10**

(b) Derive expression for phase velocity, cutoff frequency, cutoff wavelength and field equation for rectangular waveguide. **10**

6. (a) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. **10**

(b) Explain the working and derive S matrix for a two hole directional coupler. **10**

7. Write short notes on
   (i) Lorentz Reciprocity theorum
   (ii) Microstrip transmission line
   (iii) Periodic Structure. **20**

BE EXTC Sem VII

Mobile Comm. Systems

May 2014

QP Code : MV-20120

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

N.B. : (1) Question **no. 1** is **compulsory.**
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume suitable data whenever necessary.

1. (a) Explain umbrella cell concept in cellular system. **5**
   (b) Explain GSM services and features. **5**
   (c) What are the factors influencing small scale fading. **5**
   (d) Discuss about non-linear effects in CDMA. **5**

2. (a) Explain how does 60^0 and 120^0 sectoring improves signal to interference ratio. **10**
   (b) Explain diversity methods used in cellular system. **10**

3. (a) Explain signal processing in GSM. What is use of interleaver? **10**
   (b) Explain frame structure used in GSM. **10**

4. (a) Explain traffic channel, control channel, broadcast channel and common control channel in GSM. **10**
   (b) Give a complete functional account on NSS. **10**

5. (a) Describe open loop and close loop system of power control in CDMA. **10**
   (b) With neat diagram explain reverse CDMA channel. **10**

6. (a) Elaborate on forward W-CDMA channel. **10**
   (b) Explain the major 3G RTT proposal. **10**

7. Short notes (any **two**) **20**
   (a) RAKE Receiver
   (b) GPRS technology
   (c) IMT 2000 Concept.

BE/ EXTC/ VII 23/5/2014.
DCE (REV)

QP Code : **MV-20054**

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six**.
(3) Assume suitable **data** wherever necessary, with proper **justification**.

1. (a) Classify data compression techniques. Give the definition and an example of each. **5**
(b) Explain predictive coding technique for compression with an example. **5**
(c) What are one way trap door functions ? What is their importance in cryptography? **5**
(d) State :- **5**
(i) Chinese remainder theorem
(ii) Fermat's little theorem
(iii) Euler's theorem
(iv) Definition of Euler's totient function
(v) Definition of primitive root

2. (a) Draw minimum variance Huffman tree for the following alphabet with given set of probabilities. Find average length, coding efficiency, and variance of the code. A : {a,b,c,d,e} P : {0.2, 0.4, 0.1, 0.2, 0.1} **10**
(b) Consider a source with alphabet A = $\{a_1, a_2, a_3\}$ with probability model {0.8, 0.02, 0.18} respectively. Perform arithmetic coding and generate a decimal tag for the sequence : $a_1a_3a_2a_1$ **10**

3. (a) Perform LZ-78 coding on the following binary string and evaluate the compression ratio : **8**
0 1 0 0 0 1 1 1 0 0 1 1 1 0 1 1 1 1 1 1 0 0 0 0 1 1 1 1 1 1 0 1 1 0 1
(b) Give block diagram of MP-III encoder. **2**
Give its functioning in detail. **8**
Also explain what is auditory masking and temporal masking. **2**

4. (a) Explain working of DES with a block diagram. **10**
(b) Explain hash and MAC algorithms used for authentication. **10**

5. (a) Prove that the key exchanged between user A and user B with Diffie-Hellman key exchange algorithm, is the same. **10**
(b) Explain the RSA encryption - decryption algorithm. Specifically explain why the decrypted message is the same as the plain text. **10**

6. (a) Explain MPEG video compression standard. **10**
(b) Explain all the steps in JPEG image compression standard. **10**

7. Write notes (any **two**) :- **20**
(a) Viruses, worms and anti virus technique
(b) Elliptic curve cryptography
(c) Digital signatures
(d) Biometric Authentication

Sem- VII - EXTC - Rev - Comp. communication ✱ NIL

Date:→ 10/6/14

QP Code : MV-20310

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

Note: i) Question no 1 is compulsory
ii) Solve any four out of remaining questions
iii) Figure to the right indicate full marks

Q1 Answer the following questions (Any four) [20]

a) What do we mean IP is best effort delivery service?
b) What is the difference between unicast and multicast routing?
c) How does a repeater extend the length of a LAN?
d) What is the advantage of controlled access over random access?
e) What is significance of twisting in twisted pair cable?

Q2 a. Compare circuit, packet, and message switching with examples. [10]
Q2 b.What is IP addressing? What are various types of IP address classes? Explain in details with its maximum capacity? State their limitations. [10]

Q3 a.What is congestion? What is are various congestion control method? Explain open loop congestion policies in details. [10]
Q3 b. What is interior and exterior routing? Compare link sate and distance vector routing. [10]

Q4 a.What is HDLC? Explain various frame format, configuration and response mode supported by HDLC. [10]
Q4 b. What is carrier sensing? What are persistent strategies? Compare CSMA/CD and CSMA/CA? [10]

Q5 a. What is Ethernet? Explain IEE802.3 standard in detail. [10]
Q5 b. Explain TCP header in details. [10]

Q6a. What is ALOHA? What are its type? Compare and contrast. [10]
Q6 b.Compare bit-stuffing and byte stuffing. Bit-stuff the following data: [10]
000 111 111 011 111 00 1111 00 11111

Q7 Write a note on any two:- [20]

a) IEEE 802.5 standard
b) SONET
c) Transmission media.

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Con. 13475-14.

B.E. ExTC sem VII (Rev) May-14 19/5/14

Sub:- DTSP

QP Code : MV-19989

(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) **Figures** to the **right** indicate **full** marks.

1. (a) Obtain a digital filter transfer function H(ω) by applying Imputse invariance transformation on the analog TF. 5

$$H_a(s) = \frac{s}{s^2 + 3s + 2}.$$ Use f_s = 1 K samples/sec .

(b) Consider a filter with TF : 5
$H(z) = (z^{-1} - a) / (1 - a\, z^{-1})$
Identify the type of filter and justify it.

(c) Find the number of complex multiplications and complex additions required to find DFT for 32 point sequence. Compare them with the number of computations required if FFT algorithm is used. 5

(d) Consider the sequence $x(n) = \delta(n) + 2\delta(n-2) + \delta(n-3)$. 5
Find DFT of x(n).

2. (a) A sequence is given as $x(n) = \{1 + 2j, 1 + 3j, 2 + 4j, 2 + 2j\}$ 6
(i) Find X(k) using DIT-FFT algorithm.
(ii) Using the results in (i) and not otherwise find DFT of p(n) and q(n) where
$p(n) = \{ 1, 1, 2, 2 \}$
$q(n) = \{ 2, 3, 4, 2 \}$

(b) $X(K) = \{ 36, -4 + j9{\cdot}656, -4 + j4, -4 + j\,1{\cdot}656, -4, -4 - j\,1{\cdot}656, -4 - j4, -4 - j9{\cdot}656 \}$ 10
Find x(n) using IFFT algorithm (use DIT IFFT).

(c) Explain the properties of symmetricity and periodicity of phase factor. 4

3. (a) By means of FFT-IFFT method (DIT algo) compute Circular convolution of 8
$x(n) = \{ 2, 1, 2, 1 \}$ $h(n) = \{ 1, 2, 3, 4 \}$

(b) An 8 point sequence $x(n) = \{ 1, 2, 3, 4, 5, 6, 7, 8 \}$
(i) Find X(K) using DIF FFT algorithm. 5
(ii) Let $x_1(n) = \{ 5, 6, 7, 8, 1, 2, 3, 4 \}$ Using appropriate DFT property and answer of previous part, determine $X_1(K)$. 5
(iii) Again use DFT property and find $X_2(K)$ where $x_2(n) = x(n) + x_1(n)$. 2

4. (a) Draw the Lattice filter realization for the all pole filter **10**

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

(b) Obtain DF-I, DF-II, cascade (first order sections) and parallel (first order sections) structures for the system described by **10**

$y(n) = -0{\cdot}1\ y(n-1) + 0{\cdot}72\ y(n-2) + 0{\cdot}7\ x(n) - 0{\cdot}252\ x(n-1)$.

5. (a) Design a FIR low pass digital filter using Hamming window for N = 7 **10**

$H_d(e^{j\omega}) = e^{-3j\omega}$ $\quad -0{\cdot}75\pi \le \omega \le 0{\cdot}75\pi$

$= 0$ $\quad 0{\cdot}75\pi \le |\omega| \le \pi$

(b) A LPF has following specifications :— **10**

$0{\cdot}8 \le |H(\omega| \le 1$ $\quad$ for $0 \le \omega \le 0{\cdot}2\pi$

$|H(\omega| \le 0{\cdot}2$ $\quad$ for $0{\cdot}6\pi \le \omega \le \pi$

Find filter order and analog cut off frequency if

(i) Bilinear transformation is used for designing

(ii) Impulse invariance is used for designing.

6. (a) Explain up sampling by an integer factor with neat diagram and waveforms. **10**

(b) Explain the need of a low pass filter with a decimator and mathematically prove that $\omega_y = \omega_x D$. **10**

7. Write notes on any **four** of the following :— **20**

(a) Frequency sampling realization of FIR filters

(b) Goertzel algorithm

(c) Set top box for digital TV reception

(d) Adaptive echo cancellation

(e) Filter banks.
