G 1704   (Pages : 2)   Reg. No..................................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronics and Communication Engineering

EC 010 701—VLSI DESIGN (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. How photoresists are classified ?

2. Mention the need for isolation.

3. How we can control the threshold voltage of MOS circuit ?

4. What are the advantages of Bi CMOS fabrication process ?

5. List I and II generation GaAs devices.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. What is drive-in diffusion ? How is its analytic solutions found ?

7. Explain the principles of trench isolation.

8. Explain latch up problem in CMOS.

9. Draw the schematic and layout of static CMOS inverter.

10. Compare the basic structure of GaAs MESFET and silicon MOSFET.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Explain ion implantation process. Also explain the possible defects that could arise in such a process.

Or

Turn over

12. Describe the photoetching process. Explain the different masks required to complete an IC. Also explain the functions performed by each mask.

13. Explain in detail the different isolation techniques used in IC fabrication. Compare their properties.

Or

14. With neat sketches, explain the NMOS transistor fabrication process.

15. Develop a CMOS structure for a 1 bit full adder using minimum number of MOSFETs. Write the necessary Boolean expression used for implementation.

Or

16. Describe a transmission gate. What are the advantages and disadvantages of using transmission gates for implementing the logic ? Also develop a 2-input CMOS multiplexer using Transmission gates.

17. Draw the stick diagram and layout of a 2 input XOR gate using CMOS. Explain the components of it.

Or

18. What are the advantages of BiCMOS circuits ? Explain the steps involved in BiCMOS inverter fabrication process.

19. Write notes on :

    (i) Doping process in GaAs technology.

    (ii) Channelling effect.

Or

20. Draw and explain the process flow for MESFET fabrication.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronics and Communication Engineering

EC 010 703—MICROWAVE ENGINEERING (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours
Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Enumerate the features of microwave electronics.

2. Why HTWT is called so ? Explain.

3. Draw the equivalent circuits of PIN diode.

4. Define Return loss. State its significance.

5. Differentiate MMIC from HMIC.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. State Faraday's law. Show its application to an Isolator.

7. What is the concept of BWO and BWA ? Explain.

8. State and explain GUNN effect.

9. What is VNA ? Explain its features and applications.

10. What is the dominant mode of microstrip line ? How ? Explain.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. (a) Define and explain Chain parameters. Derive the chain parameters in terms of S parameters.

    (b) State and explain reciprocity theorem.

Or

Turn over

12. Draw a magic tee and explain its construction and operating principle. Derive the S matrix for an ideal magic T.

Or

13. Draw a reflex klystron oscillator and explain its concept. Derive the equation for its exit velocity and electronic admittance.

Or

14. Draw the cross section of HTWT and explain. Derive an expression for its power gain. Explain its potential applications.

15. What are parametric amplifiers ? Explain. Derive Manley Rowe power relations for parametric amplifiers.

Or

16. Draw and explain the construction and concept of IMPATT diode. Explain its advantages and applications in detail. Differentiate it from TRAPATT.

17. Draw a neat block diagram for microwave power measurement and explain the procedure in detail.

Or

18. Draw the block schematic of a Scalar network analyzer and explain its functioning in detail. Differentiate it from VNA.

Or

19. Compare and contrast all the characteristic parameters of the variants of planar transmission lines.

Or

20. (a) Give an account on "Choice of substrate materials".

   (b) Explain the fabrication techniques of planar transmission lines with diagrams.

[5 × 12 = 60 marks]

$\wedge$

Reg. No............................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronics and Communication Engineering

EC 010 702—INFORMATION THEORY AND CODING (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours
Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Define entropy. List its properties

2. Explain Kraft's inequality.

3. State and explain channel coding theorem.

4. Define generator and parity check matrix. Give an example.

5. How is convolutional code different from cyclic code ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Prove that $H(X, Y) = H(X) + H(Y) - I(X, Y)$.

7. Encode the source symbols $\{S_0, S_1, S_2, S_3, S_4, S_5, S_6, S_7\}$ using Shannon-Fano coding. The probabilities are $P(s) = \{0.2, 0.2, 0.15, 0.15, 0.1, 0.1, 0.05, 0.05\}$.

8. Find the mutual information and channel capacity of the channel shown below, if $P(x_1) = 0.55$ and $P(x_2) = 0.45$:
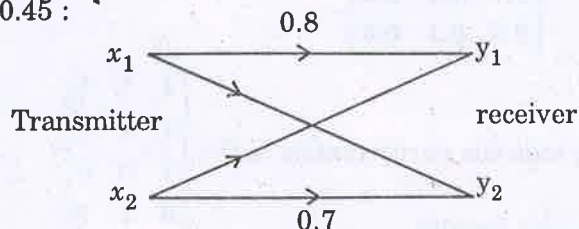
9. If C is a valid code vector, then prove that $CH^T = 0$ where H^T is the transpose of the parity check matrix H.

10. Explain sequential decoding of a convolutional coded message.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each full question carries 12 marks.

11. (a) Show that entropy is maximum when the source transmits symbols with equal probability. Plot the entropy of this source versus p $(0 < p < 1)$.

   (7 marks)

   (b) Define and explain marginal and conditional entropies.

   (5 marks)

Or

12. (a) State and prove properties of entropy.

   (6 marks)

   (b) Define joint and conditional entropy and derive the relation $H(X, Y) = H(X) + H(Y/X)$.

   (6 marks)

13. A discrete memoryless source has five symbols x_1, x_2, x_3, x_4 and x_5 with probabiliteis 0.4, 0.19, 0.16, 0.15 and 0.10 respectively attached to every symbol.

   (i) Construct a Shano-Fano code for the source and calculate code efficiency η.

   (6 marks)

   (ii) Repeat the above for Huffman code and compare the two techniques of source coding.

   (6 marks)

Or

14. Construct the Huffman code with minimum code variance for the following probabilities and also determine the code variance and code efficiency. Draw the code tree :

   {0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625}.

15. Explain binary symmetric channel and binary erasure channel with suitable examples and discuss about mutual information and its properties.

Or

16. Calculate the capacity of the channel with matrix

$$\begin{bmatrix} 0.7 & 0.1 & 0.2 \\ 0.3 & 0.1 & 0.6 \end{bmatrix}$$

17. For a symmetric (6, 4) linear block code the parity matrix is $P = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$:

   (i) Find all the possible valid code vectors.

   (ii) Draw the corresponding encoding circuit.

   (iii) Draw the syndrome calculation circuit.

Or

18. (a) Let V be the vector space over a field F. Prove that for any scalar 'a' in F, any vector v in V, $(-a). v = a . (-v) = -(a.v)$.

(4 marks)

(b) Show that $x^5 + x^3 + 1$ is irreducible over FG (2). (8 marks)

19. (a) What is viterbi algorithm ? For an L bit message sequence and an encoder of memory M, how does the algorithm proceed ? Comment on the advantages and disadvantages of viterbi algorithm.

(6 marks)

(b) Explain block length, number of message bits, minimum distance for BCH codes, giving examples.

(6 marks)

Or

20. Consider (5, 4, 2) convolution code with $g^{(1)} = 120, g^{(2)} = 210$ and $g^{(3)} = 110$:

(a) Draw the encoder block diagram.

(b) Find the generator matrix.

(c) Find codeword corresponding to (11101) using time domain and transfer domain approach.

[5 × 12 = 60 marks]

G 1748   (Pages : 2)   Reg. No..............................

                                                       Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronic and Communication Engineering

EC 010 704—ELECTRONIC INSTRUMENTATION (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Discuss about the errors in measurement.

2. Explain Active Transducers.

3. Explain TDM.

4. Briefly explain basic principles of PLC.

5. List the instruments used to measure flow.

                                                       (5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain about Units, Dimensions and standards.

7. Explain the selection criteria for transducers.

8. Explain Isolation Amplifier.

9. Write short note on Spectrum Analyzer.

10. Explain Ultrasonic flow meter.

                                                       (5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Explain in detail about static and Dynamic characteristics of instruments.

                                Or   **Turn over**

12. Discuss about instrument calibration with suitable example.

13. Explain any two opto electrical type tranducers.

<div align="center">Or</div>

14. Write short notes on :
    - (i) Proximity sensor.   (6 marks)
    - (ii) Strain gauge.   (6 marks)

15. With block diagram, Explain electrical telemetering system.

<div align="center">Or</div>

16. Explain with neat circuit diagram :
    - (i) Wheastone bridge.   (6 marks)
    - (ii) Owen's bridge.   (6 marks)

17. Explain the various functional units in a DSO with the help of a block diagram.

<div align="center">Or</div>

18. Explain any two recording instrument. Also explain the specifications that should be considered while selecting a recording instrument.

19. Discuss about the various flow measuring instruments.

<div align="center">Or</div>

20. Explain the three types of dynamometer to measure torque.

<div align="right">(5 × 12 = 60 marks)</div>

G 1761

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronics and Communication Engineering

EC 010 705—EMBEDDED SYSTEMS (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. List the levels in embedded computing system design.

2. Define cyclomatic complexity of the code segment.

3. Draw the CAN data frame format.

4. What is real time and real time clock ?

5. Why does any processor need interrupt handler ?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain the application of embedded system in the field of biomedical engineering.

7. Compare compiler and assembler.

8. Connect a 32K × 8 data and 512 × 8 program memory to 8051. Draw the connection diagram.

9. Write a note on timers.

10. What is Task : Spawn, suspension, resumption, delay ?

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. Discuss the various design issues in embedded system design.

Or

12. With suitable example, explain the application of embedded systems in consumer electronics.

Turn over

13. Explain the various techniques by which the program could be optimized with an example for each.

Or

14. Write an embedded C program that reads data from P1 and send its MSB bit to P 0.7 while simultaneously generating two square waves, one of 5 kHz and another of 25 kHz on pin P 0.1 and P 0.2. Assume XTAL = 22 MHz.

15. Give interrupt vector table and discuss about the different interrupts in 8051.

Or

16. With the help of state transition graph and control word formats explain how data transaction is taking place using I²C bus.

17. Briefly discuss the matrix keyboard interfacing with block diagram and C program.

Or

18. Explain the following :

    (i) Interfacing of a DC motor.   (6 marks)

    (ii) Position control system design.   (6 marks)

19. Discuss briefly on multitasking RTOS with involving priority level switching and the co-operative scheduling mechanism.

Or

20. Explain the need for memory management.

[5 × 12 = 60 marks]

G 1795

Reg. No............................

Name...............................

B.TECH. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Branch : Electronics and Communication Engineering

EC 010 706 L03—DIGITAL IMAGE PROCESSING—(Elective II) (EC)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Define Shannon's sampling theorem.

2. State any three properties of 2D-DFT.

3. What is histogram equalization ?

4. Explain point processing.

5. Give the classification of image data compression techniques.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Describe how a digital image can be obtained from an analog image.

7. Explain the properties of KL transform.

8. Explain the functions of smoothing and sharpening filters.

9. How an image can be segmented using adaptive thresholding ? Explain.

10. Explain the optimality conditions for VQ.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. (a) What is quantization ? How is it used in digitizing an image. (6 marks)

   (b) Explain how aliasing can be eliminated while digitizing bandlimited images. (6 marks)

Or

Turn over

(a) Derive the expression for 2D sampled signal.   (6 marks)

(b) Differentiate gray-scale and color image representation.   (6 marks)

(a) Perform 2D-DFT transformation of the following matrix :

$$\begin{bmatrix} 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & -1 \\ -1 & 1 & -1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}.$$

(8 marks)

(b) Give the representation of Walsh-Hadamard transform for N = 4.   (4 marks)

Or

Compute the basis of KL transform for the input data : $X_1 = (4, 4, 5)^T$, $X_2 = (3, 2, 5)^T$, $X_3 = (5, 7, 6)^T$, $X_4 = (6, 7, 7)^T$.

Explain the following point operations, giving suitable examples :

   (i)   Clipping.   (ii)   Digital negative.

   (iii) Thresholding.   (iv)   Range compression.

(4 × 3 = 12 marks)

Or

(a) Explain median filtering and homomorphic filtering with appropriate examples.   (8 marks)

(b) Show how contrast stretching is done using historgram.   (4 marks)

(a) Discuss edge linking techniques used for boundary detection.   (7 marks)

(b) How Hough transform can be used to detect lines in an image ?   (5 marks)

Or

(a) Explain the Ostu's method for image thresholding.   (9 marks)

(b) What is the basic formulation for region based segmentation ?   (3 marks)

(a) Explain the steps followed in dictionary based coding.   (5 marks)

(b) Explain the encoder operation of LZW dictionary algorithm for the input sequence :

   Wabba ♭ Wabba ♭ Wabba ♭ Woo ♭ Woo ♭ Woo ♭ Woo.

   Assume that the alphabet for the source is {♭, a, b, o, W}.

(7 marks)

Or

(a) Show that average codelength of arithmetic code can be made arbitrarily close to entropy, as blocklength is increased sufficiently. ·

· (3 marks)

(b) A source with alphabet S = {a, b, c, d} having an equiprobable distribution is encoded using arithmetic coding. If the block length is 3, obtain encoded binary string for the sequence "abbcacdabcad".

(9 marks)