G 1039 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. List the process steps used in IC fabrication.
2. List the difference between PMOS and NMOS.
3. Draw the stick diagram for NOT gate.
4. Draw the Bi-CMOS layout structure.
5. List the difference between ASIC *vs.* FPGA.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Write a note on chemical vapour deposition.
7. Describe Junction isolation and Dielectric isolation.
8. With neat CMOS structure explain latch up in CMOS.
9. Realize the following Boolean equation using transmission gates : $f = ab + abc$.
10. Design NOR gate using CMOS technique and draw the stick diagram for the same.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. With neat diagram, explain X-ray lithography.

Or

12. Elaborate with each and every steps of NMOS IC fabrication flow.

Turn over

13. Explain monolithic diodes and Schottky diodes with neat figure.

Or

14. Describe NMOS enhancement mode operation along with its characteristic curve.

15. With neat figure, explain each and every fabrication steps of CMOS Technology.

Or

16. Design and explain NOR-4-bit shifter.

17. With neat figure, explain CMOS sequential SR flip-flop and JK flip-flop.

Or

18. Discuss about BiCMOS Technology.

19. Describe about GaAs fabrication Technology.

Or

20. Write a short note on :

    (a) PLA.

    (b) FPGA.

(5 × 12 = 60 marks)

G 1051

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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 the terms : Amount of information, Entropy.
2. What do you mean by Optimal Codes ?
3. Write a note on Binary Symmetric Channel.
4. What is Group ? What are the conditions to be satisfied ?
5. Draw the diagram of a ½ convolutional encoder with memory order 3, whose impulse responses are given as $g^{(0)} = [1011]$, $g^{(1)} = [1111]$.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain the different types of entropy.
7. What is Data Compression ? Explain its significance.
8. What is channel capacity ? Mention the properties of channel capacity.
9. Explain the construction of Galois field.
10. Briefly explain Hamming Codes.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain mutual information. Discuss the relationship between Entropy and Mutual information.

Or

12. Explain the following :—

(a) Relative Entropy.

(b) Information rate.

(c) Efficiency of channels.

13. What is "Kfraft Inequality" in source coding ? Explain. Prove this inequality.

Or

14. Explain the following :—

(a) Arithmetic Coding.

(b) Elias Coding.

(6 + 6 = 12 marks)

15. State Shannon-Hartley theorem. Derive the expression for channel capacity of a Gaussian channel.

Or

16. (a) Write a note on Gaussian channel.

(b) What do you mean by symmetric channel ?

(c) Explain zero error code.

(4 + 4 + 4 = 12 marks)

17. (a) What is Linear Block Codes ? Discuss the capabilities of a linear block code.

(b) Write a note on Vector spaces.

(9 + 3 = 12 marks)

Or

18. (a) Discuss the encoding of an (n, k) block code, showing all the relevant matrices and their properties.

(b) What is minimum distance of a block code ? Give its significance.

19. Explain the following :—

(a) Turbo codes.

(b) Cyclic code.

(c) BCH code.

(4 + 4 + 4 = 12 marks)

Or

20. Explain the Viterbi algorithm for decoding of convolutional codes.

[5 × 12 = 60 marks]

G 1063 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. Dominant mode is propagated through a waveguide of breadth 10 cm at frequency of 2.5 GHz. Find the cut-off wavelength, phase velocity, and guide wavelength.
2. A reflex klystron operates under the following condition :

   V_0 = 600V, L = 1mm, e/m = 1.759×10^{11}, f_r = 9 GHz. A tube is oscillating at f_r at the peak of the n = 2 mode. Assume that the transit time through the gap and beam loading can be neglected. Find the value of the repeller voltage.
3. Write a equivalent circuit of a PIN diode and explain its operation.
4. A transmission line has a characteristic impedance of $50 + j\ 0.01\ \Omega$ and is terminated in a load impedance of $73 - j\ 42.5\ \Omega$. Calculate the voltage standing wave ratio.
5. Draw the structure of a microstrip line and briefly explain its operation.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Write a block diagram of a microwave system and briefly explain each block and also state any four applications of microwaves.
7. Draw the schematic diagram of a reflex klystron oscillator, and explain its operation.
8. With the doping profile, explain the principle of operation of IMPATT diode.
9. Explain the procedure of measurement of microwave power using Bolometer bridge.
10. Explain how Monolithic Microwave Integrated Circuits (MMIC) is grown on a substrate. Also state the advantages offered by MMIC's over discrete circuits.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Draw the structure of a Magic-Tee. Explain its properties and derive the S-matrix for the same.

    (b) Explain the principle of operation of a Faraday-rotation isolator.

Or

12. (a) State and prove Symmetric property of an S-matrix.

    (b) Draw the structure of a four-port circulator and explain its principle of operation.

13. (a) Draw the schematic diagram of a four-cavity klystron amplifier and explain the principle of operation.

    (b) What are the characteristics of a two-cavity klystron amplifier ?

Or

14. What are the classifications of magnetron oscillator ? Draw the schematic diagram of a cylindrical magnetron and explain its principle of operation.

15. (a) Write the equivalent circuit for a parametric amplifier and explain me circuit operation.

    (b) A TRAPATT diode has doping concentration $N_A = 2 \times 10^{15}$ cm^{-3} and a current density A = 20 kA/cm^2. Calculate the avalanche-zone velocity.

Or

16. (a) With the schematic diagram of n-type GaAs diode, explain the GLNN effect.

    (b) An n-type GaAs Gunn diode has Electron density $n = 10^{18}$ cm^{-3}. Electron density at lower valley $n_1 = 10^{10}$ cm^{-3}. Electron density at upper valley $n_u = 10^8$ cm^{-3}. At a temperature T = 300° K, determine the conductivity of the diode.

    (c) With the equivalent circuit, explain Schottky barrier diode.

17. Draw the block diagram for impedance measurement. Explain the procedure in detail.

Or

18. Draw the block diagram, for microwave frequency and VSWR measurements. Explain the procedure in detail.

19. Explain the various types of losses in microstrip lines in detail.

Or

20. (a) A microstrip line has $\epsilon_r = 5.23$, $h = 7$ mils, $t = 2.8$ mils. and $w = 10$ mils. Calculate the characteristic impedance Z_0 of the line.

    (b) Explain MMIC fabrication techniques in detail.

[5 × 12 = 60 marks]

G 1074 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electronics 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. Give the block diagram of an instrumentation system.
2. What are passive transducers ? Give *two* examples.
3. Draw the circuit of a Schering's bridge. Write the expression for R_x and C_x.
4. What is harmonic distortion ? Explain.
5. Explain any *one* method of torque measurement.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Write a note on static characteristics of instruments.
7. Discuss the principle and construction of LVDT.
8. Draw the circuit diagram of guarded Wheatstone's bridge. Compare it with the basic Wheatstone's bridge.
9. Discuss the working of swept TRF spectrum analyzer with a neat block diagram.
10. Explain the flow measurement principle with a neat diagram.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Define static error. How is it classified ? Explain.

Or

Turn over

12. Derive the dynamic responses of zero order, first order and second order instruments.

13. Write short notes on :

    (i) Hall effect sensor. (6 marks)

    (ii) Thin film sensor. (6 marks)

Or

14. Give a note on selection criteria for transducers. Add a note on strain gauge.

15. Draw an instrumentation amplifier. Explain its functioning. What are its characteristics ?

Or

16. Determine the current through the galvanometer for an unbalanced Wheatstone bridge.

17. Highlight the features of a distortion meter with a neat block diagram.

Or

18. Discuss the basic principles of data acquisition system.

19. Explain any *three* methods for the measurement of pressure.

Or

20. Write short notes on :

    (i) Measurement of temperature. (6 marks)

    (ii) Measurement of force. (6 marks)

[5 × 12 = 60 marks]

G 1084 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

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. Define an embedded system. Write a block diagram showing different units of the same.
2. Mention the advantages of writing embedded firmware in C.
3. What is bus arbitration ? Explain how bus arbitration is done in CAN.
4. Mention the use of watch dog timer in embedded systems.
5. Differentiate between counting semaphore and binary semaphore with an example.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain characteristics of embedded systems used bio-medical applications.
7. What is code optimization ? Explain any common method to optimize the code.
8. Write 8051 C program to transmit a string "Examination" serially through 8051 UART at 4800 baud.
9. Explain how the speed of DC motor is controlled using L293 motor driver IC.
10. Differentiate between process, task and threads with examples.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Mention the advantages of developing embedded system on SoC. Give an example for SoC embedded system with diagram.

(12 marks)

Or

Turn over

12. (a) Give detailed classification of embedded system. (6 marks)

(b) Write short notes on Processors in complex embedded systems. (6 marks)

13. (a) Illustrate different elements embedded C program with an example. (6 marks)

(b) Explain different activities in embedded system development process. (6 marks)

Or

14. Briefly explain embedded software development environment. (12 marks)

15. With timing diagram, explain how data transmitted between master and slave in I2C. Write diagram to show the connection between master and slave using I2C signals. (12 marks)

Or

16. (a) Write frame format of CAN. Explain different fields in the same. (8 marks)

(b) Write short notes on timer and counting devices. (4 marks)

17. (a) Describe different activities to be followed to interface ADC. (6 marks)

(b) With C program explain stepper motor interfacing. (6 marks)

Or

18. (a) With block diagram, explain interfacing of DAC. (6 marks)

(b) With block diagram, explain parallel port interfacing with LCD controller. (6 marks)

19. (a) With state transition diagram, explain different states of a task. (6 marks)

(b) What is the use of Pipe ? Describe the use of pipes in multi-tasking applications. (6 marks)

Or

20. (a) What is the use of message queue? Describe the use of message queues in multi-tasking applications. (6 marks)

(b) Write short notes on interrupt routines in RTOS environment. (6 marks)

[5 × 12 = 60 marks]

G 1320 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electronics and Communication Engineering

MICROWAVE AND RADAR ENGINEERING (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *the questions.*
Each question carries 4 *marks.*

1. Compare transmission lines and waveguides.
2. Explain the working principle of isolator.
3. Compare TWTA and Klystron Amplifier.
4. Explain basic principle of Microwave link with neat diagram.
5. Explain the modes of operation of BIT.
6. Give four advantages of FET over BJT.
7. Explain Doppler effect.
8. Write short note on Satellite navigation.
9. Write technical note on LORAN.
10. Explain different field regions of antenna.

(10 × 4 = 40 marks)

Part B

Answer **all** *the questions.*
Each question carries 12 *marks.*

11. With neat diagram explain the construction ,working of E-plane Tee, Magic Tee and Directional coupler. Derive its S matrix.

Or

12. State and derive all properties of S matrix.
13. Explain construction, principle of operation and working of reflex klystron with necessary diagram.

Or

Turn over

14. Explain construction, principle of operation and working of Travelling wave tube with necessary diagram.

15. Explain the principle of GUNN diode as an oscillator and amplifier.

Or

16. Explain construction, principle of operation and working of TRAPATT diode with necessary diagram.

17. Derive Radar range equation. Explain the limitations of this equation.

Or

18. Write the block diagram of FM-CW radar. Explain each block briefly.

19. Write the block diagram of Block diagram a simple digital MTI signal processor. Explain each block briefly.

Or

20. Explain construction, principle of operation and working of :

    (a) Log periodic dipole array. (6 marks)

    (b) Yagi-uda antenna. (6 marks)

[5 × 12 = 60 marks)

G 1331 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

OPTICAL FIBRE COMMUNICATION SYSTEMS (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Define critical angle and total internal reflection.
2. What is V number ? Write its importance.
3. Differentiate SI fibre and GI fibre.
4. Write short note on optical fibre connectors.
5. What is the principle of APD ?
6. Write working of PMTs.
7. Differentiate WDM and TDM techniques.
8. What are the requirements of optical amplifiers ?
9. Explain the importance of fibre attenuation measurements.
10. Describe any one application of fibre optic system.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain the terms with necessary equations and figures :
    (a) Numerical aperture. (b) V number.
    (c) Index profile. (d) Total internal reflection.

Or

12. What is V number ? Derive V numbers for different types of optical fibres.

Turn over

13. Explain the characteristics of single mode and multimode fibres and compare SI and GI fibres in detail.

Or

14. Explain the splicing techniques in detail with necessary sketches and equations.

15. Describe with help of neat diagrams, the construction, principle of working and characteristics of PIN diode.

Or

16. Explain the construction and working of any two photo detectors in detail.

17. Explain the principle of an optical communication system.

Or

18. Explain Transceiver requirements for optical networks in detail.

19. Explain measurement of dispersion and bandwidth of an optical fibre in detail.

Or

20. Discuss the applications of fibre optic systems.

(5 × 12 = 60 marks)

G 1112 (Pages : 2) Reg. No.....

Name.....

B.TECH DEGREE EXAMINATION, MAY 2015

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. Distinguish between a raster and a vector image.
2. List the properties of 2D-Discrete Fourier Transformation.
3. Write similarity and difference between Harmard and Walsh Transformation.
4. Write the advantage and disadvantage of Block processing.
5. The Prewitt edge detector is a much better operator than the Roberts operator why ? (Give the matrix.)

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Write and explain image classification.
7. Compute the 2D-Descret Fourier Transformation of the 4 × 4 gray scale image as given below :

$$f(x, y) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}.$$

8. Considering the following image segment Based on histogram segment the image into 2 regions.

$$\begin{bmatrix} 128 & 128 & 128 & 64 \\ 64 & 64 & 8 & 128 \\ 64 & 64 & 32 & 32 \\ 64 & 8 & 8 & 8 \end{bmatrix}.$$

Turn over

9. Giving the broad classification of Image enhancements explain the techniques used in enhancement.

10. Explain lossless and lossy compression with examples.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain different Image file format (any 3).

Or

12. Explain Concepts of Quantization and Resolution of an Image.

13. Prove that the inverse 2D Fourier Transformation of the 2D Fourier Transformation of $f(m,n)$ is $f(-m,-n)$.

Or

14. Explain 2D- Discrete-Fourier Transform.

15. Derive equations for Spatial domain High-pass filtering *or* image sharpening.

Or

16. Under non-linear gray level slicing explain logarithmic, exponential and power law transformation.

17. Explain Global Thresholding, Adaptive thresholds and Histogram-based thresholding selection in image segmentation.

Or

18. Explain region Splitting and merging in image segmentation.

19. Explain different modes of JPEG standard.

Or

20. Explain the basics of Fractal under wavelet Based Image compression.

(5 × 12 = 60 marks)

19. (a) Explain viterbi decoding technique with suitable example. (8 marks)

(b) What is Hard and soft decision decoding ? Explain with example. (4 marks)

Or

20. (a) Explain with suitable example sequential decoding procedure used in convolution code decoding. (6 marks)

(b) Briefly explain the coding and inter leaving in CD digital audio system. (6 marks)

[5 × 12 = 60 marks]

G 1343

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electronics and Communication Engineering

INFORMATION THEORY AND CODING (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What are the differences between source coding and channel coding ? Explain with suitable examples.
2. Show that the Entropy of the extension S^n, of the Zero memory is 'n' times the Entropy of the original source.

   $H(S^n) = n\,H(S)$.
3. State and explain Kraft-Mc Millan inequality.
4. Assuming that a PSTN has a bandwidth of 3000 Hz and a typical S/N ratio of 20 db, determine the maximum data rate that can be achieved.
5. Briefly explain Arithmetic coding with suitable examples.
6. What are the advantages of RS codes ? Explain its importance in communication.
7. In a (7, 4) cyclic code the generator polynomial is given by $g(x) = 1 + x + x^3$. Find the generator matrix G.
8. With block diagram discuss Meggit decoder.
9. Explain how Burst error can corrected in the communication system.
10. What is AQR ? Explain any one method of ARQ.

(10 × 4 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Show that the entropy attains its maximum value when all the symbols become equiprobable. (8 marks)

(b) Define the following terms with refers to channel :

(i) Channel capacity.

(ii) Efficiency.

(iii) Information rate.

(iv) Redundancy. (4 marks)

Or

12. (a) Explain the properties of mutual information. (8 marks)

(b) Briefly explain the trade-off between the bandwidth and signal to noise ratio. (4 marks)

13. (a) State and explain Shannon-Hartley law and also prove for upper limit of this law. (7 marks)

(b) Obtain an expression for channel capacity of a Binary Symmetric Channel. (5 marks)

Or

14. (a) For the JPM shown below find H (A), H (B), H (A/B), H (B/A) and I (A,B).

$$P(A.B) = \begin{bmatrix} 0.2 & 0 & 0.2 & 1 \\ 0.1 & 0.01 & 0.01 & 0.01 \\ 0 & 0.02 & 0.02 & 0 \\ 0.04 & 0.04 & 0.01 & 0.06 \\ 0 & 0.06 & 0.02 & 0.2 \end{bmatrix}.$$

(b) In a channel prove that $H(AB) = H(A) + H(B) - I(AB)$. (8 marks)

15. (a) A source has Seven symbols with probabilities as follows : (4 marks)

Symbols	Probabilities
S1	0.4
S2	0.2
S3	0.1
S4	0.1
S5	0.1
S6	0.05
S7	0.05

Obtain Huffman code ; find its efficiency and redundancy.

(i) Keeping added symbols as high as possible in the subsequent levels.

(ii) Keeping added symbols as low as possible in the subsequent levels when equal probabilities are there ?

Comments on the results. (8 marks)

(b) Explain the role of ZIP coding in communication. (4 marks)

Or

16. (a) A source has seven symbols with probabilities is given by :

$S = \{S1, S2, S3, S4, S5, S6, S7\}$

$P = \{0.25, 0.25, 0.125, 0.125.0.125.0.0625.0,0625\}$

Obtain Shannon-Fano binary code. Find efficiency and redundancy. (8 marks)

(b) Briefly discuss Huffman coding ? Is it optimum code ? (4 marks)

17. (a) Prove that in a(n, k) linear block code $CH^T = 0$. (4 marks)

(b) In a(7, 4) linear block code the generator matrix is given by :

$$G = \begin{bmatrix} 1000 & 1 & 1 & 1 \\ 0100 & 0 & 1 & 1 \\ 0010 & 1 & 1 & 0 \\ 0001 & 1 & 0 & 1 \end{bmatrix}$$

(i) Find the code word for all the messages.

(ii) Write the encoder and syndrome circuit.

(iii) How many errors it can detect and correct ?

(iv) If the received code is 1101111 is it a valid code ? (8 marks)

Or

18. (a) What are the advantages of cyclic codes ? (2 marks)

(b) In a(7, 4) cyclic code the generator polynomial is given by $g(x) = 1 + x + x^3$.

(i) Write encoder and decoder circuit.

(ii) Find the codeword for the message 1001 and show the contents of registers in all the steps. (10 marks)