B.L.D.E Association"s

VACHANA PITAMAHA DR.P.G.HALAKATTI

COLLEGE OF ENGINEERING AND TECHNOLOGY ,VIJAYPUR

LIBRARY AND INFORMATION CENTER

QUESTION PAPERS

1st,2nd & 4th SEMESTER

M.TECH

ELECTRONIC & COMMUNICATION

JUNE/JULY 2019

M.Tech INDEX

1sem M.Tech EC

CBCS SCHEME

USN | | | | | | | | | | |

16/17ECS14

First Semester M.Tech. Degree Examination, June/July 2019
Advanced Digital Communication

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain the gray mapped 8-PAM system with relevant mathematical expressions and signal space diagram. Draw baseband waveform for "111001010110". **(08 Marks)**

b. Describe continuous phase modulation system. How can it be converted to CPFSK? **(08 Marks)**

OR

2 a. Derive an expression for the minimum Euclidian distance of M-QAM system. **(08 Marks)**

b. With relevant mathematical expressions and signal space diagram, explain the working principle of MSK. **(08 Marks)**

Module-2

3 a. Explain Maximum a posteriori probability rule considering AWGN channel. **(08 Marks)**

b. What is principle of working of a correlation receiver? Explain in detail. **(08 Marks)**

OR

4 a. Consider a M-ary digital communication system where $M = 2^N$ and N is the dimension of signal space. Suppose that the M signal vectors lie on the vertices of a hypercube that is centered at the origin, determine average probability of a symbol error as a function of E_b/N_o. Given that all signal points are equally probable. **(08 Marks)**

b. With the help of block diagram, explain DPSK receiver. Comment on the performance of the system. **(08 Marks)**

Module-3

5 a. Describe M-ary orthogonal signaling with square law detection. **(08 Marks)**

b. Explain the FFT based multicarrier communication system. **(08 Marks)**

OR

6 a. With respect to M-ray PSK receiver, explain the carrier recovery and symbol synchronization. **(08 Marks)**

b. With the help of block diagram and mathematical expressions, explain working principles of phase locked loop. **(08 Marks)**

Module-4

7 a. Explain the optimum receiver for an AWGN channel with ISI using relevant mathematical expressions and block diagram. **(10 Marks)**

b. What is the drawback of linear equalizer? How is it overcome in fractionally spaced equalizer? **(06 Marks)**

OR

8 a. What is the need for adaptive equalizer? Explain adaptive decision feedback equalizer. **(10 Marks)**

b. Explain zero forcing algorithms with respect to adaptive linear equalizer. **(06 Marks)**

Module-5

9 a. Explain the analytical concept in generating DSSS signal with QPSK modulation. Draw all possible demodulation structures for DSSS system. **(08 Marks)**

b. Discuss slow and fast frequency hopping. **(08 Marks)**

OR

10 a. A DS spread spectrum system is used to resolve the multipath signal components in a two path radio signal propagation scenario. If the path length of the secondary path is 300 meters longer than that of direct path, determine the minimum chip rate necessary to resolve the multipath components. **(06 Marks)**

b. Describe two systems for acquisition of FH signal. **(10 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

16/17ECS/ESP151

First Semester M.Tech. Degree Examination, June/July 2019
Advanced Computer Networks

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Write a short note on the history of computer Network. **(08 Marks)**
b. Explain the cable television network with neat diagram. **(08 Marks)**

OR

2 a. Bring out the difference between telephone network and computer network. **(04 Marks)**
b. What is digitization explain. **(04 Marks)**
c. Explain TDM with neat block diagram. **(08 Marks)**

Module-2

3 a. Explain 10 BASE T at physical layer. **(08 Marks)**
b. Explain space division switching **(08 Marks)**

OR

4 a. Write short note on virtual LAN's. **(08 Marks)**
b. What is packet switching, explain. **(04 Marks)**
c. Write a note on Multicasting. **(04 Marks)**

Module-3

5 a. Explain SONET with synchronization of packet from different source. **(08 Marks)**
b. Explain Dijkstra's Algorithm. **(08 Marks)**

OR

6 a. Explain Bellman ford algorithm. **(08 Marks)**
b. Explain ATM signaling and its features. **(08 Marks)**

Module-4

7 a. What is traffic management, explain the importance. **(08 Marks)**
b. Explain admission control in control of network. **(08 Marks)**

OR

8 a. Explain internet traffic modelling. **(08 Marks)**
b. What is signaling? Explain signaling semantics. **(08 Marks)**

Module-5

9 a. Explain congestion control. **(08 Marks)**
b. Explain rate congestion control. **(08 Marks)**

OR

10 a. Explain window congestion control. **(08 Marks)**
b. Explain open flow control. **(08 Marks)**

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II Sem M.Tech EC / EE

CBCS SCHEME

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18EMS21

Second Semester M.Tech. Degree Examination, June/July 2019
Optimal Control Theory

Time: 3 hrs. Max. Marks: 100

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain with example, static optimization and dynamic optimization. **(10 Marks)**

b. Define the following :
i) Control history
ii) State trajectory
iii) Admissible control
iv) Admissible trajectory
v) Optimal control law. **(10 Marks)**

OR

2 a. Explain the applications of the principle of optimality. **(10 Marks)**

b. What is optimal control system? Explain the state variable representation of systems. **(10 Marks)**

Module-2

3 a. Define calculus of variations. Explain the linearity of functional and closeness of function. **(10 Marks)**

b. With proper mathematical equations derive the recurrence relation of a dynamic programming. **(10 Marks)**

OR

4 a. Explain the principle of optimality in dynamic programming applied to a routing problem. **(10 Marks)**

b. Derive Hamilton – Jacobi – Bellaman's equation. **(10 Marks)**

Module-3

5 a. Derive Euler's equation for the functional $J(x) = \int_{t_0}^{t_f} g(x(t), \dot{x}(t), t)\,dt$ with fixed end points. **(10 Marks)**

b. Explain Piecewise smooth extremals. **(10 Marks)**

OR

6 a. Determine the smooth curve of a smallest length connecting point $x(0) = 1$, to line $t = 5$ where $J(x) = \int_0^5 \sqrt{1 + \dot{x}^2(t)}\,dt$ **(10 Marks)**

b. Explain the boundary condition problem with free final time. **(10 Marks)**

Module-4

7 a. Explain matrix Riccati equations. **(10 Marks)**

b. Explain Pontrygin's minimum principle and derive the necessary condition for constrained optimal control. **(10 Marks)**

OR

8 a. Explain state variable inequality constraints. **(10 Marks)**

b. Explain Linear tracking problems. **(10 Marks)**

Module-5

9 a. What are the conditions for singular intervals to exist? Explain in brief. **(10 Marks)**

b. Explain minimum fuel problem. **(10 Marks)**

OR

10 a. Mention different control problem considered while selecting a performance measure. Explain any one of them with an example. **(10 Marks)**

b. Explain minimum energy problem. **(10 Marks)**

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18ECS22

Second Semester M.Tech. Degree Examination, June/July 2019
Antenna Theory and Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain antenna performance parameters :
i) Radiation pattern ii) Directivity iii) Gain iv) Polarization v) Bandwidth. **(10 Marks)**

b. A voltage source of amplitude $V_g = (50 + j40)V$ and a source impedance $Z_g = 50\Omega$ is connected to an antenna having a radiation resistance $R_{rad} = 70\Omega$, loss resistance $R_{loss} = 1\Omega$ and reactance $jX = j25\Omega$. Calculate :
i. Radiation efficiency.
ii. Current through antenna circuit
iii. Real power input to the antenna
iv. Power radiated by the antenna
v. Power dissipated in the antenna. **(10 Marks)**

OR

2 a. Define polarization of antenna and explain the three types of polarizations. **(10 Marks)**

b. What is an ideal dipole? Derive an expression for electric and magnetic fields of an ideal dipole. **(10 Marks)**

Module-2

3 a. Explain pattern multiplication, obtain pattern multiplication for two collinear, half wave length spaced short dipoles. **(10 Marks)**

b. What is antenna synthesis? Explain Woodward–Lawson sampling method for line source shaped beam synthesis. **(10 Marks)**

OR

4 a. Derive an expression for normalized array factor for uniformly excited equally spaced linear array for 'N' elements. **(10 Marks)**

b. Explain the Tylor line source method for deriving the expressions for current distribution and half power beam-width. **(10 Marks)**

Module-3

5 a. Derie the expression for radiation resistance for a half wave dipole antenna. **(10 Marks)**

b. What is LPDA? Derive the design equations for LPDA. **(10 Marks)**

OR

6 a. With suitable expressions, explain axial mode Helical antenna. **(10 Marks)**

b. Explain the principles of frequency independent antennas and briefly explain spiral antennas. **(10 Marks)**

Module-4

7	a.	Explain the axisymmetric parabolic reflector antennas.	(10 Marks)
	b.	Explain the general feed model for reflector antennas.	(10 Marks)

OR

8	a.	Explain Gain calculations for reflector antennas.	(10 Marks)
	b.	Write a short notes on feed antennas used in practice.	(10 Marks)

Module-5

9	a.	Explain the classification of CEM for antenna and the method of moments.	(10 Marks)
	b.	Explain the Pocklington's integral equation.	(10 Marks)

OR

10	a.	Explain weighted residuals and the method of moments.	(10 Marks)
	b.	Derive the Kirchoff's network equations form integral equations.	(10 Marks)

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CBCS SCHEME

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18ECS23

Second Semester M.Tech. Degree Examination, June/July 2019
Error Control Coding

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define mutual information. Derive and explain the properties of mutual information. **(10 Marks)**

b. A discrete memory less source has alphabet of five symbols with their probabilities as given below :

Symbol	S_0	S_1	S_2	S_3	S_4
Probabilities	0.4	0.2	0.2	0.1	0.1

Compute Huffman code by placing composite symbol as high as possible and by placing composite symbol as low as possible. Also find the :
i) The average code word length
ii) The variance of the average code word for both of the cases. **(10 Marks)**

OR

2 a. For a set integers G = {0, 1, 2, - - - m – 1} where m is nay +ve integer, show that $(i \boxplus j) \boxplus k = i \boxplus (j \boxplus k)$ where $\boxplus$ denotes module in addition. **(08 Marks)**

b. Explain the construction of Galois field $G^F(2^m)$ a field F. **(08 Marks)**

c. Let V be a vector space over a field F.
Prove that for any C in F and any V in V $(-C)\cdot(V) = C\cdot(-V) = -(C\cdot V)$. **(04 Marks)**

Module-2

3 a. The syndrome of a (7, 4) linear code is given by :
$S_0 = r_0 + r_3 + r_5 + r_6$
$S_1 = r_1 + r_3 + r_4 + r_5$
$S_2 = r_2 + r_4 + r_5 + r_6$
Find the following :
i) Find the generator matrix draw the encoder circuit
ii) Draw syndrome circuit
iii) Find all possible code vectors
iv) How many errors can it detect and correct?
v) Detect and correct errors if r = 1001010. **(14 Marks)**

b. If C = DG is a valid code vector prove that $CH^T = 0$ where H^T is transpose of parity check matrix H. **(06 Marks)**

OR

4 a. Write a note on product codes and interleaved codes. **(10 Marks)**

b. Form the generator matrix of a second order reed Muller code RM (r = 2, m = 4) of length 16. What is the minimum distance of the code? **(10 Marks)**

Module-3

5 a. A (15, 5) binary cyclic code has a generator polynomial $g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$.
i) Draw the encoder block diagram
ii) Find the code polynomial for message polynomial $d(x) = 1 + x^2 + x^4$ in systematic form.
iii) Is $v(x) = 1 + x^4 + x^6 + x^8 + x^{14}$ is a code polynomial? If not find the syndrome of v(x). **(10 Marks)**

b. With a block diagram, explain the decoding operation of error trapping decoder for a(15, 7) cyclic code generated by $g(x) = 1 + x^4 + x^6 + x^7 + x^8$. **(10 Marks)**

OR

6 With a block diagram explain decoding circuit for (31, 26) cyclic Hamming code generated by $g(x) = 1 + x^2 + x^5$. If the above Hamming code is shortened by three digits. Draw and explain the decoding circuit for resultant (28, 23) shortened cyclic code. **(20 Marks)**

Module-4

7 a. Give the circuit for Galois field $GF(2^4)$ adder and multiplier (for multiplying $GF(2^4)$ by α^3) and explain their operation. What is requirement of these circuits? **(10 Marks)**

b. Give the important parameters and features of RS code. Give the encoding circuit for q-ray R - S code and explain the symbols used in the circuit. **(10 Marks)**

OR

8 a. Example with suitable diagram type-1 one step majority logic decoder error correction procedure. **(10 Marks)**

b. Draw and explain type-2, two step majority logic $g(x) = 1 + x + x^3$.

$$H = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}.$$ **(10 Marks)**

Module-5

9 a. For a rate $\frac{1}{2}$ convolutional encoder with a transfer function :

$G(x) = [1 + x^2 + x^3, 1 + x + x^2 + x^3]$, draw the encoder circuit and state diagram, hence evaluate the codeword produced by the input sequence 1 0 1 1 1. **(10 Marks)**

b. With a flow chart explain ZJ or stack algorithm. **(10 Marks)**

OR

10 a. Explain the steps involved in viterbi algorithm. **(06 Marks)**

b. Consider the convolutional encoder with $g(x) = [1 + x, 1 + x^2, 1 + x + x^2]$. If the received sequence v = [110, 110, 110, 111, 010, 101, 101]. Using Viterbi algorithm find the transmitted bit sequence. Assume that the codeword is transmitted over BSC channel. **(14 Marks)**

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CBCS SCHEME

18EMS242

USN

Second Semester M.Tech. Degree Examination, June/July 2019
Process Control Instrumentation

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. With a neat block diagram, explain the elements that make up the feedback path in a process control loop. **(10 Marks)**

b. With a neat block diagram, explain inverting and non inverting amplifier and also mention the characteristics of Op - amp. **(10 Marks)**

OR

2 a. With a neat block diagram, explain DAC using $\frac{R}{2R}$ Resistor Network. **(10 Marks)**

b. Briefly explain the Performance parameters of control system evaluation. **(10 Marks)**

Module-2

3 a. Explain the Operating principle of Baudan tubes, with a neat diagram. **(10 Marks)**

b. With a neat circuit diagram and waveform, explain sample and hold techniques. **(10 Marks)**

OR

4 a. With a neat block diagram, explain the operations of a smart sensor. **(10 Marks)**

b. Explain the sight glass method for direct liquid level sensing. **(10 Marks)**

Module-3

5 a. Derive and explain the Bernoulli equation. **(10 Marks)**

b. With a neat diagram, explain strain gauge sensor. **(10 Marks)**

OR

6 a. List and explain temperature measuring devices. **(10 Marks)**

b. List and explain the basic methods for heat transfer. **(10 Marks)**

Module-4

7 a. Briefly explain the humidity measuring devices. **(10 Marks)**

b. With a neat diagram, explain the working principle of synchronous motor. **(10 Marks)**

OR

8 a. List out and explain the viscosity measuring instruments. **(10 Marks)**

b. With a neat block diagram, explain the functions of central processing unit. **(10 Marks)**

Module-5

9 a. Explain the conditioning considerations of specific type of devices. **(10 Marks)**

b. Write a note on RTD. **(10 Marks)**

OR

10 a. Explain Continuous Control Modes. **(10 Marks)**

b. Explain the importance of PLC documentation. **(10 Marks)**

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18ECS251

Second Semester M.Tech. Degree Examination, June/July 2019

Multimedia over Communication Links

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List different types of multimedia networks. Explain any three networks in detail. **(10 Marks)**

b. Discuss the different types of multimedia applications. **(10 Marks)**

OR

2 a. Explain the meaning of key QoS parameters associated with circuit switching and packet switching. **(10 Marks)**

b. Explain the following terms:
i) Unformatted text
ii) Formatted text
iii) Hyper text **(10 Marks)**

Module-2

3 a. Discuss the PCM principles with signal encoding and decoding schematic. **(10 Marks)**

b. With the help of a neat diagram, explain audio/sound synthesizer. **(10 Marks)**

OR

4 a. Mention the main features of a DMS. **(04 Marks)**

b. With the help of a neat diagram, explain integrated management architecture for IP-Based Networks. **(08 Marks)**

c. Explain the multimedia operating systems. **(08 Marks)**

Module-3

5 a. With the help of neat block diagram, explain digital audio signal processing. **(06 Marks)**

b. Draw the block diagram of perceptual audio coder architecture. Explain in detail. **(08 Marks)**

c. Discuss the concept of absolute threshold of hearing. **(06 Marks)**

OR

6 a. Explain the schematic representation of temporal masking properties of the human ear. **(12 Marks)**

b. Explain the wavelet decompositions. **(08 Marks)**

Module-4

7 a. Explain the basic structure of the MPEG-1 audio encoder. **(06 Marks)**

b. Explain the basic DPCM/DCT encoder and decoder structure with a neat diagram. **(08 Marks)**

c. Explain the profiles and levels of MPEG-2 video. **(06 Marks)**

OR

8 a. Explain reference model for MPEG-2 DSM-CC. **(06 Marks)**

b. Discuss the MPEG-4 object based architecture. **(08 Marks)**

c. Explain system layer model of MPEG-4. **(06 Marks)**

Module-5

9 a. Discuss integrated packet networks. **(06 Marks)**

b. Explain the process of layered video coding. **(06 Marks)**

c. Explain the layer structure of a network based multimedia system. **(08 Marks)**

OR

10 a. With the help of a neat block diagram, explain the SRC. **(08 Marks)**

b. Discuss the multiplexing in ATM networks. **(06 Marks)**

c. Explain the video delay in ATM networks. **(06 Marks)**

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16/17ECS21

Second Semester M.Tech. Degree Examination, June/July 2019
Advanced DSP

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain the sampling rate conversion by a factor I/D with the help of block diagram and mathematical equations. **(10 Marks)**

b. Consider the DT signal $x(n) = \{1, \underset{\uparrow}{2}, 3, 4\}$, determine the up sampled version if, (i) I = 2 and (ii) I = 4. Sketch the signals. **(06 Marks)**

OR

2 a. Explain the process of FDM-to-TDM with the help of block diagram. **(08 Marks)**

b. Suppose the polyphase matrix for a three channel perfect reconstruction FIR QMF bank is,

$$P(z^3) = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 3 & 1 \\ 1 & 2 & 1 \end{bmatrix}.$$

Determine the analysis and the synthesis filters in the QMF bank. **(08 Marks)**

Module-2

3 a. Explain the principles of forward linear prediction and also realize the prediction filter. **(08 Marks)**

b. What are the properties of the Linear prediction error filters and explain any two of them. **(08 Marks)**

OR

4 a. Explain the Levinson-Durbin algorithm for solving the normal equations. **(10 Marks)**

b. Draw the block diagram of pipelined parallel processor for implementing the Schur Algorithm and explain it. **(06 Marks)**

Module-3

5 a. Explain the process of adaptive filtering to adaptive channel equalization in digital communication systems. **(08 Marks)**

b. Draw the block diagram of source encoder for a speech signal and explain it. **(08 Marks)**

OR

6 a. Explain the LMS algorithm for the use of a gradient method for solving optimum filter coefficients. **(08 Marks)**

b. Draw the block diagram for adaptive noise cancelling system and explain it. **(08 Marks)**

Module-4

7 a. Explain the Bartlett method for averaging periodograms. **(08 Marks)**

b. Explain Yule-Walker method for the AR model parameters. **(08 Marks)**

OR

8 a. Explain Welch method of averaging modified periodograms. **(08 Marks)**

b. Mention the computational requirements of non-parametric power spectrum estimates. **(08 Marks)**

Module-5

9 a. What are the applications of wavelets and explain it. **(08 Marks)**

b. Explain the uncertainty principle and time-frequency Tiling in Wavelet transform. **(08 Marks)**

OR

10 a. Explain the Haar scaling functions in Discrete Wavelet transform. **(06 Marks)**

b. Discuss the Daubechies wavelets. **(04 Marks)**

c. Explain triangular scaling function in discrete wavelet transform. **(06 Marks)**

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CBCS SCHEME

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16/17ECS23

Second Semester M.Tech. Degree Examination, June/July 2019
Wireless Communication

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain power decay with distance and shadowing. **(08 Marks)**
b. Bringout the importance of base band equivalent model with its representation. **(08 Marks)**

OR

2 a. Describe Rayleigh and Racian fading. **(08 Marks)**
b. Explain Delay spread and coherence bandwidth. **(08 Marks)**

Module-2

3 a. Explain Non-coherent detection in a Rayleigh fading channel. **(08 Marks)**
b. Explain the concept of Repetition coding in time diversity. **(08 Marks)**

OR

4 a. Explain Receive diversity in Antenna diversity. **(08 Marks)**
b. Briefly explain three approaches of frequency diversity. **(08 Marks)**

Module-3

5 a. What is Microdiversity? Explain five methods to combat small scale fading. **(10 Marks)**
b. Explain in brief macrodiversity and simulcast. **(06 Marks)**

OR

6 a. Explain the principle of combining diversity in detail. **(08 Marks)**
b. Describe in detail transmit diversity. **(08 Marks)**

Module-4

7 a. Explain Repetition coding with respect to AWGN channel. **(08 Marks)**
b. Describe AWGN capacity of continuous time AWGN channels. **(08 Marks)**

OR

8 a. Explain frequency selective channel with reference to LTI Gaussian channels. **(08 Marks)**
b. Discuss in detail the optimal power allocation "water filling" strategy for the OFDM systems. **(08 Marks)**

Module-5

9 a. Explain MIMO based system architecture with block diagram. **(08 Marks)**
b. Describe space time coding. **(08 Marks)**

OR

10 a. With block diagram, explain STBC- OFDM system. **(08 Marks)**
b. Write note on advantages and applications of MIMO. **(08 Marks)**

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16/17ECS22

Second Semester M.Tech. Degree Examination, June/July 2019
Error Control Coding

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Construct the group under modulo-6 addition and modulo-3 multiplication. **(06 Marks)**

b. Define the following term:
(i) Group (ii) Field. **(03 Marks)**

c. Brief out the following:
(i) Characteristics of field. (ii) Properties of field. **(07 Marks)**

OR

2 a. Consider the primitive polynomial $P(z) = 1 + z + z^4$ over GF(2). Display the polynomial and vector representation of each element. **(08 Marks)**

b. Solve for x and y from the following linear equations over $GF(2^4)$:
$x + \alpha^7 y = \alpha^2$; $\alpha^{12} + \alpha^8 y = \alpha^4$ **(08 Marks)**

Module-2

3 a. Consider a systematic (8, 4) code whose parity check equation are $V_0 = \mu_1 + \mu_2 + \mu_3$, $V_1 = \mu_0 + \mu_1 + \mu_2$, $V_2 = \mu_0 + \mu_1 + \mu_3$ and $V_3 = \mu_0 + \mu_2 + \mu_3$ where μ_0, μ_1, μ_2 and μ_3 are message digit and V_0, V_1, V_2 and V_3 are parity check digit.
Find (i) The generator matrix
(ii) The parity check matrix for the code.
(iii) Show that analytically the minimum distance is 4. **(08 Marks)**

b. Write a node on Reed-Muller code. **(08 Marks)**

OR

4 a. For a systematic (6, 3) linear block code, the Parity matrix 'P' is given by, $P = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$.
(i) Construct the standard array table for the codewords.
(ii) If the received bit pattern $r = [1\,0\,1\,1\,0\,0]$, determine the syndrome and draw the circuit. **(10 Marks)**

b. Explain product code and interleaved code. **(06 Marks)**

Module-3

5 a. 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 code word for message 1 0 1 1 and show register contents for all steps.
(iii) From given g(x) obtain generator matrix.
(iv) If 1 0 1 0 1 1 0 is the received code, is it valid? **(12 Marks)**

b. Show that the generator polynomial g(x) of an (n, K) cyclic code is a factor of $X^n + 1$. **(04 Marks)**

OR

6 a. With the help of Meggit decoder diagram, explain the general decoder operation for (n, K) cyclic code. **(08 Marks)**

b. Write note on shortened cyclic codes with example. **(08 Marks)**

Module-4

7 a. Prove that t-error correcting BCH code indeed has a minimum distance of at least (2t+1). **(10 Marks)**

b. Explain decoding steps in RS code. **(06 Marks)**

OR

8 a. Discuss the type-II one step majority logic decoding. **(08 Marks)**

b. Explain the iterative algorithms for finding the error location polynomial $\sigma(X)$ in BCH codes. **(08 Marks)**

Module-5

9 a. Draw the block diagram of binary rate $R = \frac{2}{3}$ non-systematic feed forward convolution codes with memory order m = 1. If μ^1=(1 0 1) and μ^2=(1 1 0). Compute the output vector V. **(10 Marks)**

b. Explain the distance properties of convolution codes. **(06 Marks)**

OR

10 a. In a (2, 1, 3) convolution encoder, the impulse response is given by $g^0 = 1\ 0\ 1\ 1$ and $g^1 = 1\ 1\ 1\ 1$.

(i) Draw the encoder circuit.

(ii) For the message $\mu = [1\ 0\ 1\ 1\ 1]$ find the codeword. **(10 Marks)**

b. Explain Zj (slack) sequential decoding. **(06 Marks)**

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CBCS SCHEME

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18CAE251

Second Semester M.Tech. Degree Examination, June/July 2019
Design Optimization

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain briefly about engineering design versus engineering analysis. **(06 Marks)**

b. Mention any four different applications of optimization. **(04 Marks)**

c. Determine the maximum and minimum value of the function. **(10 Marks)**

OR

2 a. Write classification of optimization problem. **(05 Marks)**

b. Write example of engineering design optimization in industry. **(05 Marks)**

c. Use simplex method to solve the given LPP.

Max $Z = 5x_1 + 3x_2 + 2x_3$

Subjected to $2x_1 + 6x_2 - x_3 \leq 4$

$-x_1 + 5x_2 - 3x_3 \leq 1$

$5x_1 + x_2 - 6x_3 \leq 3$

and $x_1, x_2, x_3 \geq 0$. **(10 Marks)**

Module-2

3 a. Explain Lagrange multiplier theorem. **(10 Marks)**

b. For the following function, calculate the gradient vector and the hessian matrix the point (1, 2) : $f(x) = x_1^3 + x_2^3 + 2x_1^2 + 3x_2^2 - x_1x_2 + 2x_1 + 4x_2$. **(10 Marks)**

OR

4 a. Calculate the gradient and Hessain of following quadratic form

$$F(x) = \frac{1}{2}(2x_1^2 + 2x_1x_2 + 4x_1x_3 - 6x_2^2 - 4x_2x_3 + 5x_3^2).$$ **(10 Marks)**

b. Explain any two of following concept :

i. Equality and inequality constraints

ii. Linear and non linear constraints

iii. Implicit constraints. **(10 Marks)**

Module-3

5 a. Write the dual of the following linear programming problem :

Maximize $f = 50x_1 + 100x_2$

Subject to $2x_1 + x_2 \leq 1250$

$2x_1 + 5x_2 \leq 1000$

$2x_1 + 3x_2 \leq 900$

$x_2 \leq 150$ where $h = 2$, $m = 4$

$x_1 \geq 0$ and $x_2 \geq 0$. **(05 Marks)**

b. Minimize $f = 20x_1 + 16x_2$
subject to $x_1 \geq 2.5$, $x_2 \geq 6$
$2x_1 + x_2 \geq 17$
$x_1 + x_2 \geq 12$
$x_1 \geq 0$, $x_2 \geq 0$. **(15 Marks)**

OR

6 Explain the following :
a. Optimization of multiple static loading
b. Transient simulation
c. Equivalent static load method
d. Combined optimization. **(20 Marks)**

Module-4

7 a. Explain active and in active constraints, with examples. **(10 Marks)**
b. A design project has two options A and B. Option A will cost \$280,000 and option B \$250,000. Annual operating and maintenance paid at the end of each year will be \$8000 for A and \$10,000 for B. Using the annual cost (AC) method of comparison with a 12 percent interest rate, which option should be chosen if both have a 50-year life with no salvage? **(10 Marks)**

OR

8 a. Prove any local minimum of a convex function f(x) is global minimum. **(06 Marks)**
b. Derive sensitivities equations using Kuhn-Tucker conditions. **(14 Marks)**

Module-5

9 a. Explain ground –radar controlled missile chasing a moving target. **(08 Marks)**
b. Explain different types of multistage decision problems. **(08 Marks)**
c. With neat diagram explain the concept of sub-optimization in the context of the design of the water tank. **(04 Marks)**

OR

10 a. Explain computational procedure in dynamic programming. **(08 Marks)**
b. Small machine tool manufacturing company entered in to contract to supply 80 drilling machine at the end of the first month and 120 at end of the second month. The unit cost of manufacturing a drilling machine in any month is given by $\$(50x + 0.2x_2)$, where X denote the number of drilling machine manufactured in that month. If the company manufactures more units than needed in first month, there is an inventory carrying cost of \$8 for each unit carried to the next month. Find the number of drilling machine to be manufactured in each month to minimize the total cost. Assume that the company has enough facilities to manufacture up to 200 drilling machines per month and that there is no initial inventory. Solve that problem as a final value problem. **(12 Marks)**

IV Sem M.Tech EC/EE

CBCS SCHEME

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16/17ECS41

Fourth Semester M.Tech. Degree Examination, June/July 2019
Wireless Broadband LTE4G

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Draw a Original network architecture for LTE radio protocols, explaining the LTE standardization phases. **(08 Marks)**

b. Discuss any two projects that have been addressed in 3GPP during release 9 and 10 work. **(03 Marks)**

c. Use a schematic to explain what are the necessary specification numbers and protocols over the radio interface for LTE specifications. **(05 Marks)**

OR

2 a. Name the main elements of the basic system architecture configure with only E – UTRAN Access Network and describe their functions along with neat diagram. **(10 Marks)**

b. Explain the functioning of Interworking elements related to IP Multimedia Services Subsystem (IMS) architecture. **(06 Marks)**

Module-2

3 a. Explain Multicarrier principle with a suitable block diagram. **(08 Marks)**

b. Describe MIMO principle with two – by – two antenna configuration, with a neat diagram. **(08 Marks)**

OR

4 a. Distinguish between OFDMA and SC – FDMA systems in terms of technology. **(06 Marks)**

b. Explain LTE RACH preamble formats for FDD with neat diagrams. **(10 Marks)**

Module-3

5 a. Describe contention and non contention based Random access procedures with signaling diagrams. **(10 Marks)**

b. Explain physical layer parameter configuration , with a neat diagram. **(06 Marks)**

OR

6 a. With a neat block diagram, explain the overall LTE radio interface protocol architecture. **(08 Marks)**

b. Explain how uplink and downlink logical and transport channels are mapped to physical channels. **(08 Marks)**

Module-4

7 a. Explain RRC connection set up procedure with a neat diagram. **(07 Marks)**

b. Define Handover. Give complete diagram showing the importance of a X_2 interface in the intra LTE handover operation. **(09 Marks)**

OR

8 a. Enumerate the mobility management in Idle state by mentioning the S – Criterion that has to be fulfilled for cell selection. **(10 Marks)**

b. Bring out any six main differences between UTRAN and E – UTRAN mobility **(06 Marks)**

Module-5

9 a. Explain layer 2 functionalities for dynamic packet scheduling , link adaptation and HARQ management , with a neat diagram. **(08 Marks)**

b. With a simple illustration of DRX parameters, explain discontinuous transmission and reception. **(08 Marks)**

OR

10 a. What is meant by Link budget? Mention down line budget parameters for LTE with typical values. **(12 Marks)**

b. Discuss how Round trip time measurement is done in user plane latency. **(04 Marks)**

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16EMS422

Fourth Semester M.Tech. Degree Examination, June/July 2019
Digital System Design with FPGA

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the characteristics of discrete logic and programmable logic. **(10 Marks)**
b. Explain the different scripting language. **(06 Marks)**

OR

2 a. Explain in brief about VHDL and verilog HDL. **(06 Marks)**
b. Explain the types of simple programmable logic device. **(10 Marks)**

Module-2

3 a. With a neat flow diagram, explain the concurrent engineering process. **(10 Marks)**
b. Explain synchronous and asynchronous data transfer. **(06 Marks)**

OR

4 a. With a neat flow diagram. Explain Y-chart in relation to categorizing the different design abstraction level and design synthesis. **(10 Marks)**
b. Explain in brief about System In Package (SIP) and System On Chip (SOC). **(06 Marks)**

Module-3

5 a. Explain the following loop statements :
i) if-then-else ii) case-when iii) while-loop vi) for loop v) when-else. **(10 Marks)**
b. Write an VHDL code for one-bit half adder. **(06 Marks)**

OR

6 a. Write an VHDL code for four-to-one multiplexer using the if-then-else statement. **(08 Marks)**
b. Explain the coding style for VHDL. **(08 Marks)**

Module-4

7 a. With a neat diagram, explain digital IC testing. **(08 Marks)**
b. Write an VHDL code for unsigned addition. **(08 Marks)**

OR

8 a. With a neat diagram, explain analog IC testing. **(08 Marks)**
b. Write an VHDL code and test bench for 16 address × 8 data bit ROM. **(08 Marks)**

Module-5

9 a. Explain the types of DAC. With a net diagram. **(08 Marks)**
b. Write VHDL code for DAC controller. **(08 Marks)**

OR

10 a. With a neat diagram, explain CPLD control of thyristor. **(08 Marks)**
b. Explain the types of ADC, with a neat diagram. **(08 Marks)**

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16/17EMS41

Fourth Semester M.Tech. Degree Examination, June/July 2019
Industrial Control Technology – II

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain the Relay ladder logic controller with an example. **(08 Marks)**
b. Explain Motion control of CNC system with neat diagram. **(08 Marks)**

OR

2 a. What is Fuzzy logic? explain briefly about
i) Fuzzy sets ii) Fuzzyification iii) Defuzzification. **(08 Marks)**
b. Explain with a neat diagram the FPGA based Fuzzy logic controllers. **(08 Marks)**

Module-2

3 a. Explain PID controller software Design with a neat flowchart. **(08 Marks)**
b. Explain briefly the functions of batch process control system. **(08 Marks)**

OR

4 a. Briefly explain about i) Industrial Motherboards ii) Industrial Embedded computer. **(08 Marks)**
b. What are the industrial computer peripherals and explain their function. **(08 Marks)**

Module-3

5 a. Explain application layer, Data link layer and physical layer in CAN networks. **(08 Marks)**
b. Explain briefly about components of SCADA system. **(08 Marks)**

OR

6 a. Explain the benefits of industrial Ethernet Network. **(08 Marks)**
b. Explain the Four LAN Topology Network. **(08 Marks)**

Module-4

7 a. Give reasons why fast switches are becoming more popular in Ethernets. **(08 Marks)**
b. Discuss the Hardware and Software components of the Router. **(08 Marks)**

OR

8 a. Explain the types of Network bridges? **(08 Marks)**
b. Explain the specification and configuration of Network gateways. **(08 Marks)**

Module-5

9 a. Explain the Designs of Human – machine interactions. **(08 Marks)**
b. Explain the Human – Machine interfaces in SCADA system. **(08 Marks)**

OR

10 a. What is Data Transmission? Discuss bit serial and bit – parallel transmission. **(08 Marks)**
b. Illustrate the application of data transmission control circuit. **(08 Marks)**

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