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B.E. (Electronics Engineering) (Part - IV) (Semester - VII)
Examination, April - 2019

INFORMATION THEORY AND CODING TECHNIQUES

Sub. Code : 67526

Day and Date : Friday, 26 - 04 - 2019

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Use of scientific calculator is allowed.
 - 3) Assume suitable data if necessary.
 - 4) Figures to the right indicate full marks.

SECTION - I

Q1) Attempt any Three of the following (6 Marks each) [18]

- a) Prove the following relationship
 - i) $H(X, Y) = H(X/Y) + H(Y) = H(Y/X) + H(X)$
 - ii) $I(X; Y) = H(X) - H(X/Y) = H(Y) - H(Y/X)$
- b) State Shannon Channel Capacity Theorem. Prove that maximum Channel Capacity is given by, $C = \lim_{B \rightarrow \infty} C = 1.44 [S/N_0]$.
- c) What do you mean by joint and conditional entropy? Derive relation between joint and conditional entropies.
- d) A transmitter has an alphabet of four letters $[x_1, x_2, x_3, x_4]$ and the receiver has an alphabet of three letters $[y_1, y_2, y_3]$, The joint probability matrix is

$$P(X,Y) = \begin{bmatrix} y_1 & y_2 & y_3 \\ 0.25 & 0.1 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0.15 & 0.05 \\ 0 & 0.15 & 0.15 \end{bmatrix}$$

Calculate all the entropies.

P.T.O.

Q2) Attempt any Two of the following (8 Marks each).

[16]

- a) Consider a (6, 3) linear block code whose generator matrix is

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

- i) Find all the code vectors
 - ii) Find all the hamming weights and distances
 - iii) Find parity check matrix H
 - iv) Error detecting and correcting capability of this code
- b) Consider the (7, 4) Hamming code defined by the generator polynomial $g(x) = 1 + X + X^3$. The code word 1000101 is sent over a noisy channel, producing the received word 0000101 that has a single error. Determine the syndrome polynomial $s(x)$ for this received word. Find its corresponding message vector m and express m in polynomial $m(x)$.
- c) A discrete memory less source has five symbols X_1, X_2, X_3, X_4 and X_5 with probabilities $p(x_1) = 0.4, p(x_2) = 0.2, p(x_3) = 0.15, p(x_4) = 0.15$ and $p(x_5) = 0.1$.
- i) Construct Shannon fano Code and Huffman Code.
 - ii) Calculate code efficiency of both codes and compare the result with comment.

Q3) Attempt any Two of the following (8 Marks each)

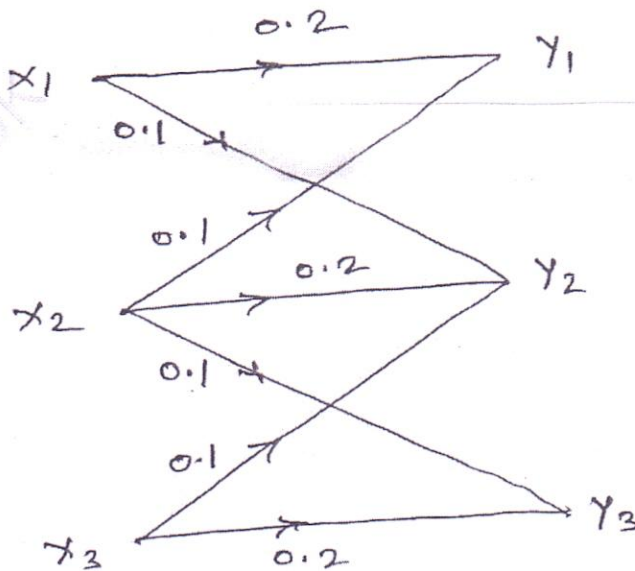
[16]

- a) Determine the expression of capacity of the following channel whose channel matrix is given by,

$$P(Y/X) = \begin{bmatrix} p & 1-p \\ 1-p & p \end{bmatrix}$$

- i) Draw channel diagram.
 - ii) If the sources are equally likely, find probability of output if $p = 0.7$
 - iii) Find capacity of channel for $p = 0.7$
- b) i) What is minimum distance? Explain how error detection and correction capabilities of block code are related to minimum distance.
- ii) What is entropy? Derive an expression for entropy.

- c) Find the mutual information for the channel shown in figure below - (fig-1)



(fig - 1)

SECTION - II

Q4) Write any three : [18]

- Determine generator matrix using (7, 4) cyclic code and generator polynomial $g(x) = 1 + X^2 + X^3$.
- Explain with circuit diagram error-correction in systematic cyclic code (Syndrome calculations).
- Construct all the elements of GF (8) using primitive polynomial $P(x) = x^3 + x + 1$ assuming that primitive elements of GF (8) is $\alpha = y$.
- With the help of net schematic, explain the operation of cyclic encoder and syndrome calculator for (n, k) cyclic code.

Q5) Write any two : [16]

- Design encoder and syndrome calculator for the (7, 4) cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using message vector (0101).
- Sketch and determine convolution encoder for 0001, 0111, 1000, 1101 messages and $V_1 = S_1 \oplus S_2$, $V_2 = S_2 \oplus S_3$, $V_3 = S_1 \oplus S_2 \oplus S_3$. Where V_1 , V_2 & V_3 are commutators and S_1 , S_2 , S_3 are outputs of shift registers. Also draw its code tree.
- What is coding? Explain characteristics of BCH and RS code.

Q6) Write any two :

[16]

- a) Find the generator polynomial for RS code using GF (2^3) for double error correction with primitive polynomial $x^3 + x + 1$. Also find code for (011, 001, 110).
- b) A rate 1/3 convolutional encoder has generating vectors as :
- $$g_1 = [100], g_2 = [111] \text{ and } g_3 = [101]$$
- i) Sketch the encoder configuration.
- ii) If the message sequence is 10110, determine the output sequence of the encoder using transform domain approach.
- iii) Draw code tree.
- c) Construct systematic (7, 4) cyclic code using generator polynomial $g(x) = 1 + x^2 + x^3$. Determine transmitted data vector for the received code vector (1011011) using syndrome decoding technique.

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B.E. (Electronics Engg.) (Semester - VII) (Revised)

Examination, May - 2019

EMBEDDED SYSTEM DESIGN

Sub. Code : 67527

Day and Date : Thursday, 02 - 05 - 2019

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Assume suitable data if necessary.
 - 3) Figures to the right indicate full marks.

SECTION - I

Q1) Answer any three of the following : [18]

- a) Explain the start & stop conditions of I2C serial bus communications.
- b) What is barrel shifter? Explain the use of LSL & LSR.
- c) Write ASM code to enable FIQ.
- d) Describe the instructions used to handle a subroutine call.
- e) Explain the instructions- CMN, BIC & UMULL with suitable examples.

Q2) Answer any two of the following. [16]

- a) Write ASM code to move block of 5 data words using post index method to update the pointers.
- b) Draw CPSR register format and explain its control field.
- c) Describe CAN serial bus.

Q3) Answer any two of the following : [16]

- a) Explain SPI bus along with its signals.
- b) What is interrupt latency? Explain IRQ and FIQ exceptions.
- c) Draw & explain I2C bus master transmitter mode with its format.

P.T.O.

SECTION - II

Q4) Attempt any three of the following : **[18]**

- a) Explain various types of resets used in LPC 2148.
- b) Describe with diagram the oscillator selection algorithm for LPC 2148.
- c) How power optimization can be achieved using power control block and what are the registers associated with power control?
- d) Explain with system memory map of LPC 214X series of microcontroller.

Q5) Attempt any two of the following : **[16]**

- a) Explain I/O ports of LPC 2148 with reference to pin connect block, pin function select register, I/O direction register, IOSET and IOCLR register.
- b) Explain the architecture of onchip UART0 port of LPC 214X.
- c) Explain with block diagram, the role of Memory Acceleration Module on LPC2148.

Q6) Attempt any two of the following : **[16]**

- a) Explain the role of pipe in inter task communication.
- b) Explain working mechanism followed by Mutex.
- c) State the different states of tasks and explain.



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B.E. (Electronics) (Semester - VII) Examination, May - 2019
BIOMEDICAL INSTRUMENTATION (Elective - I) (Revised)

Sub. Code : 67532

Day and Date : Thursday, 09 - 05 - 2019

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Digits to the right indicate full marks

SECTION - I

Q1) Attempt any THREE from following. [18]

- a) With neat sketch explain physiology of respiratory system.
- b) With labeled diagram explain the structure of neuron.
- c) Explain the following terms
 - i) Action potential
 - ii) Resting potential
- d) With neat sketch explain working of stethoscope. Mention different types of stethoscopes.

Q2) Attempt any TWO. [16]

- a) Give the classification of medical laboratory equipment. Explain any one therapeutic equipment.
- b) With anatomy of the human ear explain the conduction of sound in the hearing mechanism.
- c) Explain the block diagram of ECG machine.

Q3) Attempt any TWO. [16]

- a) With labeled diagram explain the central nervous system components. What are different biofeedbacks?
- b) List different specialized amplifier used in biomedical instrumentation. Explain any one in detail.
- c) Explain the different electrode used for recording of EMG signal.

P.T.O.

SECTION - II

Q4) Attempt any THREE from following. [18]

- a) Explain the use of thermistor and strain gauge for measurement of respiration rate.
- b) What are different safety standards applicable to medical instruments?
- c) What are different biological effect of X-ray on human body. Suggest necessary precautions.
- d) What is meant by evoked response ? Explain with example.

Q5) Attempt any TWO. [16]

- a) With neat sketch explain the functioning of motor unit in muscle fiber. Explain the characteristics of biopotential generated by muscle fiber.
- b) With neat sketch explain block diagram of X-ray machine.
- c) With neat sketch explain the working principle of ultrasound blood flow meter.

Q6) Attempt any TWO. [16]

- a) Explain ECG leads system with typical waveform for
 - i) Unipolar limb leads
 - ii) Bipolar limb leads
- b) Describe in detail the physiological effects of electric current on human body.
- c) Explain the photosensitive transducer used for measurement of blood pulse and blood oxygen.



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B.E. (Electronics Engg.) (Semester - VIII) (Revised)

Examination, May - 2019

MICROWAVE ENGINEERING

Sub. Code : 67777

Day and Date : Tuesday, 14 - 05 - 2019

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to right indicates full marks.
 - 3) Assume suitable data if necessary.

SECTION - I

Q1) Attempt any two of the following : [16]

- a) Derive TM mode field equations for rectangular waveguide.
- b) Explain with suitable equations and diagram E plane and H plane Tee
- c) Air filled rectangular waveguide having inside dimensions $a=8$ cm, $b=4$ cm operates in dominant mode TE_{10} mode Find:
 - i) Cut off frequency
 - ii) Group velocity of the waveguide at the frequency of 3.75 GHz
 - iii) Guided wavelength at same frequency

Q2) Attempt any two of the following : [16]

- a) With the help of schematic diagram explain operation of forward wave cross field amplifier
- b) What is re entrant cavity? Explain. Give its application.
- c) With the help of suitable diagram explain operation of hybrid T junction What are its applications?

Q3) Attempt any three of the following : [18]

- a) With suitable example explain MMIC fabrication process.
- b) Write note on plane wave propagation in shielded room
- c) Explain anechoic chambers and microwave clean rooms
- d) Write note on Microwave hazards

P.T.O.

SECTION - II

Q4) Attempt any two of the following : [16]

- a) Explain how tunneling action takes place in tunnel diode. What are its applications?
- b) Describe the operating principles with characteristics of the IMPATT diode.
- c) Explain three valley models for Inp diode'.

Q5) Attempt any two of the following : [16]

- a) Explain in detail procedure for measurement of VSWR with block diagram.
- b) Define attenuation and insertion loss. Explain substitution method for attenuation measurement.
- c) Explain reflectometer method for impedance measurement.

Q6) Attempt any three of the following : [18]

- a) Explain parabolic reflector and how gain of this antenna is determined
- b) Define and explain the terms
 - i) SWR
 - ii) Antenna gain
 - iii) Band width
 - iv) Directivity
- c) Explain various feed technique for parabolic reflector
- d) Explain horn antenna with all type of feeding methods



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**B.E. (Electronics Engineering) (Semester - VIII) (Revised)
Examination, May - 2019**

WIRELESS COMMUNICATION NETWORK

Sub. Code : 67778

Day and Date : Thursday, 16 - 05 - 2019

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Use suitable assumptions if required.
 - 3) Draw necessary figures on right side of answer sheet.

SECTION - I

Q1) Solve any three. [18]

- a) Explain the Challenges in wireless networking
- b) List out the types of dedicated physical and logical channels in GSM.
- c) Compare 2G and 3G wireless Networks.
- d) Explain the various types of Handoff processes available

Q2) Solve any two. [16]

- a) Explain the GSM system architecture with neat sketch.
- b) Compare between FDMA, TDMA, and CDMA.
- c) Explain the Signal processing in GSM.

Q3) Solve any two. [16]

- a) Draw and Explain the Frame structure for GSM.
- b) Differentiate Fixed and Dynamic channel assignment strategies.
- c) Explain in detail cell splitting and Sectoring. Define co-channel reuse ratio in detail.

P.T.O

Q4) Write a short note on any three.

[18]

- a) Wireless LAN
- b) Wireless transport layer security
- c) EDGE
- d) GPRS interfaces

Q5) Attempt any two.

[16]

- a) Explain Infra Red wireless network in detail.
- b) Draw and explain high speed circuit switched data(HSCSD) protocol architecture.
- c) Draw and Explain Wireless Datagram Protocol.

Q6) Attempt any two.

[16]

- a) Explain functions and components of Wireless Application Protocol (WAP) architecture.
- b) Explain with neat diagram Bluetooth Protocol.
- c) Draw and Explain architecture of IEEE 802.11 wireless LAN.



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**B.E. (Electronics) (Part - IV) (Semester - VIII) Examination,
May - 2019**

POWER ELECTRONICS & DRIVES

Sub. Code : 67779

Day and Date : Monday, 20 - 05 - 2019

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary.

SECTION - I

Q1) Solve any two of the following. [18]

- a) Draw the circuit diagram of three phase half wave controlled rectifier and derive the equation for V_{dc} and V_{rms} in the continuous conduction mode.
- b) A three - phase fully - controlled bridge converter is connected to three -phase a.c. supply of 400v, 50Hz and operates with a firing angle $\alpha = \frac{\pi}{4}$.

The load current is maintained constant at 10 Amp and the load voltage is 360V. Compute.

- i) Source inductance, L_s .
- ii) Load resistance, R'
- iii) Overlap angle, μ .
- c) Explain with different operating modes the operation of three phase semiconverter with RL load. Derive expression for average and rms load voltage for three phase semiconverter considering transformer leakage inductance $L_c = 0$.

Q2) Solve any two of the following. [16]

- a) Draw and explain in details 120° mode of conduction of three phase IGBT based inverter.
- b) What is the cause of harmonics in the inverter. Explain the harmonic reduction techniques of inverter.
- c) Explain different methods of voltage and frequency control of inverter.

P.T.O

Q3) Solve any two of the following. [16]

- What is the need of cycloconverter? Explain operation of bridge type single phase to single phase cycloconverter.
- Explain the single phase cycloconverter which divides the supply frequency by three.
- Explain methods of harmonic reduction in cycloconverter output.

SECTION - II

Q4) Solve any two. [16]

- Draw & explain Star - delta starter.
- A d.c. shunt motor takes a current of 50A on a 480v supply and runs at 840rpm. The armature resistance is 0.5Ω and the field resistance is 150Ω . A chopper is used to control the speed of the motor in the range of 500-1000rpm having constant torque. The on period of the chopper is 5ms. The field is supplied directly from 480v supply. Determine the range of frequencies of the chopper.
- Explain Types of 3 phase induction motors.

Q5) Solve any two. [16]

- State and explain selection criteria of a electric drive.
- Explain speed control of separately excited DC motor using single phase full controlled converter with appropriate waveform.
- Explain the variable frequency speed control of an induction motor.

Q6) Write note on any three. [18]

- Block diagram of Electric drive.
- Dynamic braking in D.C. Motor.
- Comparison of A.C. & D.C. drives.
- Stator voltage control technique used for speed control of induction motor.



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B.E. (Electronics) (Semester - VIII) Examination, May - 2019
HIGH PERFORMANCE COMPUTER NETWORK (Elective - II)

Sub. Code : 67786

Day and Date : Wednesday, 22 - 05 - 2019

Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Draw Diagram wherever necessary.

Q1) Attempt any two. [18]

- a) Explain with diagram 10 Base 5 and 10 Base 2 networks of IEEE (802.3) Ethernet network.
- b) Draw and explain frame format for IEEE(802.5) Token Ring.
- c) Draw and explain FDDI network.

Q2) Attempt any two. [16]

- a) Explain ISDN Addressing mechanism.
- b) Draw and explain ISDN services.
- c) Explain in detail SONET.

Q3) Attempt any two. [16]

- a) Draw and explain ATM cell Header for NNI.
- b) Explain ATM switching building blocks.
- c) Explain ATM signaling.

Q4) Attempt any two. [16]

- a) With neat diagram explain optical LANs.
- b) What is WDM? Explain WDM System with neat diagram.
- c) Explain Optical paths in detail.

P.T.O

Q5) Attempt any two.

- a) Explain with neat Diagram Data Transfer Phase in Frame Relay.
- b) With neat Diagram Compare X.25 and Frame Relay Protocol Stacks.
- c) Describe General CLLM Format for Congestion Control.

Q6) Write short note on any three.

- a) RSVP
- b) LAF Core Protocol Frame Format
- c) Frame Handler Operation
- d) Leaky Bucket



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**B.E. (Electronics) (Semester - VII) (Revised) Examination,
May - 2019**

IMAGE PROCESSING

Sub. Code : 67529

Day and Date : Tuesday, 07 - 05 - 2019

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to right indicate full marks.

Q1) Attempt any Four.

[20]

- a) Explain Gamma transformation used in Image processing.
- b) Explain types of distance metric used in Image processing.
- c) Explain image acquisition using single sensor.
- d) Draw a histogram for a image whose, gray values are in the range [0,7] shown in table.
- e) How image acquisition takes using sensor strip.

2	2	2	2	4	4	4	4
2	2	2	2	4	4	4	4
2	2	2	2	4	4	4	4
2	2	2	2	4	4	4	4
6	6	6	6	6	6	6	6
6	6	6	6	6	6	6	6
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Q2) Attempt any Two.

[16]

- a) Draw fundamental steps in digital image processing and explain their functions.
- b) Describe concept of image formation model.
- c) Describe different components used in image processing system.

P.T.O.

Q3) Attempt any Two.

[14]

- Explain Intensity level slicing and Bit plane slicing used in image processing.
- Explain logical operations used for image enhancement.
- Suppose that a 3 bit image of size 64×64 pixels has an intensity distribution are shown in tables, where the intensity levels are integer in the range $[0, 7]$. Draw histogram and equalized histogram for given image.

r_k	n_k
$r_0 = 0$	790
$r_1 = 1$	1023
$r_2 = 2$	850
$r_3 = 3$	656
$r_4 = 4$	329
$r_5 = 5$	245
$r_6 = 6$	122
$r_7 = 7$	81

Q4) Attempt any Four.

[20]

- What do you mean by sharpening of image? How it is done?
- Explain Unsharp masking and Highboost filtering.
- What is segmentation? Describe steps to do it.
- Describe order statistic filters.
- Describe edge models.

Q5) Attempt any Two.

[16]

- Describe Thresholding and Write an algorithm used for global Thresholding.
- Describe segmentation by region splitting and merging.
- Explain edge detection and various mask used for it.

Q6) Attempt any Two.

[14]

- Describe HSI color model.
- Describe RGB color model.
- How intensity to color transformations is done?

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