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

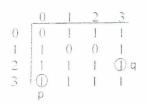   b. Discuss the concept of optical flow for motion estimation.   10

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

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	1	1	1
	p			

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

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(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

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   **10**
$d = d_0 = 1$ 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?

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   **10** channel Structure.
  (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   **10**

6. Write short note on.(any two)   **20**
    (a) Problems in SDR communications
    (b) Multiantenna technologies
    (c) Rake receiver

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(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   5
      Reflection.
   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   5
      profile $\alpha = 2$, core radius 25 μm, core refractive index 1.48 and cladding
      refractive index 1.46.

3. a) Sketch the Refractive Index Profile of SIF and GIF. Derive an expression   10
      for Numerical Aperture and Number of Modes in SIF.
   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   8
      PIN and RAPD photodiodes.
   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

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01/06/17

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. **10**
   (i) Isolator (ii) Gyrator

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**

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

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

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.

BE - Sem - VII -EXT C - CBS GS

7/6/17

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   **10**
        $P = \{0.15, 0.05, 0.25, 0.35, 0.2\}$ respectively, calculate
        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 &   **10**
        disadvantages? Explain DES with neat block diagram.

3. (a) What are dictionary based comprension schemes? Explain the LZ-77   **10**
        technique with an example.
    (b) Alice and Bob choose $p = 13$ and $q = 5$ as prime numbers for RSA   **10**
        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.

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

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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

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