

CBCS SCHEME

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21EC71

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Advanced VLSI

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain ASIC design flow with neat flow chart. (10 Marks)
- b. Explain Booth Encoding multiplier with an example. (10 Marks)

OR

- 2 a. Describe different cell compilers and I/O cells. (10 Marks)
- b. With a neat diagram, explain the operation of conditional sum adder. Mention its advantages and disadvantages. (10 Marks)

Module-2

- 3 a. Explain the concept of measurement of delay in Floorplanning. (10 Marks)
- b. Explain the following : (10 Marks)
 - i) Power planning
 - ii) Clock planning

OR

- 4 a. Write an algorithm for iterative placement improvement method and explain briefly. (10 Marks)
- c. Explain the goals and objectives of global routing in detail. (10 Marks)

Module-3

- 5 a. Explain factors in randomizing the stimulus to a design. (10 Marks)
- b. Draw the diagram of layered test bench of system verilog and describe the function of each layer. (10 Marks)

OR

- 6 a. Describe the various array methods with an example. (08 Marks)
- b. Describe type def and enumerated data types with example. (06 Marks)
- c. Explain constant and strings in system verilog with example. (06 Marks)

Module-4

- 7 a. Explain Tasks, functions and void function in system verilog. (06 Marks)
- b. How time values are specified in system verilog, describe with example. (06 Marks)
- c. Explain automatic storage and variable initialization with system verilog program example. (08 Marks)

OR

- 8 a. Describe the communication between the test bench and DUT with suitable diagram and system verilog program. (10 Marks)
- b. Explain different types of system verilog assertions with example. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-5

- 9 a. Explain common randomization problems in brief. (10 Marks)
b. Write any 4 Random Number functions with an example. (04 Marks)
c. Explain Pseudorandom Number Generators (PRNG) in system verilog. (06 Marks)
- OR**
- 10 a. What is coverage? Explain coverage types in system verilog. (10 Marks)
b. Describe various coverage options with an example. (10 Marks)

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21EC72

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Optical and Wireless Communication

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Briefly explain with a neat figure the propagation mechanism of meridional rays in an ideal step index optical waveguide. (08 Marks)
- b. Define the term attenuation in optical fibers. Explain the different attenuation mechanisms in optical fibers. (12 Marks)

OR

- 2 a. Define Dispersion. Briefly explain intermodal and intramodal dispersion effects in optical waveguide. (10 Marks)
- b. With neat figures, discuss the structure of single mode and multimode step-index and graded index optical fibers. (06 Marks)
- c. A multimode fiber has a core refractive index of 1.480 and a core cladding index difference of 2.0 percent. Find the numerical aperture and critical angle at the core cladding interface. (04 Marks)

Module-2

- 3 a. What are the characteristic requirements of an optical source? With the help of neat diagram, explain the constructional features and emission pattern of surface emitting LED. (10 Marks)
- b. Define optical isolator. With a neat figure, explain the design and operation of a polarization independent isolator. (06 Marks)
- c. A given silicon avalanche photodiode has a quantum efficiency of 65 percent at a wavelength of 900 nm. If 0.5 μW of optical power produces a multiplied photocurrent of 10 μA . What is the multiplication M? (04 Marks)

OR

- 4 a. Discuss the operation of pin photodiode with a neat circuit and energy band diagram. (10 Marks)
- b. What is Diffraction gratings? Discuss briefly Diffraction grating techniques. (10 Marks)

Module-3

- 5 a. Explain briefly the different propagation mechanisms that influence the signal propagation in a mobile communication environment. (10 Marks)
- b. A cellular communication service area is covered with 12 clusters having 7 cells in each cluster and 16 channels assigned in each cell. Find the number of channels per cluster and the system capacity. (03 Marks)
- c. Explain how the concept of frequency reuse increases the spectrum efficiency that in turn increases the cellular communication system capacity. (07 Marks)

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OR

- 6 a. Briefly discuss the generations of wireless communication network technology. (08 Marks)
b. Discuss the effects of co-channel interference in wireless communication in reducing the system capacity. (05 Marks)
c. Discuss the concept of multipath fading in mobile communication system. (07 Marks)

Module-4

- 7 a. With a neat block diagram, explain the operation of basic TDMA link. (10 Marks)
b. Explain the basic cellular system with necessary block diagram. (10 Marks)

OR

- 8 a. Discuss with a neat figure the call processing in a cellular system for mobile-originated calls. (12 Marks)
b. List the advantages of CDMA over TDMA and FDMA. (08 Marks)

Module-5

- 9 a. What is Hand off in GSM networks? Explain briefly the different handoff procedure in GSM. (10 Marks)
b. Explain the functions of data bases HLR and VLR at MSC in GSM network architecture and also explain how it is helpful in location updation in GSM networks. (10 Marks)

OR

- 10 a. Briefly explain the three major subsystems in GSM network architecture with a neat block diagram. (10 Marks)
b. Explain briefly the following identifiers in GSM system:
(i) SIM
(ii) Mobile system ISDN with frame format
(iii) Location Area Identify (10 Marks)

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21EC732

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With neat diagram explain Single image sensor, how it can be used in Sensor Strip and Sensor Array. (08 Marks)
- b. Explain basic concept of Sampling and Quantization with reference to Digital Image. (07 Marks)
- c. Calculate the photon energy for visible light for given wavelength range 400 nm to 750 nm. [Plank's constant, $h = 6.63 \times 10^{-34}$ Js, $C = 3 \times 10^8$ m/s] (05 Marks)

OR

- 2 a. Explain the Brightness Adaption and Discrimination. (07 Marks)
- b. Explain the Neighbour pixel basic relationship in Digital Images with adjacency connectivity, Regions and Boundaries. (08 Marks)
- c. Given two pixels P and Q with coordinate positions $(-2, -2)$ and $(3, 4)$ respectively, calculate the distance measure D_e, D_4, D_8 . (05 Marks)

Module-2

- 3 a. Define 2-D orthogonal and unitary transform. (06 Marks)
- b. For given orthogonal matrix A and an image u obtain unitary transform. (08 Marks)
- c. Define the properties of unitary transform. (06 Marks)

OR

- 4 a. Define 2-D DFT and its properties. (06 Marks)
- b. Define cosine transform and its properties. (06 Marks)
- c. Calculate Haar transform for $N = 4$

$$\text{Given Haar function } H_a(z) = \frac{1}{\sqrt{N}} \begin{cases} +2^{p/2}, & \frac{q-1}{2^p} \leq z < \frac{q-0.5}{2^p} \\ -2^{p/2}, & \frac{q-0.5}{2^p} \leq z < \frac{q}{2^p} \\ 0, & \text{else} \end{cases}$$

$$n = \log_2 N$$

$$p = 0 \text{ to } n - 1$$

$$q \text{ range between } 1 \leq q \leq 2^p$$

$$k = 2^p + q - 1$$

$$z = 0, 1/4, 2/4, 3/4$$

(08 Marks)

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Module-3

- 5 a. With necessary graph and equation explain
 i) Image Negative
 ii) Power law transformation
 iii) Intensity level slicing (06 Marks)
- b. Compute Histogram equalization for given data:

Table 5(b)

r_k	0	1	2	3	4	5	6	7
n_k	790	1023	850	656	329	245	122	81

- for 3 bit image ($L = 8$) of size 64×64 pixels ($MN = 4096$) with intensity distribution shown in Table 5(b). Intensity level are integer in range $[0, L-1] = [0, 7]$ (08 Marks)
- c. With an example for 2-bit image of size 5×5 define the sample mean, sample variance with equation. (06 Marks)

OR

- 6 a. Explain with example fundamentals of Spatial Filtering for spatial correlation and convolution for 1-D and 2-D filter. (08 Marks)
- b. Using 1st order derivative Image Sharpening (the Gradient) define:
 i) Robert's cross gradient operation
 ii) Sobel's operators (for 3×3 region) (06 Marks)
- c. Define smoothing spatial filters with brief note:
 i) Linear Filters
 ii) Order Statistic Filter (06 Marks)

Module-4

- 7 a. With neat block diagram of Homomorphic system, derive Homomorphic filtering approach for Image Enhancement. (08 Marks)
- b. Define sharpening of images in frequency domain using
 i) Ideal High Pass Filter
 ii) Butterworth High Pass Filter
 iii) Gaussian High Pass Filter (06 Marks)
- c. Give Frequency domain filtering necessary steps followed. (06 Marks)

OR

- 8 a. Define pseudo color image processing with intensity slicing and intensity to color transformation. (06 Marks)
- b. Based on Hardware oriented models classify different color model given color conversion for RGB to HIS and vice versa with relevant equation. (08 Marks)
- c. With color fundamentals for primary and secondary colors. (06 Marks)

Module-5

- 9 a. Write brief note on restoration in presence of only noise using
 i) Mean filter ii) Order statistic filter iii) Adaptive filter (08 Marks)
- b. Discuss some of the important noise probability density functions. (06 Marks)
- c. With help of block diagram give details of Degradation / Restoration process. (06 Marks)

OR

- 10 a. In digital images discuss about Inverse Filtering. (06 Marks)
- b. Explain minimum mean square error (Wiener Filter) in Digital Image Processing. (08 Marks)
- c. Discuss periodic noise reduction by frequency domain filtering. (06 Marks)

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Network Security

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Discuss the four principles of security in detail. (10 Marks)
- b. What are the 2 types of security attacks? Explain Passive attacks in detail along with classification. (10 Marks)

OR

- 2 a. Write short notes on virus, worms and cookies. (08 Marks)
- b. What is packet spoofing? Mention its three possible cases. (06 Marks)
- c. Explain sniffing and phishing attacks. (06 Marks)

Module-2

- 3 a. Explain the parameters that define the session state and connection state in the secure socket layer. (08 Marks)
- b. Mention the types of security threats faced when using the web. (08 Marks)
- c. With the help of diagram, explain the alert protocol and its operation. (04 Marks)

OR

- 4 a. With suitable diagram, explain how the Message Authentication Code (MAC) is calculated and the generation of pseudorandom function in transport layer security. (10 Marks)
- b. Explain the connection initiation and closure of HTTPs in detail. (10 Marks)

Module-3

- 5 a. Explain the transport and tunnel modes in IP security. (10 Marks)
- b. Mention the applications and benefits of IP security. (10 Marks)

OR

- 6 a. Illustrate the working of basic combinations of security associations. (10 Marks)
- b. Explain the Internet key Exchange process using Diffie-Hellman algorithm. (10 Marks)

Module-4

- 7 a. Explain the 3 classes of intruders with examples and explain the intruder behavior patterns. (10 Marks)
- b. Explain the types of malicious software in detail. (10 Marks)

OR

- 8 a. Describe the generations of antivirus software. (10 Marks)
b. With neat diagram, explain the digital immune system approach of virus protection. (10 Marks)

Module-5

- 9 a. What are the capabilities and limitations of firewall? (10 Marks)
b. What are the different types of firewall? With a neat diagram, describe the working of packet filtering firewall. (10 Marks)

OR

- 10 a. With neat diagram, explain the distributed firewall configuration. (08 Marks)
b. Discuss the characteristics of Bastion host. Explain the host based and personal firewalls. (12 Marks)

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