

Reg. No. :

**Question Paper Code : 91375**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Seventh Semester

Electronics and Communication Engineering

EC 2029/EC 708/10144 ECE 41 — DIGITAL IMAGE PROCESSING

(Regulation 2008/2010)

(Common to 10144 ECE 41 – Digital Image Processing for B.E. (Part-Time)  
Seventh Semester – ECE – Regulation 2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Compare RGB and HSI color image models.
2. Write the Kernel for 2D-DCT and how this lead to data compression.
3. What are the possible ways, for adding noise in images?
4. For the following image region, obtain the median filtered output.

|    |     |     |     |     |     |     |    |
|----|-----|-----|-----|-----|-----|-----|----|
| 72 | 55  | 33  | 65  | 32  | 30  | 21  | 12 |
| 15 | 20  | 3   | 5   | 18  | 21  | 65  | 30 |
| 35 | 40  | 34  | 255 | 200 | 17  | 51  | 87 |
| 0  | 255 | 20  | 100 | 101 | 87  | 59  | 42 |
| 65 | 32  | 18  | 78  | 86  | 50  | 21  | 11 |
| 30 | 11  | 8   | 97  | 108 | 129 | 151 | 2  |
| 68 | 72  | 19  | 37  | 14  | 27  | 50  | 64 |
| 36 | 202 | 111 | 18  | 26  | 192 | 23  | 63 |

5. What is Lagrange multiplier? Where it is used?
6. Why blur is to be removed from images?
7. How edges are linked through Hough transform?
8. State the problems in "region splitting and merging" based image segmentation.
9. What is a shift code? How this is used in image analysis?
10. Write the performance metrics for image compression.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write the elements of an image processing system and its working. Describe the working principle of operation of vidicon camera. (8)
- (ii) How do you obtain the 2D-DFT for a digital image? Discuss about the time complexities. (8)

Or

- (b) (i) What is visual perception model and explain. How this is analogous to a DIP system. (8)
  - (ii) When do you prefer non-uniform sampling and quantization? Justify. (8)
12. (a) (i) Write the salient features of image histogram. What do you infer?(8)
  - (ii) Explain any two techniques for color image enhancement. (8)

Or

- (b) (i) How do you perform directional smoothing, in images? Why it is required? (8)
  - (ii) What is geometric mean and harmonic mean with reference to an image? What purpose do they serve for image analysis? Discuss. (8)
13. (a) (i) Describe how image restoration can be performed for black and white binary images. (8)
  - (ii) Compare restoration with image enhancement. (8)

Or

- (b) (i) What is Weiner filtering approach? How this is used for image restoration? Describe. (8)
- (ii) What are the performance measures for ascertaining the adequacy of image restoration? (8)

14. (a) (i) How edge detection is performed in digital images using
- (1) Laplacian operator (2)
  - (2) Sobel operator and (2)
  - (3) Prewitt operator and compare their out comes. (2+2)
- (ii) Write morphological concepts applicable for image processing. (8)

Or

- (b) (i) What is meant by optimal thresholding? How do you obtain the threshold for image processing tasks? (8)
- (ii) Describe watershed segmentation algorithm and compare with region based approaches. (8)
15. (a) (i) Discuss the need for image compression. Perform Huffman algorithm for the following intensity distribution, for a  $64 \times 64$  image. Obtain the coding efficiency and compare with that of uniform length code. (8)

$$r_0 = 1008$$

$$r_1 = 320$$

$$r_2 = 456$$

$$r_3 = 686$$

$$r_4 = 803$$

$$r_5 = 105$$

$$r_6 = 417$$

$$r_7 = 301$$

- (ii) What is arithmetic coding? Illustrate. (8)

Or

- (b) (i) Explain the procedure for obtaining Run Length Coding (RLC). What are the advantages if any? (8)
- (ii) Write short notes on
- (1) Vector Quantization (4)
  - (2) JPEG Standard. (4)

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**Question Paper Code : 91419**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014

Seventh Semester

Electronics and Communication Engineering

EC 2401/EC 71/10144 EC 701 – WIRELESS COMMUNICATION

(Regulation 2008/2010)

(Common to PTEC 2401 – Wireless Communication for B.E. (Part-Time) Sixth Semester – ECE – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the different modules of a basic cellular system?
2. State advantages of CDMA over FDMA?
3. List the different types of propagation mechanisms.
4. What are the different fading effects due to Doppler Spread?
5. State advantages of Offset-QPSK.
6. List the advantages of GMSK.
7. List the different types of Channel coding techniques.
8. Differentiate between Macrodiversity and Microdiversity.
9. What are the effects of Multipath propagation on CDMA?
10. List some important features of 3G networks.

PART B — (5 × 16 = 80 marks)

11. (a) (i) With a block diagram of a basic cellular system, explain its various functional modules and the method by which a call is routed. (10)  
(ii) Explain in detail a handoff scenario at cell boundary. (6)

Or

- (b) (i) Explain the different types of Multipath propagation in wireless communication. (10)
- (ii) With neat illustration, explain CDMA. (6)
12. (a) (i) Explain briefly on outdoor propagation models. (8)
- (ii) Describe in detail Two Ray Rayleigh Fading Model. (8)
- Or
- (b) (i) Explain on path loss estimation techniques using path loss models. (8)
- (ii) Describe on Ricean distribution. (8)
13. (a) (i) Explain with neat constellation diagram the modulation technique of QPSK. (8)
- (ii) List the advantages and applications of BFSK. (8)
- Or
- (b) (i) Describe with a block diagram  $\pi/4$  Quadrature Phase Shift Keying and its advantages. (8)
- (ii) What is MSK? Explain its power spectral density. (8)
14. (a) (i) With a neat block diagram, explain the principle of Macrodiversity. (8)
- (ii) Explain the operation an adaptive equalizer at the receiver side. (8)
- Or
- (b) (i) Explain with a block diagram Maximal ratio combiner. (8)
- (ii) Describe on Polarization and Space Diversity. (8)
15. (a) Write short notes on the following :
- (i) Frequency Hopping and its advantages. (8)
- (ii) Orthogonal FDM (OFDM) (8)
- Or
- (b) Discuss in detail the 2G and 3G wireless network standards. Compare the relative merits and demerits of both the standards. (16)

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**Question Paper Code : 91388**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014

Eighth Semester

Electronics and Communication Engineering

EC 2047/EC 803/EC 1011/10144 ECE 38 – OPTO ELECTRONIC DEVICES

(Regulation 2008/2010)

(Common to PTEC 2047 – Opto electronic Devices For B.E. (Part-Time)  
Seventh Semester ECE – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State "Malus's" Law.
2. At 300K, the Conductivity of intrinsic Silicon is  $5 \times 10^{-4} \Omega^{-1}m^{-1}$ . If the electron and hole mobilities are 0.14 and  $0.05m^2V^{-1}s^{-1}$  respectively. What is the density of electron hole pairs?
3. Differentiate between characteristic and non characteristic energy level system in Phosphors.
4. Determine the Q of a laser cavity if its operating wavelength is  $1 \mu m$  and the line width is 1 MHz.
5. Photon detectors operating above  $3 \mu m$  wavelength must be cooled to 77 K - justify.
6. Define "Noise equivalent Power" of a photo detector.
7. What do you understand by "Ray velocity surfaces"?
8. List the processes that involve in optical detection in a MQW PIN diode.
9. How does Optical integration improves the performance of fiber Optic receivers?
10. Calculate the switching energy for a Mach Zender electro optic switch with  $C = 1pF$  and  $V_n = 1V$ .

PART B — (5 × 16 = 80 marks)

11. (a) (i) From the first principles, show that the fringe spacing in a Young's slits experiment is given by  $\delta Y = \lambda x / H$ . If the aperture to the screen distance is 1.5 m and the wavelength is 632.8 nm what slit separation is required to give a fringe spacing of 1.2 mm? (8)
- (ii) Explain the interference effects in thin films. (4)
- (iii) Brief about Fraunhofer diffraction. (4)

Or

- (b) Write a short note :
- (i) Diffraction
- (ii) Polarization
- (iii) Interference
- (iv) Various light sources
12. (a) (i) Illustrate the working of CRT screen. Also explain the principle of obtaining colour display in CRT, with relevant diagrams (10)
- (ii) Outline the mechanism of electroluminescence emission involving avalanche process. (6)

Or

- (b) (i) Discuss about the energy level diagram in the case of a heterojunction lasers and explain the method of obtaining population inversion. (10)
- (ii) Explain the construction and working of a stripe geometry laser diode. (6)
13. (a) (i) Explain the energy balance condition in a thermal detector element and obtain the expression for sensitivity. Also discuss the frequency dependence of detection in a Pyro electric detector. (12)
- (ii) Brief about the noise performance of a Photo diode. (4)

Or

- (b) (i) Derive the expression for frequency dependent responsivity of a photo diode detector. (8)
- (ii) Brief about the factors affecting the response time in photo diodes. (8)
14. (a) (i) Prove that the transmittance in the case of an electro optic modulator varies with applied voltage, with relevant equations. (10)
- (ii) Explain the structure of a longitudinal electro optic cell with necessary diagram. (6)

Or

- (b) (i) Explain the non linear phenomena in optical materials, which can be utilized for optical switching applications. (10)
- (ii) Discuss the structure of bipolar controller - modulator for optical logic applications. (6)
- 15. (a) (i) Elaborate the various approaches for realizing Opto Electronic Integrated circuits. (8)
- (ii) Discuss any two applications of opto electronic integrated circuits. (8)

Or

- (b) (i) Enumerate with neat diagram, the construction and operation of an InP based front end photo receiver. (12)
- (ii) Brief about the photo receiver Noise considerations. (4)



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**Question Paper Code : 61215**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Eighth Semester

Electronics and Communication Engineering

EC 1451 — MOBILE AND WIRELESS COMMUNICATION

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Doppler Effect.
2. Binary phase-shift keying (BPSK) modulation transmits the signal  $s_1(t) = \alpha \cos(2\pi f_c t)$ ,  $0 \leq t \leq T$ , to send a 1-bit and the signal  $s_2(t) = -\alpha \cos(2\pi f_c t)$ ,  $0 \leq t \leq T$ , to send a 0-bit. Find the set of ortho-normal basis functions and coefficients  $\{s_{ij}\}$  for this modulation.
3. Consider a wireless LAN operating in a factory near a conveyor belt, the transmitter and receiver have a LOS path between them with gain  $\alpha_0$ , phase  $\beta_0$ , and delay  $T_0$ . Every  $T_0$  secs, a metal item comes down the conveyor belt, creating an additional reflected signal path with gain  $\alpha_1$ , phase  $\beta_2$ , and delay  $T_1$ , phase and delay. Find the time-varying impulse response  $c(T, t)$  of this channel.
4. State the difference between IPV4 and IPV6.
5. Compare ad-hoc network with sensor network in terms of data handling capability.
6. List out the salient features of location based routing protocols.
7. Mobile computing need to be energy aware – why?
8. Write down the steps involved in data forwarding in mobile IP.
9. Compare GloMoSim with NS2 simulator.
10. What are the special features available in Opnet simulator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the system model of Direct Sequence Spread Spectrum with relevant diagram. (10)  
(ii) Discuss the function of rake receiver with a neat sketch. (6)

Or

- (b) (i) Explain the system model of Frequency Hopping spread Spectrum with relevant diagram. (10)  
(ii) Compare the various multiple access mechanism used in mobile communication. (6)

12. (a) Compare and contrast the scheduled based MAC with Contention based MAC detailing with any two protocol for each category. (16)

Or

- (b) Discuss the various issues and challenges involved in 3G networks also enumerate the mechanisms adopted in CDMA 2000 to overcome these problems. (16)

13. (a) Describe the working mechanisms of DSR and AODV routing protocol with suitable network scenario and also compare their performance in terms of network parameter. (16)

Or

- (b) Describe the working mechanisms of group mobility and Point mobility with suitable network scenario and also compare their performance in terms of network parameter. (16)

14. (a) Present your understanding on IP packet delivery, Agent discovery, registration, tunneling and encapsulation related to Mobile IP. (16)

Or

- (b) Mobile Networks face several threats; hence security aspects need more attention. Discuss the various mechanisms available to tackle these problems in mobile networks. (16)

15. (a) With neat sketch, explain the architecture of IP based cellular network and compare 3G with 2G cellular networks. (16)

Or

- (b) (i) Write down the syntax of NS 2 to create 5 nodes and formulate mesh topology with these nodes by setting up the essential link parameters. (8)

- (ii) Discuss key aspects involved in evaluating routing and transport protocol of mobile networks. (8)



12. (a) Perform encryption and decryption using the RSA algorithm for  $p = 5$ ;  $q = 11$ ;  $e = 3$  and  $M = 9$ .

Or

(b) Discuss briefly about authentication protocols.

13. (a) Write about Kerberos.

Or

(b) Discuss about ESP in detail.

14. (a) Explain about intrusion detection in detail.

Or

(b) Discuss about fire wall.

15. (a) Discuss about wireless LAN security standards.

Or

(b) Describe about wireless LAN security factors and issues.

