BE 1

1/06/17

(03)

(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   **5**
than bipolar transistors.

   b) Explain the principle of working of a quarter wave transformer.   **5**

   c) Explain the terms frequency pushing and frequency pulling with reference to   **5**
magnetron.

   d) How long does it take for the radar signal to travel out and back when the   **5**
target is at maximum unambiguous range.

2. a) An air filled circular waveguide having an inner radius of 1 cm is excited in   **10**
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.

   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   **10**
(200+j300)Ω load to a transmission line whose characteristic impedance is
300Ω (Use Smith chart)

   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   **10**
hence obtain an expression for the bunched beam current. Also find out the
condition for maximum power output.

   b) Explain the operation of basic parametric device. Is it phase dependent. What   **10**
are the relationships of the signal, pump and idler frequencies for a parametric
amplifier with an idler circuit operated as a degenerate amplifier.

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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.

Sem VII CBGS
EXTC

(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.

[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

Sem VII CBGS
EXTC

QP Code :789102

(3 Hours)   Total Marks: 80

N.B. : (1) Questions No.**1** is **compulsory**.
(2) Solve any three questions out of remaining **five** questions
(3) Draw neat labeled diagram whenever necessary
(4) Assume suitable data if necessary

Q1: Solve any four out of five   (5x4)

1 a. Draw and explain neural networks based OR function.

b. Draw and explain McCulloch Pitts neuron architecture.

c. Explain with block diagram the unsupervised neural networks with an example.

d. List the different activation functions used in neural network.

e. Mention the five properties of Fuzzy Sets.

2 A Explain perceptron learning algorithm and develop perceptron network to implement two input OR function. Consider inputs and output as unipolar. Assume initial weights and bias value equal to zero. Consider learning rate equal to one.   (10)

(b) For speed control of DC motor the membership functions for series resistance, armature current and speed are: (10)

$$\underset{\sim}{R} = \left\{ \frac{0.4}{30} + \frac{0.6}{60} + \frac{1}{100} + \frac{0.1}{120} \right\}$$

$$\underset{\sim}{I} = \left\{ \frac{0.2}{20} + \frac{0.3}{40} + \frac{0.6}{60} + \frac{0.8}{80} + \frac{1}{100} + \frac{0.2}{120} \right\}$$

$$\underset{\sim}{N} = \left\{ \frac{0.35}{500} + \frac{0.67}{1000} + \frac{0.97}{1500} + \frac{0.25}{1800} \right\}$$

Find the following: Fuzzy Cartesian Product & Fuzzy Composition

[Turn Over

$$S = R \times I$$
$$T = I \times N$$
$$P = S \, o \, T (\text{max} - \text{min})$$
$$P = S . T (\text{max} - product)$$

3A. Explain the any five methods of De-fuzzification.   (10)

3B.Describe neural network based face recognition with block diagram.   (10)

4A. Describe back propagation algorithm with flow chart.   (10)

4B. Explain Hopfield network using a suitable example.   (10)

5A. Describe Handwritten character recognition using Neural Networks.   (10)

5B. What is self organizing map? Explain Kohonen self-organizing map .   (10)

6A Design a fuzzy controller to regulate the temperature of a domestic shower.   (10)
    Assume that:
        a)   Temperature is adjusted by single mixtap.
        b)   The flow of water is constant.
        c)   Use three descriptors for each input and output variable.
        d)   Derive set of rules for control action.
        e)   Verify the design using one example.

6B Design a fuzzy controller to determine wash time of domestic washing machine.   (10)
    Assume that:
        a)   Input is dirt and grease on clothes.
        b)   Output is wash time.
        c)   Use three descriptors for each input variable and five descriptors for output variable.
        d)   Derive set of rules for control action.
        e)   Verify the design using one example.

B·E - Sem-VII . EXTC - (CCBGS)

(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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BE (EXTC) Sem VII   CBSGS

Mobile Communication

19/5/2017

(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 LTE 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